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1ST INTERNATIONAL CONGRESS ON PHYSIOTECHNOTHERAPY (ICPTT)

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Journal of Exercise Therapy and Rehabilitation. 2018;Sup (2)

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WELCOME TO ICPTT 2018,

On the behalf of Marmara University Faculty of Health Sciences, Department of Physiotherapy, I am pleased to invite you to participate in a four-day meeting to discuss novel technology and telecommunication in physiotherapy and rehabilitation. With the revolution of the Industry 4.0 nowadays technological developments are healthcare is accelerated. Objective physiotherapy assessment, monitoring and rehabilitation technologies are the important elements of novel healthcare systems. Main topics with theme 'rehabilitation' are mobile-health, tele rehabilitation, virtual rehabilitation, wearable technology, sensory systems, assistive technology, robotic rehabilitation, 3D printing, imaging technologies etc. We aimed to bring experts from different fields (physiotherapist, mechatronics/mechanics engineers, industrial designer, etc) for the first time to organize more effective and useful use of technological developments in rehabilitation. We are happy to welcome you at Bosnia Herzegovina, sister city of Sarajevo with İstanbul. We will take great pleasure in welcoming physiotherapists, engineers, medical doctors, researchers, health professionals and health institutes, biomedical companies to **1st International Congress on Physiotechnotherapy (ICPTT)** and hope that their stay in Sarajevo will be informative, educational and, last but not least, enjoyable.

Kind Regards,

Assoc. Prof. Dr. Zübeyir Sarı

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IS THERE A TIME DIFFERENCE BETWEEN ONSETS OF LATERAL AND MEDIAL HAMSTRING MUSCLES DURING GAIT IN PATIENTS WITH PATELLOFEMORAL PAIN COMPARING TO HEALTHY SUBJECTS?

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Abstract:

Purpose: Early activation of lateral hamstrings (LH) in respect of medial hamstrings (MH) may cause abnormal knee abduction and external rotation of the tibia which affect the orinetation of patellar tendon.and causes an increase lateral patellofemoral compression. The aim of this study is to compare the time difference between MH and LH onsets in patients with PFP and asymptomatic subjects.

Methods: 15 patients who were diagnosed with PFP (age 28.73±7.44, height 169.73±7.09, weight 67.47±14.31) and 15 asymptomatic subjects (age 30.47±6.22, height 167.87±7.81, weight 67.87±13.48) were recruited in the study. The inclusion criteria for PFP subjects was presence of the anterior and retropatellar pain for minimum 6 weeks scaled as 3 in accordance with Numeric Analog Scale during at least two of the following activities: stair descending, ascending, squatting, prolonged sitting, jumping, sitting on the knees. Surface EMG (TELEEMG, BTS, Milan, Italy) with built in x10 amplifications, 10-450 Hz bandpass and sampling rate of 1000 Hz were used for recording of MH and LH muscle activities during walking at normal walking speed. “Paired sample t-test” was used for statistical analysis.

Results: LH activation started before MH in both groups. Time delay between LH and MH in PFP and control groups were 21.89±20.06ms and 21.18±29.8ms respectively. The differences between groups were statistically not significant (p>0,05).

Conclusions: Further studies are neseccary to evaluate onset timing differences in more severely affected patients with PFP and with dynamic activities which needs more demanding muscle activities such as landing.

Keywords: Surface EMG, Medial And Lateral Hamstring Muscles, Patellofemoral Pain

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BASIC ELEMENTS AND METHODOLOGY IN RESEARCH AND DEVELOPMENT OF THE ASSISTIVE REHABILITATION TECHNOLOGIES

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Abstract:
Purpose: It seems that assistive rehabilitation technologies have begun commercialization after 2000 years. This process began after the research and development studies reached a certain level. Proper configuration of the research and development infrastructure in this area is extremely important. Because today's knowledge is tomorrow's technology.
The aim of this study is to address the basic elements and methodology of the research and development work in the area of assistive rehabilitation technologies and to present a methodology in terms of the engineering point of view. In this way, it is aimed to support researchers and experts who want to work in this area.
Methods: Important elements of research and development work for assistive rehabilitation technologies are Team, theoretical background, cooperation, machinery and equipment, project support and dissemination.
Team: Assistive rehabilitation systems (ARS) are systems that deal with electrical-electronics, computer, and mechanical engineering. In addition, the development of these technologies requires knowledge, guidance, and approval of specialists (such as doctors and physiotherapists) working in the field of rehabilitation. Therefore, in the development of an ARS, it is necessary for the experts and engineers working in these fields to work jointly.
Theoretical background: In the development of ARS technologies, issues such as human physiology, anatomy, neural structure, etc. are needed. In addition to this, the following subjects are foregrounded from different engineering branches: Mechanism technique, robotics, system dynamics, control, signal processing, artificial intelligence, algorithm and coding, actuators and sensors, statistics, numerical analysis. For this reason, the research team needs to have good knowledge of the related subjects.
Collaborations: Target group and their problems should be determined correctly before developed of an ARS. For that reason, a close cooperation is needed between the person who needs rehabilitation and the institutions in which they are in contact.
Machinery and equipment: Research laboratories are the primary areas in which ARS technologies are developed and tested. For this reason, the fact that these laboratories have a good infrastructure will lead to an efficient progress of these studies.
Project support: The indispensable part of a research project is project support and we can say, “research is budget”. In this way, EU, TUBITAK, Development agency, university research projects local supports can be used.
Dissemination: It is also important that the research studies and their findings are promoted and shared by experts of researchers working in this area and the public. In this respect, the findings from research should be published through websites, conferences, workshops, seminars, and scientific publications. In this way, it will be possible to open various fields to develop different collaborations, products, and new technologies. Ultimately, these technologies will both become easier and faster to reach the target group.
Results: Human resources, interdisciplinary work, machinery and equipment, relations with different institutions, collaborations, project supports, and dissemination is important for developing of an ARS. In this way:
a. It will be provided that system reaches the end user.
b. The environment for the development of new technologies will be provided.
c. Significant gains will be achieved in the social and economic sense.
Conclusions: In this study, the elements of research and development of ARS are explained and presented in a methodological way in order to support researchers and experts who want to work in this area. Accordingly, it has been revealed that it should be focused on following issues for effective, rapid and accurate research and development: team, cooperation, project support, theoretical background, dissemination, machinery, and equipment.

Keywords: Assistive Technologies, Research And Development

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THE IMMEDIATE EFFECTS OF MUSCLE ENERGY TECHNIQUE ON POSTERIOR SHOULDER TIGHTNESS FOR IMPROVING RANGE OF MOTION AND ISOKINETIC PERFORMANCE IN VOLLEYBALL PLAYERS

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Abstract:
Purpose: The purpose of the present study was to investigate acute effects of muscle energy technique (MET) for the posterior shoulder on glenohumeral joint (GHJ) range of motion (ROM) and isokinetic peak torque values of GHJ rotators.
Methods: The study was designed as double blinded randomized controlled trial. 18 male volleyball players volunteered to participate. All participants attended both, muscle energy technique trial for the glenohumeral joint horizontal abductors and sham trial. Pre-intervention and post-intervention internal rotation and external rotation ROM and GHJ rotators isokinetic peak tork values were measured. Repeated measures one-way ANOVA and Bonferroni correction were used for analyzing the differences in the ROM and isokinetic parameters among the trials. Significance was defined as $p \leq 0.05$.
Results: The experimental group had a significantly greater increase in GHJ internal rotation ROM post intervention compared to control group (p=.005). No significant difference among experimental group and control group were found for external rotation ROM (p>.05). However, a significant increase between the control/experimental and sham trials were found for external rotation ROM post intervention (p=.005). Besides, 60o internal rotator (p=.001) and external rotator (p=.008), and 180o internal rotator (p=.019) and external rotator (p=.049) peak torque values showed significant increase between the experimental and control/sham trials.
Conclusions: A single application of an MET for the posterior shoulder provides immediate improvement in GHJ internal rotation ROM and isokinetic peak torque values of both GHJ internal and external rotators in asymptomatic volleyball players.

Keywords: Volleyball, Manual Therapy, Muscle Strength, Glenohumeral Joint

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EFFECTS OF DIFFERENT EXERCISE APPLICATIONS ON FEMORAL CARTILAGE THICKNESS ULTRASONOGRAPHY IN KNEE OSTEOARTHRITIS

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Abstract:
Purpose: Evaluate the effects of different exercises on femoral cartilage thickness in patients diagnosed with osteoarthritis of the knee using ultrasonography.
Methods: There were three groups as isometric, isotonic and isokinetic. The study included 60 patients of ages between 45 and 65 diagnosed with primary osteoarthritis of the knee. Exercise program was applied for 3 weeks, 5 days a week. Femoral cartilage thickness was assessed with ultrasonography, and muscle strength was assessed with isokinetic dynamometer before and after treatment in all patients.
Results: There were statistically significant improvement for pain (VAS), WOMAC pain, stiffness and physical function scores in all groups ($p<0.05$). Significant increases were found in muscle strength measurements in extensor and flexor muscles in both knees in the isokinetic exercise group in the 60°/sec and 180°/sec angular velocities ($p<0.05$). A statistically significant increase was detected in the extensor and flexor peak torque values of only the left knee in the isotonic exercise group at 60°/sec ($p<0.05$). In the femoral cartilage thickness measured using USG, significant increases were found in the measurements of left knee intercondylar area and lateral femoral condyle in the isokinetic group and the measurements of right knee intercondylar area in the isometric group ($p<0.05$). A statistically significant decrease was observed in the right knee medial condyle in the isokinetic exercise group ($p<0.05$).
Conclusions: Isokinetic exercise is functionally superior to isometric and isotonic exercises, and it provides more significant improvements in muscle strength measurements and femoral cartilage thickness.

Keywords: Exercise, Femoral Cartilage Thickness, Knee, Osteoarthritis, Ultrasonography

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ROBOT-ASSISTED PHYSIOTHERAPY OF UPPER EXTREMITY – A LITERATURE REVIEW

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Abstract:
Purpose: Recent studies demonstrated that robot-assisted rehabilitation programmes are one of the most used technology-based modalities in upper extremity rehabilitation. The aim of this review is to evaluate the effectiveness of robotic types and their aims of usage in upper extremity motor control and functional ability.
Methods: A research was conducted in the electronic bibliographic databases Cochrane, CIRRIE, and PubMed. Search terms included 3 themes: (1) robotics; (2) robot-assisted therapy; (3) upper extremity. Relevant randomized controlled trials which have been published in last 10 years were identified.
Results: 13 RCTs were included. Studies showed the robots used in upper extremity robotic rehabilitation, have passive, active or interactive systems. The types of those robots are planar, end effector or exoskeleton. The exoskeleton and interactive robots were found more effective on upper extremity motor control and functional abilities ($p<0.05$). Robotic rehabilitation which was last more than 4 weeks, has been shown more successful outcomes than conventional therapy ($p<0.05$). In addition, according to the patients the usage of robotics in rehabilitation programmes were motivational.
Conclusions: Preliminary evidence suggests robot-assisted interventions have positive effects on upper extremity rehabilitation. On the other hand, it has been seen that high evidence level RCT's were insufficient in defining the factors that potentially effects outcomes of the treatment. Future research in robot-assisted upper extremity rehabilitation is needed to determine optimal intrinsic and extrinsic factors that potentially effects the outcomes as well as effectiveness.

Keywords: Upper Extremity, Robotics, Robot-Assisted Therapy

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THE EFFECT OF THE CONNECTIVE TISSUE MASSAGE ON AUTONOMIC FUNCTIONS OF THE HEMIPLEGIC PATIENTS

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Abstract:
Purpose: The aim of this study is to investigate the effects of connective tissue massage (CTM) on hand temperature and autonomic dysfunctions (i.e. orthostatic hypertension, vasomotor changes, diearrhea, neurogenic bladder, sexual dysfunctions) of patients with hemiplegia.
Methods: Forty patients with hemiplegia were included in this study. All participants were divided randomly into two groups, namely, experimental and control groups. The inclusion criteria were as follows: stable systemic condition, patients diagnosed with autonomic dysfunction according to R-R interval variation and autonomic dysfunction questionnaires. CTM was applied for 15 minutes, every day for a total of 10 sessions.
Results: Among the CTM, and control groups, there were statistically significant differences regarding the changes in sphincter dysfunction and gastroparesis ($p<0.05$). However, there was no statistically significance between the groups in terms of hand temperature ($p>0.05$).
Conclusions: This study is the first randomized controlled trial investigating the effects of CTM on hand temperature and autonomic dysfunctions in patients with hemiplegia. Although we found that CTM has no effect on hemiplegic hand temperature, CTM has significant effects on some autonomic dysfunction symptoms. In further studies with a larger sample size and a long-term follow-up should be planned to investigate the effects of CTM on patients with hemiplegia.

Keywords: Stroke, Connective Tissue, Gastroparesis

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THE EFFECT OF TAPING ON FUNCTIONALITY WITH STATIC AND DYNAMIC BALANCE IN USERS OF HIGH-HEELED SHOES

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Abstract:
Purpose: We planned to study with Kinesio taping (KT) which can be used to overcome these negative, to determine immediate effect on functionality with static and dynamic balance in healthy young people using heeled shoes.
Methods: Thirty healthy female students who used heel shoes between ages of 18-24 were included in study. Static and dynamic balance assessed with Techno Body Postural Line; functionality assessed with vertical jump, functional reach and 6-min walk test. Individuals were randomly divided into 2 groups of 15 subjects. Study group was taped medially, laterally and dorsally with KT, no application was made to control group.
Results: The mean age was calculated as 20.33 ± 1.83 years in control group and 20.20 ± 0.94 in study group. Usability of high heels was 8.4±2.47 hours per day, 4.73±1.53 days per week, 4.2±2.3 years in the study group while 7.3±2.55 hours per day, 3.73±1.03 days per week, 3.73±2.15 years in control group.
There were an increase in functional reach, 6-minute walking and vertical jump distance but no statistical difference after KT in study group ($p>0.05$).
There was significant difference between control and study groups in open-eyed stabilometric test and disequilibrium test evaluating dynamic equilibrium ($p<0.05$). We found significant difference in right one-foot balance, left one-foot balance and disequilibrium test after KT ($p<0.05$).
Conclusions: It has been shown that kinesiological taping can be effective in preventing and treating balance and functional problems associated with use of high heels but there is a need for long-term and more number of case studies.

Keywords: Shoes, Balance, Kinesio Tape

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IMMEDIATE EFFECT OF KINESIOLOGIC TAPING APPLIED TO BILATERAL QUADRICEPS FEMORIS AND GASTROCNEMIUS ON VERTICAL JUMP PERFORMANCE IN SOCCER PLAYERS

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Abstract:
Purpose: The aim was to investigate the effect of kinesiologic taping applied to bilateral quadriceps femoris and gastrocnemius muscles of soccer players by functional correction technique on vertical jump performance.
Methods: This research was conducted with 20 healthy licensed soccer players aged 18-23. The participants' vertical jump performance was measured by the "Smartjump Jump Training System". The data were recorded in jump height (cm). The kinesiological elastic tape was applied to the bilateral quadriceps femoris and gastrocnemius muscles by functional correction technique. The measurements were carried out four times in succession in the same order: (1) without taping, (2) bilaterally tapping the gastrocnemius muscle, (3) bilaterally tapping the gastrocnemius and quadriceps femoris muscles, and (4) removing all kinesiologic tapes. The "Repeated Measures ANOVA" test was used to compare the data obtained.
Results: The mean age of the participants was 18.94±1.43 years, the mean length was 170,07±5,41 cm and the mean body weight was 67,66±6,07 kg. There was no difference in vertical jump heights between the four measurements with tape and without tape ($F=1,141$, $p>0,05$). The difference in mean values was not statistically significant ($p=0.581$), although the greatest difference was between the first tapeless measurement (37.54±6.21) and the last tapeless measurement (38.59±6.18).
Conclusions: There was no immediate effect of kinesiologic taping applied to the quadriceps femoris and gastrocnemius muscles by functional correction technique on vertical jump performance in soccer players. Further researches should investigate the long-term effects of kinesiologic banding on a larger sample.

Keywords: Kinesiology Taping, Performance, Soccer

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IS ARM SWING AN EFFECTIVE FACTOR FOR GROUND REACTION FORCES AT JUVENILE İDIOPATHIC ARTHRITIS WITH AFFECTED UPPER EXTREMITY?: A CASE STUDY

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Abstract:
Purpose: To investigate how does change ground reaction forces during walking at children with juvenile idiopathic arthtiris (JIA) which affected only one upper limb.
Methods: The patient was 9 year-old-child and diagnosed with JIA for 2 months. The patient had JIA-induced impairment in the left hand wrist. For the ground reaction forces (GRF), the Mat-Scan system (Tekscan Inc. Mass. USA) was utilized. GRF was analysed when the patient walking at self selected speed. Also video recording was performed to see patients's arm swing during walking. The first and the second peak forces which occured heel strike and toe off respectively (F1, F2 (kg/cm2), the times that occured this forces (t1 and t2 (sec)), stance times (t stance (sec)) and maximum forces (F max (kg/cm2)) were the interested parameters (1).
Results: Fmax (51,54 kg/cm2), F1 (51,54 kg/cm2), tstance (0,71 sec) and t2 (0,52 sec) was higher at the affected side than non-affected side (49,99 kg/cm2, 49,34 kg/cm2, 0,70 sec, 0,46 sec, respectively). Mean values of the parameters were given at Table 1.
Conclusions: The maximum ground reaction forces and the stance duration at the affected side are higher than the unaffected side. The patient was transferring and weight more on the affected side thus, maintain the balance (2). Also increased GRF in the heel strike at affected side. Applying more GRF to the affected side during heel strike can affect energy efficiency in walking (3).
1. Kim, 2015 2. Demur, 2010 3. Bruijn, 2010

Keywords: Foot Pressure Analysis, Juvenile Idiopathic Arthritis

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INVESTIGATION OF THE RELATIONSHIP BETWEEN ARM SWING AND GROUND REACTION FORCES DURING WALKING: A CORELATION STUDY

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Abstract:
Purpose: To investigate the relationship between arm swing and ground reaction forces that occur during restricted arm swing during walking.
Methods: Twenty-seven healthy volunteers included the study (av. age: 22.59 ± 1.04). For the ground reaction forces (GRF), the Mat-Scan system (Tekscan Inc. Mass. USA) was utilized. GRF was analysed for 3 walking conditions at self selected speed; 1- both arms freely swing (FS), 2- the dominant arm swing was restricted and 3- The dominant arm was held by an arm sling (H). The first and the second peak forces (F1, F2 (kg/cm2), stance times (tstance (sec)) and maximum forces (Fmax (kg/cm2)) of dominant side foot were the interested parameters (3). After the normality test, Spearman rho's was used for the correlation. ($p < 0.05$)
Results: There was very strong corelation between the case of freely swing and restricted arm swing for Fmax (rho: 0,94) F1 (rho: 0,95) and F2 (rho: 0,91) and strong between the case of freely swing and restricted arm swing for tstance (rho: 0,79) (Table 1). Also, very strong corelation between the case of freely swing and held arm swing for Fmax (rho: 0,92) and F1 (rho: 0,93) was found. ($p < 0.05$)
Conclusions: The ground reaction forces and the duration of the stance phase have changed on the restricted side, depending on the state of the arm swing during walking. This may be related to increased plantar flexion momentum and energy expenditure.

Keywords: Ground Reaction Force, Arm Swing, Pedobarography

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CORRELATION OF BALANCE AND COORDINATION OF BODY COMPOSITION AND PHYSICAL ACTIVITY LEVELS IN HEALTHY YOUNG INDIVIDUALS

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Abstract:

Purpose: Aim of this study is investigate the relationship between balance and coordination of body composition and physical activity level.

Methods: Thirty healthy individuals between 18 and 25 years of age were included in the study. The TANITA Body Analyzer was used for body composition measurements. International Physical Activity Level Questionnaire was applied. Skinfold measurements were taken from the 9 different points. The static and dynamic balance was evaluated with the SportKAT balance device and the Star Excursion Test was applied.

Results: There was a positive correlation between physical activity level and balance-coordination measures ($p < 0.05$). There was no statistically significant relationship between body mass index and body fat ratio with balance-coordination measures ($p > 0.05$). When the relationship was investigated between regional fat ratio and SportKAT balance score, it was found that the static balance worsened when fatness increased in chest, abdominal and midaxillary regions ($p < 0,05$). There was no statistically significant relationship between body fat measurement results with dynamic balance results ($p > 0.05$).

Conclusions: According to the results of our study; the level of physical activity should be increased and to reduce the amount of fat in the body should be reduced to improve balance and coordination in young people.

Keywords: Physical Activity, Balance, Coordination, Body Composition

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THE RELATIONSHIP BETWEEN SMARTPHONE, INTERNET ADDICTION AND MUSCULOSKELETAL PROBLEMS

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Abstract:
Purpose: Smartphones and the Internet have become essential technologies in our daily lives. Technology can facilitate many things in life, but at the same time, it can have adverse effects. The purpose of the recent study was to investigate the relationship between mobile phones, Internet addiction and musculoskeletal problems.
Methods: A study was conducted with 178 university students. A Turkish version of the short form smartphone addiction scale (SAS-SF), with a score range of 10-60 points, a Turkish version of Young's Internet Addiction Test-Short Form YIAT-SF, with a score range of 10–72, and a Turkish version of the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) were applied. Data were analysed by descriptive statistics, Kolmogorov-Smirnov, Mann-Whitney U and a Spearman correlation test. The significance level was accepted as 0.05.
Results: The mean age was 20.04±1.74 years. The mean of SDS-SF was 31.72±11.21 points. The mean of YIAT-SF was 28.41±8 points. The mean of CMDQ was 51.50±91.28 points. There were significant correlations between SDS-SF and global CMDQ scores (correlation coefficient (cc)=0.29, p= 0.000). There were significant correlations between YIAT-SF and global CMDQ scores (cc=0.18 p=0.019).
Conclusions: Smartphone and Internet addiction were associated with musculoskeletal problems. These dependencies could be associated with a combination of poor posture, inactivity habits and stress levels. The authors believe that poor posture and inactivity are mechanical factors in the increasing number of musculoskeletal problems.

Keywords: Addictive Behavior,Musculoskeletal Pain,Posture

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THE INTER AND INTRAOBSERVER RELIABILITY OF MUSCULOSKELETAL ULTRASOUND ASSESSMENT OF ANTERIOR TALOFIBULAR LIGAMENT & ANKLE MUSCLES

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Abstract:
Purpose: Although function of subjects with chronic ankle instability (CAI) has been examined, structural analysis by Musculoskeletal Ultrasound (MSUS) imaging of ligaments and muscles surrounding the ankle is limited. The aim of this study was to investigate the inter-intraobserver reliability of measuring characteristics of selected ankle structures in healthy subjects.
Methods: Eleven healthy participants were assessed by two observers (an experienced sonographer and inexperienced certificated operator). Ultrasound images were collected of the ATFL in two positions (neutral and stressed) to examine length. Images of four ankle muscles (gastrocnemius medialis (GM), tibialis anterior (TA), Peroneus Longus (PL) and Peroneus Brevis (PB) were collected. Thickness was measured for TA and GM, whilst thickness and cross sectional area (CSA) were measured for the PL and PB. One observer repeated the measurements a week later. ImageJ software was used to measure length, thickness and CSA. An average of three measurements was calculated for each assessment. Intraclass Correlation Coefficient (ICC) and Limits of Agreement (LoA) were used to analyse reliability.
Results: Inter-observer reliability was excellent for all structures (ICC2,3=0.913-0,983). Intra-observer reliability shows excellent agreement for all structures (ICC3,1=0.917-0.983) except GM which showed moderate agreement (ICC3,1=0.815). LoA, relative to structure size, ranged from 1.38% to 6.88% for interreliability and from 0.07% to 5.79% for intrareliability.
Conclusions: This study shows a high level of inter-intraobserver reliability in measuring length of the ATFL, thickness of GM, TA and thickness & CSA of Peroneals. Future research has been planned to investigate clinical use of MSUS in CAI.

Keywords: Ultrasound, Ankle Sprains, Muscles, Ligaments
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THE SYNTHESIS OF LITERATURE ON TECHNOTHERAPY WITH EXERGAMING IN BALANCE REHABILITATION

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Abstract:

Purpose: Technotherapy can provide improving balance in wide range of sensory stimuli. Recently, technology-aided applications are modern approaches. Our aim was update current evidence about technotherapy in physiotherapy systematic research.

Methods: We followed Preferred Reporting Items for Systematic Reviews (PRISMA) statement to conduct review. Two authors (I.K, M.T) independently conducted systematic literature searches, using electronic database: PubMed, Cochrane and PEDro, published betwen 1945-2017. Keywords/MeSH terms used included following: "technotherapy-physiotherapy-rehabilitation-balance-augmented reality-virtual reality-exergaming-active video gaming-Nintendo-Xbox-Kinect-techno". Randomized controlled English clinical trials are included; studies published as "review-protocool-books-news-pilot study-preliminary study", not reach full text and not related to physiotherapy rehabilitation were excluded. After articles had been reached, we used QUADAS-2 checklist for metodological quality.

Results: 2869 articles were identified, 45 (publihed 2011-2017) of met eligibility criteria and selected for present systematic review. The subjects of articles neurological disorders (Parkinson, multiple sclerosis, spinal cord injury, stroke, traumatic brain injury), pediatric diseases (Cerebral palsy, developmental coordination disorders), fibromyalgia, diabetes mellitus, Meniere's disease and geriatric population. Evaluation methods; Berg Balance Scale, Timed Up and Go, Functional Reach Test. Treatments methods; NintendoWii, XBoxKinect, Treadmill, Balance Rehabilitation Unit, and BioRescue training were used in frequently. The session duration 33.97±14.964(min-max=15-90) minutes, freguency 2.69±0.877(min-max=1-5) days/week, treatment duration 6.63±2.685(min-max=3-12) weeks, totally 17.22±7.873(min-max=6-40) sessions and 565.52±334.924(min-max=90-1350) minutes.

Conclusions: There is no consesus of any evaluation or treatment methods for improving balance rehabilitation. Virtual reality-based interventions that promote motor learning mechanisms may offer additional benefits to balance recovery compared with conventional therapy. Virtual task-oriented exercises can be enjoyable and motivating.

Keywords: Technotherapy, Virtual Reality, Balance, Physiotherapy, Rehabilitation

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EFFECT OF VIRTUAL REALITY EQUIPMENT BY ACTIVE VIDEO GAMING ON PHYSICAL ACTIVITY

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Abstract:

Purpose: Physical activity has been identified as an important public health concern for people. The use of active video gaming(AVG) can be useful in promoting physical activity. Purpose of our study was to identify commonly used virtual reality(VR) platform in physiotherapy.

Methods: We followed Preferred Reporting Items for Systematic Reviews(PRISMA) statement to conduct review. Two authors (I.K,M.T) independently conducted systematic literature searches, using electronic database: PubMed, Cochrane and PEDro, published betwen 1945-2017. Keywords/MeSH terms used included following: "technotherapy-physiotherapy-rehabilitation-physical activity-augmented reality-virtual reality-exergaming-active video gaming-Nintendo-Xbox-Kinect-techno". Randomized controlled English clinical trials are included; studies published as "review-protocool-books-news-pilot study-preliminary study", not reach full text and not related to physiotherapy rehabilitation were excluded. After articles had been reached, we used QUADAS-2 checklist for metodological quality.

Results: 2765 articles were identified, 15 (published 2009-2017) of met eligibility criteria and selected for present systematic review. The study group: pediatric, adolescent, young and elderly adults. Treatments methods; NintendoWii (n=6,%40), XBox Kinect (n=6, %40), Sony Playstation II-EyeToy (n=1, %6,6), Light Space Play Floor(n=1,%6,6), and GestureTek VR System(n=1,%6,6) training were used in frequently. Evaluation methods; Body Mass Index(n=10, %66,6), Heart Rate(n=6,%39,6), VO2max(n=4,%26,4), accelorometer (n=3, %19,2), Shuttle Run (n=3, %19,2), and Physical Activity Enjoyment Scale (n=3,%19,2) were used in frequently.

Conclusions: VR platforms have proliferated, and it is therefore a fruitful time to study their effectivenes as clinical tool. This platform is an affordable, feasible and enjoyable option. Our study shown that AVG involve daily life activities can make participation easier, developed healthy lifestyle behaviors and improving physical activity levels. We think Nintendo-Wii and Xbox-Kinect are being used more because of their equipment and games.

Keywords: Technotherapy, Virtual Reality, Physical Activity, Physiotherapy, Rehabilitation

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EVALUATION OF CARDIOVASCULAR RESPONSES IN SEDANTER YOUNG ADULTS WITH SINGLE-SESSION MEDIUM AND STRONG DENSITY AEROBIC EXERCISES

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Abstract:
Purpose: Today, the effects of physical activity performed at different intensity on the cardiovascular system are still not clearly known. Therefore, in our study, we aimed to evaluate the cardiovascular effects of moderate and heavy exercise in sedentary individuals and amateur athletes in a single session.
Methods: A total of 40 sedentary young volunteer adults (mean age: 23.8±3.7 years) were included in this study. Each participant was evaluated twice. In the initial evaluation, all were subjected to moderate-intensity aerobic exercise (5 km/h 30 min walking), while in the second evaluation, all were subjected to heavy aerobic exercise (8 km/h 20 min jogging). Systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), oxygen saturation (SpO2), body temperature (BT), and respiratory rate per min (RR) were assessed. The modified Borg Rating of Perceived Exertion was used to evaluate the fatigue levels of the participants.
Results: In our study, after moderate-intensity exercise, change in the SBP, DBP, and SpO2 were significantly higher ($p<0.05$), while after heavy exercises, change in the SBP, SpO2, HR, and RR was significantly ($p<0.05$). The BORG scores were significantly higher after both moderate and heavy exercises ($p<0.05$).
Conclusions: Our study results showed that cardiovascular responses increased in direct proportion to the intensity of the exercise. We conclude that both exercise intensities are useful to improve the health status of healthy young adults.

Keywords: Aerobic Exercise, Young Adult, Physical Activity, Sedentary.

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DEVELOPING A HAPTIC HAND INTERFACE WITH FORCE FEEDBACK FROM VIRTUAL ENVIRONMENT

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Abstract:
Purpose: A multi-functional human-machine interface was designed to assist fingers flexion and extension motions. The proposed exoskeleton system may help and improve the rehabilitation progresses of hand fingers.
Methods: This system was designed with 2 degrees of freedom (DOFs) for the thumb finger and 3 DOFs for the other fingers actuated via direct-driven linear DC actuators, which had PID position and force controllers. An armband with a built-in gyroscope and accelerometer unit supplies hand orientation signals to synchronize the exoskeleton hand with the one designed in three dimensional virtual environment. In addition, this exoskeleton system has also a novel force sensing mechanism designed to sense fingertip forces and also help the motors freely follow human finger movements with a minimal resistance in its virtual reality applications. A contact detection method was developed and applied to sense the 3 dimensional (3D) objects in the virtual environment. Fundamental experimental studies of the proposed exoskeleton mechanism on a normal person were conducted to obtain position and force data for some virtual reality applications.
Results: The delay between the mechanical and the virtual system was determined as 13 milliseconds, which was not significantly felt by the user.
Conclusions: The studies showed that the position and force feedback controllers suitably worked for both sensing the 3D virtual objects and for the mechanism's following the user fingers' movements with minimal resistances. In conclusion, such a mechanism with proposed special capabilities could be used to be utilized for finger rehabilitation and also haptic training applications.

Keywords: Virtual Rehabilitation, Virtual Reality, Exoskeleton Device, Force Feedback
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EFFECTS OF EXERCISE-COGNITIVE ACTIVITY COMBINED TRAINING AND DUAL TASK TRAINING ON GAIT SPEED AND PREFRONTAL CORTEX ACTIVATITON: A FNIRS STUDY

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Abstract:
Purpose: Dual-task training was shown to be more effective in increasing gait speed and improving executive functions compared to single task training. However, a comparative of the effects of dual-task and exercise-cognitive activity combined training on gait speed and the blood flow of dorsolateral prefontal cortex in healthy older adults have not been performed.
Methods: Fortyfive volunteers were recruited (8 male; 39 female; age range 65-83 years). Subjects were divided into i) control (balance and gait), ii) dual-task training (cognitive activity simultaneous with balance and gait), iii) exercise-cognitive activity combined training (balance and gait activity asynchronously at different times during the same day) groups. Gait speed under single-task and dual-task conditions was obtained at baseline and at the end of training period. Prefrontal cortex activity during Stroop task was assessed by use of functional near infrared spectroscopy (fNIRS) modality before and after the 4 week interventions.
Results: Participants performing cognitive activity showed a significant increase in single and dual task gait speed at post-intervention when compared to pre-intervention measurements ($p<0.05$). Subjects performing balance and gait activity asynchronously at different times during the same day had significantly reduced local brain oxygenation at post-intervention when compared to pre-intervention ($p<0.05$).
Conclusions: Daily activities which require dual task such as walking while talking or crossing streets may be improved to a greater extent with an exercise-cognitive activity combined training protocol involving balance, gait and cognitive activities at different times when compared to the dual task training.

Keywords: Dual-Task, Executive Function, Gait Speed, Older Adults, Spectroscopy, Near-InfraredIS

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BODY COMPOSITION, ULTRASONOGRAPHIC CROSS-SECTIONAL AREA AND ISOKINETIC STRENGTH CORRELATED?

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Abstract:
Purpose: To establish relationship between body composition ultrasonographic cross-sectional area and isokinetic strength.
Methods: 45 healthy subjects (8 female-37 male, age: 26.31±4.61, BMI: 25.34±3.72) were included in study. Segmental body composition was assessed by body-fat analyser (Tanita Corp.,Tokyo,Japan). Ultrasonographic muscle thickness measurements of vastus medialis oblique (VMO), rectus femoris (RF), biceps femoris (BF) and semitendinosus-semimembranosus (SM-ST) muscles were performed using a 7.5-12 MHz linear probe with B-mode ultrasonography (LOGIQ7 Pro;GE Yokogawa Medical System, Tokyo, Japan). Knee flexion and extension strength were measured in sitting position with isokinetic dynamometer (Cybex NORM®, Humac,CA,USA) in 60°/s concentric mode. Peak torque (PT) values were obtained from system. Statistical analysis was performed with SPSS 22.0 program.
Results: There was a positive correlation between ratio of lower extremity muscle mass, muscle dimensions (VMO: r:0.493, p:0.001; RF: r:0.482, p:0.001; SM-ST: r:0.517, p:0.000; BF; r:0.457, p:0.002) and muscle strength (quadriceps PT: r:0.611, p:0.000; hamstring PT: r:0.728, p:0.000).
Conclusions: It is reported in literature that muscle mass has an effect on muscle strength. In our study, muscle mass was evaluated by two different methods and similar results were obtained as a result of both measurements. Muscle mass obtained by both methods correlated with muscle strength. This result shows us that we could get an idea about muscle mass, size and strength with a segmental body composition device in clinics where Ultrasonographic and isokinetic system, which are quite expensive devices, are not available.

Keywords: Body Composition, Isokinetic Strentgh, Ultrasonographic

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RELIABILITY OF CYBEX NORM® ISOKINETIC SYSTEM IN MEASURING SHOULDER ISOKINETIC STRENGTH AND PROPRIOCEPTION

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Abstract:
Purpose: The purpose of this study was to evaluate the reliability of the Cybex isokinetic system in measuring shoulder strength and proprioception.
Methods: 15 healthy participants (5 females-10 males, age: 25.3±3.8, BKI: 24.6±3kg/m2) who did not have any history of shoulder pain or dysfunction, were included to study. The strength of the shoulder internal rotators (IR) and external rotators (ER) and proprioception were measured with an isokinetic dynamometer (Cybex NORM®, Humac, CA, USA). The isokinetic evaluation was made in the sitting position at the scapular plane, 60°/s and 180°/s concentric, 90°/s eccentric mode. The active joint position sense (AJPS) was used for evaluation of the proprioception. The target angels for AJPS were selected as 30° IR and 30° ER. The difference between the target angle and the angle found by participant was recorded as proprioceptive deficit. To test retest reliability, evaluations were repeated after a week. The results were analyzed using the Intraclass Correlation Coefficient (ICC) method.
Results: It was found that dominant side concentric 60°/sec IR Peak Torque (PT) (0.968) and ER PT (0.978), concentric 180° /sec IR PT (0.845) and ER PT (0.906), eccentric 90°/sec IR PT (0.867) and ER PT (0.821) and 30°/sec IR (0.905) proprioception sense measurements have almost perfect reliability while the at 30°/sec ER (0.746) were high.
Conclusions: Using Cybex isokinetic system in assessing shoulder isokinetic strength and proprioception is a reliable method. Cybex isokinetic dynamometers can be used clinically as a reliable method to evaluate shoulder strength and proprioception.

Keywords: Shoulder, Strength, Proprioception, Isokinetic, Reliability

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IS THE IPHONE A USEFUL TOOL FOR DETERMINING PHYSICAL ACTIVITY LEVEL?

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Abstract:
Purpose: The accuracy of the iPhone pedometer function in laboratory test conditions was shown by the researchers. Recent studies are investigating the functionality of the iPhone pedometer in daily life.The purpose of this study was to examine the usability of the iPhone pedometer in determining the physical activity levels of young adults using iPhone.
Methods: 27 volunteers using iPhone 5S and newer models were included in the study. First of all, physical activity was recorded using the IPAQ short version. Then, the number of average daily steps for a month was recorded retrospectively from the iPhone pedometer. The correlation between the number of average steps, walking-related MET scores and total MET scores was examined.
Results: Of the 27 volunteers, 14 responded only questions related to walking. There was a significant correlation between the iPhone pedometer results and walking-related MET scores (p=0,04 r=,531). There was no significant relationship between iPhone pedometer results and total MET score (p>,05).
Conclusions: Despite lab-based evidence demonstrating adequate levels of agreement between the iPhone and manually counted steps, there is lack of studies investigating the functionality of the iPhone pedometer in daily life. The researchers must be careful about determining the physical activity level of individuals with iPhone. As a self-monitoring and motivational tool, iPhones should only be used for in the daily life condition.

Keywords: Iphone, Pedometer, Physical Activity

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EFFECT OF LEVITAS DEVICE EXERCISES ON THE LEVEL OF PAIN AND FUNCTIONAL ACTIVITY IN PATIENTS WITH KNEE OSTEOARTRITIS

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Abstract:
Purpose: Levitas is an assistive device designed to exercise with suspensions in the treatment of rheumatic diseases with body weight support. In this study, it was aimed to investigate the effect of the Levitas device exercises on pain intensity and functional activity level in knee OA patients.
Methods: Patients in the age range of 42-65 years who were diagnosed with OA at 2nd and 3rd degree participated voluntarily. 14 patients were randomly divided into Levitas Group (n = 7) and Control Group (n = 7). While the Control Group performed traditional exercise program, The Levitas Group practiced traditional exercise program and the hanger exercises made with the Levitas. Patients were evaluated by the same methods at the end of the treatment and at the end of the 6-week treatment. 'Visual Analogue Scale' (VAS) and 'Knee Injury and Osteoarthritis Outcome Score' (KOOS) questionnaire were used in assessing resting and activity pain and functional activity level.
Results: According to the descriptive characteristics of the patients, the groups were similar in the initial evaluation ($p > 0.05$). At the end of treatment, in both groups' rest and activity pain scores and all subheadings of KOOS form showed significant improvement ($p < 0.05$). In the Levitas group, improvement of scores of activity pain and all subheadings of the KOOS form were found to be more significant than the control group ($p < 0.05$).
Conclusions: This study indicates that training with Levitas assistive device is effective for contributing to healing in investigated parameters in patients with osteoarthritis.

Keywords: Osteoartritis, Exercise, Levitas, Pain

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EFFECT OF SUSPENSION SYSTEM EXERCISES ON PAIN AND LIFE QUALITY IN PATIENTS WITH CHRONIC NECK PAIN: A PILOT STUDY

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Abstract:
Purpose: In recent years, the use of assistive system execises in pain management has become widespread in rehabilitation programs. This study was carried out to investigate the effect of suspension system exercises on pain and quality of life in patients with chronic neck pain (CNP).
Methods: A total of 17 patients (13 female, 4 male) aged between 34 and 62 years were randomly assigned to the Suspension System Group and the Control Group. Both groups had hot pack, classical massage, manual therapy, posture and neck exercises, home exercise program and lifestyle recommendations during 3 weeks. In addition to the Suspension System Group, cervical exercises and manual therapy were applied in partial suspension on Levitas device at each treatment session . Pain assessment was assessed by Visual Analog Scale (VAS) for rest, activity, practice and night time. Quality of life was assessed by Short Form-36 (SF-36) at the beginning and end of treatment.
Results: Pain and quality of life were improved in both groups after the treatment program ($p < 0.05$). Statistically significant differences were found in the suspension therapy group compared to the control group, in evaluating the difference of VAS and SF-36 scores between the groups ($p<0.05$).
Conclusions: In conclusion, we think that both methods are effective in improving the pain intensity and quality of life of patients with CNP and addition of suspension system exercises to the treatment program provides an additional contribution to treatment.

Keywords: Neck Pain, Suspension, Exercise, Quality Of Life

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EFFECTS OF MASSAGE ON ANAEROBIC POWER AND JUMP HEIGHT

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Abstract:
Purpose: Massage is an implementation used for treatment purposes in numerous areas. It is utilized in sports for both its contributions to performance and reduction of the recovery phase. In my study, I have set the objective to find out the impact of the Swedish massage applied on feet for the period of one month on jumping performance and anaerobic power.
Methods: Nine female and nine male volunteering participants doing sports as amateurs were included in the study. Massage was applied in the Swedish method on their both feet for the period of one month three days a week. Prior and subsequent to the study, the measurements were made with the NEWTEST-3000 device for the jumping heights, flight times, and anaerobic power. The statistical analysis was performed in the SPSS 22 computer program using the Wilcoxon signed rank test for the measurements before and after the study and Mann Whitney U test for the assessment between the two types.
Results: The values prior and subsequent to the massage increased statistically in both groups ($p<0,05$). All the values were higher in males than females ($p<0,05$).
Conclusions: In my study, the jumping height, endurance times, and anaerobic power were improved in all the groups thanks to the Swedish massage applied on the foot for a period of one month. The massage might have provided this impact by means of increasing the blood circulation in the ankle and facilitating the lactic acid distancing. In view of the result of the study, we can say that it provides contributions to the literature as it demonstrates the fact that massage improves the explosive power.

Keywords: Massage, Jumping, Anaerobic Power

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COMPARISON OF MUSCLE ACTIVATION LEVEL, MECHANICAL PROPERTIES OF LOWER LIMB MUSCLES AND VERTICAL JUMP PERFORMANCE BETWEEN PHYSICALLY ACTIVE AND SEDENTARY YOUNG INDIVIDUALS

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Abstract:
Purpose: The vertical jump (VJ), considered to be associated with muscle strength (MS), is often used to determine performance. In this study, we aimed to examine the relationship between performance and mechanical properties (MP) of lower limb muscles and muscle activation and the differences between physically active and sedentary individuals.
Methods: Participants were examined in 2 groups according to IPAQ vigorous intensity activity scores. sEMG was used to measure the MVIC and normalized (%MVIC) data of QF obtained during squat were recorded for each 19 participants (physically active, PA;n=14, sedentary, SE;n=5) with a mean age of 21,68±2,23. Lower Limb muscles; QF, GC, GMax were examined for MP (tone, stiffness, and elasticity) and for MS. The VJ test was performed 3 times and maximum score was recorded.
Results: MVIC and VJ of PA group was significantly higher than SE group (p=.007 and p=.018; respectively) whereas QF activation (%MVIC), MS and MP were similar between groups (p<.05). For the whole sample; when the correlations between VJ and MP were examined, VJ and MP (tone and stiffness) of GC (p<.01) and stiffness of QF (p<.05) were positively high correlated. While VJ and MVIC showed a positively moderate level of correlation (r=.520, p=.023), the correlation level of MS with VJ, MP, and MVIC was low and insignificant (p<.05).
Conclusions: According to the results, MP was more determinant than MS in performance test. To increase physical activity and performance level in young sedentary individuals it is necessary to consider muscle activation and muscle mechanical properties.

Keywords: Vertical Jump, Electromyography, Muscle Mechanical Properties

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ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY, PHYSICAL ACTIVITY ADHERENCE AND MUSCULOSKELETAL PAIN CONDITIONS IN SEDENTARY WORKERS

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Abstract:
Purpose: Workplace conditions and working hours in daily life induce to sedentary life. individuals, undertaken these conditions develops different strategies to cope with musculoskeletal pain (MSP). The study is planned to investigate the pain, physical activity level and physical activity adherence of sedentary workers.
Methods: 83 workers (female, n=33, male; n=53) were examined divided into groups according to the type of work (sitting (SW), standing (StW) and both (BW)), work experience and gender. Individuals filled out Cornell Musculoskeletal Discomfort Questionnaires (CMDQ), İnternational Physical Activity Questionnaire (IPAQ) and Physical Activity Adherence Questionnaire (PAAQ). Demographic data and reductive and preventive measures for pain were recorded.
Results: SW group had significantly the lowest level of physical activity ($p<.001$) and had the highest pain score. The distribution of MSP scores by gender, it was found that female workers were higher than men but not significantly different ($p=.053$). As the experience increased, PAAQ scores decreased and the physical activity adherence was significantly higher in the first 10 years ($p<.01$). When the correlations of IPAQ and PAAQ scores of workers were examined, it was low but significant in women ($r=.356$, $p<.05$). Males prefer to do nothing at all, while women prefer pain relievers, exercises and rest to cope with pain. As a measure for MSP; exercises, weight management and ergonomic arrangement were preferred by both.
Conclusions: Depending on gender, type of work and experience, pain and physical activity cause changes in different areas and levels. Professional support in approaches and measures are inadequate for pain.

Keywords: Musculoskeletal Pain, Physical Activity, Vocational Rehabilitation

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THE EFFECTS OF SHOES CHARACTERISTICS ON STATIC BALANCE

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Abstract:
Purpose: It is often asserted that bad footwear hinders health, life-style, mobility, and independence. Purpose of study is to determine effects of shoes-shoe characteristics on static balance in young adults.
Methods: Totally 40 young adult participated in study. None of participants had any orthopedic/neurologic alterations. Static balance was assessed using Nintendo Wii Fit Plus-stability. Mediolateral and anteroposterior directions were measured. For statistical analysis, with level of significance set at 5%($p<.05$).
Results: 19(47.5%) had no sports, 21(52.5%) doing sports, frequency of sports; 6(15%) had 1/week, 11(27.5%) had 2-3/week, 4(10%) had >3/week, types of sports 6(15%) walking, 9(22.5%) fitness, 2(5%) swimming, 5(12.5%) other sports. 4(10%) had falling, when analysised the mean using shoes; flat 1.07±1.241(min-max=0-5) days/week, high heel 0.53±1.320(min-max=0-7) days/week, sneakers 5.21±1.589(min-max=2-7) days/week, casual 0.25±0.670(min-max=0-3) days/week. The point of antero-posterior balance 2(5%) neutral, 38(95%) had posterior balance. The mean stability percent of balance 70.35±11.956(min-max=27-85)%. There was a statisticially significant relationship between using sneakers and types of sports ($r=-0.356;p=0.024$), using casual shoes and types of sports ($r=0.394;p=0.012$), using high heel shoes and falling ($r=-0.377;p=0.016$), sneakers and falling ($r=0.364;p=0.021$), high heel shoes and anteroposterior balance ($r=-0.346;p=0.031$). There is no relationship between using types of shoes and balance stability ($p>.05$).
Conclusions: In the literature, studies demonstrate that the use of high heels altered static balance in the healthy young women analyzed, increasing the oscillation of the center of pressure, regardless of visual restriction. In our studies the similar results were found, however in future studies will be detailed and combined with the walking analysis.

Keywords: Shoes, Static Balance, Dynamic Balance, Stability

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A PORTABLE MECHANICAL CHEST WALL OSCILLATOR

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Abstract:
Purpose: There are many devices available for clearing the secretion in the lungs. When these devices were investigated, It was seen to focus on certain lung lobes. The aim of this study is to introduce a device that can provide high frequency chest oscillation that can affect each lobe of the lung.
Methods: This device, which can be used on each region of the lung, allows these secretions to be cleared by high-frequency chest oscillation during the normal breathing cycle, which can be placed on a velcro-covered vest. This device, which is under user control, has on / off and frequency settings. After the vest is worn, it attaches the oscillation apparatus to the desired region and ensures that the mucus is cleaned in the desired position.
Results: This portable high-frequency chest oscillator device is user-controlled and can reduce the risk of pneumonia in patients.
Conclusions: In various diseases such as cystic fibrosis, emphysema, asthma and chronic bronchitis, the mucus collected in the tracheobronchial region is difficult to discard by coughing. This may be due to the properties of the mucus (for example quantity, viscosity or both) or because the patient does not have the power to produce a sufficient cough. Up until now, the inventions have focused on specific lung segments in such disease groups. The difference from the other high-frequency chest oscillators is that it is applied to the desired lung segments and is easier to use. This will ensure a better result by focusing on the desired region.

Keywords: Airway Clearance, High Frequency Chest Wall Oscillations

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PHYSIOTHERAPISTS' OVERVIEW ABOUT ROBOTIC REHABILITATION

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Abstract:
Purpose: The aim of this study was to evaluate the views of physiotherapists working in Denizli province on robotic rehabilitation.
Methods: In our study, 50 physiotherapists from 17 different institutions in Denizli province, whose age was between 23-51 and their working experience was between 6 months and 32 years were included. A questionnaire created as online forms which included participants demographic information and 8 question about robotic rehabilitation and applied to participants.
Results: It was determined that 98% of participants(N = 49) knew what robotic rehabilitation was, and 86%(N=43) had witnessed robotic rehabilitation before. %24 of participants(N=12) gave 7 points for "robotic rehabilitation is a useful application?" question, it means useful above medium level and 86% of them(N=43) think that robotic rehabilitation practices are not superior to normal physiotherapy applications. For a session fee of robotic rehabilitation, 56% physiotherapists(N=28) though it was between 100-200. 98% of participants(N=49) stated that robotic rehabilitation could be used for both extremities. While 62% of participants (N = 31) want to have a robotic rehabilitation device in their institution, 22% of them(N =11) are not and 16% of them(N = 8) also have a robotic rehabilitation device. 98% of physiotherapists (N =49) think that in the future robotic rehabilitation will not take place in physiotherapists.
Conclusions: As a result, robotic rehabilitation is well known by physiotherapists, but cannot take place of conventional physiotherapy. Physiotherapists look positively at robotic rehabilitation practices but in terms of its benefits, they think it can be a complementary option.

Keywords: Physiotherapist, Rehabilitation Robotics

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ARE VIRTUAL REALITY APPLICATIONS EFFECTIVE IN RUSSELL-SILVER SYNDROME? A CASE REPORT

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Abstract:
Purpose: Russell-Silver syndrome,(RSS) is a rare genetic disease, is characterized with typical triangular face (distinctive facial features including a prominent forehead, a narrow and small jaw), low birth weight, short height, an unusual curving of the fifth finger (clinodactyly), asymmetric or uneven growth of some parts of the body. The disease is also together with delayed musculoskeletal development (low muscle strength and bone mass), language problems, learning disabilities. We aimed to investigate the effectiveness of X-Box Kinect virtual reality application in a patient with RSS.
Methods: A-9 years old boy diagnosed as RSS was undergoing the therapy because of complaints of frequent falls, difficulty during walking and upper extremity dysfunctions. Motor functions, balance, level of independence, muscle strength and hand ability were evaluated by Gross Motor Function Measurement (GMFC), Pediatric Berg Balance Scale (PBBS), Functional Independence Measure for Children (Wee-FIM), Gross Muscle Strength Test (GMS) and Manual Ability Classification System (MACS), respectively.
Results: After a 2-month virtual reality programme (45 minutes x two sessions in a week), important recovery was observed in GMFC level (from 213 to 240), PBSS (from 34 to 43), Wee FIM (from97 to 110), GMST (from low to good) and MACS scores (from 2 to 1).
Conclusions: Virtual reality applications can improve gross motor function, balance, functional independence level, muscle strength and hands ability and increase the attendance to treatment. The studies with large samples compare the virtual reality applications with traditional physiotherapy programmes, are needed.

Keywords: Russell-Silver, Virtual Reality, Physiotherapy

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EFFECTS OF SHOULDER STABILIZATION EXERCISE ON UPPER EXTREME PROPRIOCEPTION AND HAND FUNCTIONS IN GERIATRIC INDIVIDUALS

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Abstract:
Purpose: In recent years, the average life span has increased due to improvements in medicine and technology. And thus, problems such as health and socialization of the elderly population are among the priority issues of public health. In this regard, the World Health Organization emphasizes active aging and independence. Hand skills in geriatrics are of vital importance in terms of quality of life and level of independence. People's upper extremity use skills are important for many functions, from ambulances to the removal of individual needs independently. The aim of the study was to determine the effect of strengthening of the shoulder girdle muscles in proprioception of shoulder and elbow in geriatric individuals over 65 years of age.
Methods: 22 geriatric individuals (mean age: 73±5.4) were recruited from Darussafaka Nursing Home. All directional strengthening exercises were applied to the shoulder girdle for 5 days a week for 4 weeks. The assessments including Nine Hole Peg Test, Myometer Test and MarVAJED-Proprioception were made before and after the training. The obtained data were analyzed by Wilcoxin Test.
Results: According to the results of exercises, statically significant increase ($p < 0.05$) in shoulder flexor, abductor, elbow flexor and extensor muscles strength were determined. In the proprioceptive evaluations, there was an increase in the elbow flexion and the shoulder abduction ($p < 0.05$). The increase in the hand skills of the individuals ($p < 0.05$).
Conclusions: Along with aging, muscle mass and strength decrease. Strength exercises increased shoulder proprioception and neuromuscular control. It is known that there is a strong correlation between shoulder rotator muscle strength and hand grip strength. The results we achieved in our study are in the same way with the literature. In geriatric individuals, strong and stable shoulder muscles increase the proprioceptive sensation and hand skill, so that the level of independence and quality of life of geriatric individuals with increased upper extremity use abilities is thought to increase.

Keywords: Proprioception, Shoulder, Geriatrics

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CAPABILITY OF INTERACTIVE FLOOR TECHNOLOGY IN REHABILITATION PROCESS

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Abstract:
Purpose: Along with the developing technology, rehabilitating individuals in different gaming environments enables physiotherapists and individuals to have more fun in rehabilitation processes. The purpose of this study was to evaluate the capability of interactive floor applications in the rehabilitation process.
Methods: 17 healthy participants (13 girls; 4boys; mean age: 19±2,7) were recruited from Faculty of Health Sciences, Marmara University. Quadriceps femoris muscle strength of dominant lower extremity of was evaluated at 120o/s, and proprioception of knee joint was measured 30o, 45o and 60o with isokinetic system. "Balloon Blasting" game from interactive floor application was performed. Participants were instructed to keep stable their dominant lower extremity on the ground, they were encouraged to blast balloon with their non-dominant lower extremity. At the end of game, the amount of the blasted balloon was counted by a physical therapist. The obtained data were analyzed by using Spearman correlation test.
Results: There was a positive good correlation between the amount of blasted balloon and quadriceps femoris muscle strength of dominant lower extremity ($p=0.013$, $rho=0.607$). On the other hand, there was no correlation between the amount of blasted balloon and proprioception of knee joint in any measured degree (($p >0.05$).
Conclusions: The current technology, which is every stage of our lives, can contribute the rehabilitation process by making it more enjoyable (1, 2). A moderate positive correlation found in the present study suggest that during the training of the muscle strength in the rehabilitation program can be supported by one of the games of the interactive floor technology in the clinical setting.

Keywords: Interactive Floor Technology, Strength, Proprioception

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THE IMPACT OF KINESIOLOGY TAPING ON VOLLEYBALL SERVE SPEED

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Abstract:
Purpose: Kinesiology taping is often used in various sports branches to achieve better performances. There is no relevant or similar research regarding this subject in the literature. Our aim was to investigate the effectiveness of kinesiology taping in serve speed of volleyball players.
Methods: Study was conducted at the Istanbul Metropolitan Municipality Sports Club. Total 22 professional volleyball players participated. Demographic data were recorded. Since there is no specific technique for applying kinesiology taping to volleyball players, Kenzo Kase's shoulder taping technique modified and elastic tape was applied to deltoid and long head of biceps brachii as a functional correction technique. Jump and float serves velocity assessed by using "Pocket Radar Gun" before and with kinesiology taping.
Results: 12 male and 10 female volleyball players participated in the study. The mean age was 18.9 ±1.5 years. Initial mean jump serve speed was 76.1±14 km/h and float serve speed was 63.1±6.2 km/h; the mean jump serve speed with kinesiology taping was 81.8±11.1 km/h and float serve speed with kinesiology taping was 65.4±4.9 km/h. No relation was found with or without taping in jump(p:0.034) and float (p:0.327) serve speeds.
Conclusions: We found no significant relationship between serve speed with and without kinesiology taping. Studies with larger sample size groups are needed for further researches.

Keywords: Radar, Speed, Volleyball, Taping

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THE CORRELATION BETWEEN PHYSICAL ACTIVITY AND LOCOMOTOR FUNCTIONS IN HEALTHY ADULTS

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Abstract:

Purpose: The Aggregated Locomotor Function (ALF) score is used to evaluate the ability to perform daily functional tasks practically and quickly. The aim of the study is to investigate the correlation between ALF scores and physical activity levels in healthy individuals.

Methods: 46 volunteer healthy subjects (28 female, 18 male) age between 18 to 35 was participated in the study. To determine the relationship between physical activity and locomotor functions; International Physical Activity Questionnaire (IPAQ) long form which consists five parts and measures physical activity level such as recreation, work or housework and ALF score which is a sum of the mean time (seconds) taken to complete walking 8 meter, ascending and descending 7 steps, and transfer time to a chair were used.

Results: Patient's mean age was 24.5±4.48 years, mean BMI was 22.24±3.64 kg/m2. Walking and vigorous physical activity has moderate correlation (r:0.56, p:0.001), transfer and moderate physical activity has good correlation (r:0.68, p:0.001). There was no correlation between IPAQ's result (recreation, sport, and leisure-time physical activity, housework, time spent sitting) and locomotor function subgroup which ascending and descending steps .

Conclusions: The walking and transfer times have good to moderate correlation with physical activity levels. The using of time-based ALF scoring may also be useful in assessing and interpreting physical activity. We recommend ALF score using both in patient and healthy populations for physical activity.

Keywords: Ipaq, Alf, Outcome, Evaluation, Health

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THE EFFECT OF NEGATIVE HEEL HEIGHT ON INCREASED KYPHOTIC CURVATURE IN ADOLESCENTS WITH THORACIC HYPERKOFOSIA: PILOT STUDY

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Abstract:
Purpose: Hyperkyphosis defines as curvature at 50° and over. The use of positive and negative heel heights can have an effect on pelvic position, spinal curvatures and kinematic chain. The aim of this study is to investigate the immediate effect of the negative heel height on correcting the increased kyphotic curvature.
Methods: Twelve adolescents diagnosed with hyperkyphosis (mean-age 13,75±2,09years) were enrolled. The kyphosis angle (with Flexicurve and Body Analysis Kapture System-BAK) and the body posture (with New York Posture Scale-NYPS) were assessed with the feet in a neutral position (A0), at 15☐(A15), at 20☐(A20), with wedges support. SPSS 20.0 program was used for statistical analysis and $p<0.05$ values were considered as significant.
Results: Kyphosis angles with Flexicurve were 57,08±4,29 (A0); 53,25±3,67 (A15) and 52,88±4,43 (A20) calculated. The difference between the measurements was statistically significant (p=0,001) (A0-A15 p=0,002, A0-A20 p=0,002, A15-A20 p=0,363). The kyphotic angles assessed by BAK were 45.08±3.23 (A0); 41.58±2.39 (A15) and 41.42±2.54 (A20). There was a significant difference between the measurements (p=0.001) (A0-A15 p=0.002, A0-A20 p=0.003, A15-A20 p=0.719). Mean NYPS scores were 32,17±7,36 (A0); 41.00±5.97 (A15) and 39.25±6.30 (A20). There was a significant difference between the scores (p=0.001) (A0-A15 p=0,002, A0-A20 p=0,004, A15-A20 p=0,058).
Conclusions: The negative heel height appears to be a method that can reduce the angle of the thoracic kyphosis by affecting the kinematic chain. The effects weren't different between 15-20 degrees. Also at 20☐, NYPS scores were decreased. This may be due to the increase in inclination affects the foot posture to pronation.

Keywords: Hyperkyphosis, Posture, Negative Heel Height

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VIBRATORY SENSORY TRAINING DEVICE: A BIOMEDICAL INNOVATION

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Abstract:
Purpose: Nowadays there are few devices developed for sensory training. When these devices were investigated, it was seen that there wasn't device that could give different deep and superficial sensory inputs separately and together. The aim of this study is to introduce vibratory sensory training device designed for treatment.
Methods: This device, which can be used in every region of body, is hard and durable. It is designed in cylindrical structure so that it can be easily moved on body. The device has eight side surfaces that can be replaced with different sensory inputs and inserted into body of the device. In the body chamber, there is vibration source for deep sensory training. and battery designed. The 360 ° angular lines in lower area of the device give information for the proprioception in the joint which is also moving at the same time.
Results: The vibratory sensory training device can be easily used in clinics and can accelerate treatment process with different sensory input options.
Conclusions: Today, for sensory training, patients are wanted to touch as many different surfaces as possible. Such different densities surfaces consist of soft surfaces such as rubber, foam and hard surfaces such as mats and brushes. Vibration devices are used at different frequencies for deep sensation. As far as inventions made up to now include single sensory input, they are usually designed for hand, and there is no device that can be standardized in therapy and capable of delivering sensory inputs in different environments and in different sensory combinations.

Keywords: Sensory Training, Vibratory Sensory Training Device, Sensory Device

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EFFECTS OF WHOLE BODY VIBRATION AT DIFFERENT FREQUENCIES ON GLUTEUS MEDIUS MUSCLE' EMG ACTIVITIES

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Abstract:
Purpose: It was aimed to examine effects of whole body vibration on gluteus medius muscle' EMG activities at different frequencies during a static deep squat.
Methods: 11 healthy men (height weight) were included in this study. A 8-channel Noraxon EMG Mini DTS system (Noraxon, USA, Inc, Scottsdale, AZ) was used to assess EMG amplitude. The EMG activity of gluteus medius muscle was assessed during 90° knee flexed squat exercise. The EMG activity was recorded for 20 seconds each conditions (no vibration (NV), 20 Hz., 30 Hz., 40 Hz., 50 Hz., 60 Hz). Vibration stimulus was applied with a GLOBUS Physio Plate® that oscillates vertically up and down. 2 minutes rest period was given between each EMG measurements.
Results: Statistical analysis revealed that there was a significant difference between NV and 40, 50, 60 Hz, but no significant difference between NV and 20, 30 Hz. There was no significant difference between the frequencies of 20, 30, 40, 50, 60 Hz when the difference in gluteus medius muscle activation was examined.
Conclusions: As a result of study only gluteus medius activity is increased in whole body vibration exercise using high frequencies during deep-squat. According to these results, when asked to increase gluteus medius muscle activation while exercising on squat position on TVV, it can be work at high frequencies such as 40, 50, 60 Hz.

Keywords: Surface Electromyography, Frequency, Vibration

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DOES WHOLE BODY VIBRATION EXERCISES INFLUENCE ANKLE MUSCLE ACTIVITY?

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Abstract:
Purpose: This study investigated the acute effects of Whole Body Vibration (WBW) exercises on ankle muscles activities in healthy adults
Methods: 9 healthy adults (4 female and 5 male, age: 24.22±3.56 years, height: 176.11±12.33 cm, body mass: 70.41±19.24 kg, BMI: 22.27±3.56 kgxm-2) was participated in this study. 8-channel Noraxon EMG system (Mini DTS) was used to assess surface Electromyography (sEMG) amplitude of ankle muscles (tibialis anterior, peroneus longus, gastrocnemius medial and lateral heads) by during 900 knee flexed static squat exercise. The knee flexion angle was monitored using a universal goniometer. EMG measurement for 20 seconds in two conditions: no vibration and vibration using 50 Hz. frequency. Vibration stimulus was applied with a GLOBUS Physio Plate® that oscillates vertically up and down. Two minutes' rest period was given between each EMG measurement.
Results: Mann-Whitney U test revealed that WBW significantly increased ($p<0.05$) in peroneus longus, gastrocnemius medial and lateral heads sEMG amplitude compared with no vibration. There was no significant difference ($p>0.05$) between two conditions in tibialis anterior.
Conclusions: Our results demonstrate that whole body vibration exercises increase ankle muscle activity. Whole Body Vibration could be used as an efficient approach for increasing ankle muscle activity in deep squat position.

Keywords: Surface Electromyography, Whole-Body Vibration, Muscle Activity, Ankle

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THE EFFICACY OF DIFFERENT STRETCHING EXERCISES COMBINED WITH PRESSURE RELEASE TECHNIQUE ON LATENT TRIGGER POINTS IN THE PECTORALIS MINOR MUSCLE

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Abstract:
Purpose: To investigate which type of stretching exercise using after a single-session ischemic compression is more effective for muscle length, pressure pain threshold (PPT), pulmonary function, and respiratory muscle strength in subjects with latent trigger point in the pectoralis minor (PM) muscle.
Methods: Two-hundred-six individuals were screened for possible inclusion criteria. Fourty subjects were randomized to the Group-1 (ischemic compression with modified contract-relax PNF stretching), Group-2 (ischemic compression with static stretching), Group-3 (ischemic compression with myofascial release) or Group-4 (no intervention). The assessments were performed at baseline, immediately after the intervention, and at 24-hours later. The pectoralis minor length (PML) was assessed using a standard tape measure. Then, pectoralis minor index (PMI) was calculated. Rounded shoulder posture (RSP) was assessed by measuring the distance between the posterior border of the acromion and the table. Digital algometer was used to evaluate the PPT; spirometer and respiratory pressure meter were used to assess pulmonary function and maximal respiratory pressure, respectively.
Results: Improvements were found for PML and PMI between baseline and immediately after intervention in Group-1 and Group-3 ($p<0.05$). RSP showed a significant improvement only in Group-3 ($p=0.03$), whereas there was a statistically significant improvement for PPT value in Group-1 immediately after intervention ($p=0.005$). Significant difference were found in the PEMax at baseline to 24-hours later in Group-1 ($p<0.05$). There was a statistically significant difference in the PIMax and PEMax in Group-3 ($p<0.05$).
Conclusions: For effective myofascial pain therapy, ischemic compression should be followed by myofascial release or contract-relax PNF stretching exercises.

Keywords: Pain Threshold, Pectoralis Minor, Proprioceptive Neuromuscular Facilitation Stretching, Spirometer, Respiratory Pressure

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EFFICACY OF EMG BIOFEEDBACK WITH RELAXATION TRAINING ON PAIN, SLEEP QUALITY AND QUALITY OF LIFE IN CHRONIC NECK PAIN

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Abstract:
Purpose: Our aim is which patient had chronic neck pain(CNP) with electromyography biofeedback (EMG-BF) relaxation training effect of determine the impact on pain, sleep quality, quality of life .
Methods: 20 subjects received 5 days a week in the study were treated for 4 weeks. While individual with CNP the has been implemented conservative physiotherapy in addition to EMG– BF and relaxation training. Conservative physiotherapy included TENS, ultrasound, hotpack and home exercise. Pre-treatment and post-treatment were used EMG, Visual Analogue Scale(VAS), goniometric measurements, Manual Muscle Test(MMT), the movement distance measurement, Short Form Health Survey (SF-36), Beck Depression Inventory(BDI), New York Posture Scale(NPS), Neck Disability Index(NDI), Neck Pain and Disability Index(NPDI), Pittsburgh Sleep Quality Index(PSQI).
Results: After treatment, the value of VAS, BDI, NPDI and the SF-36 component were seen effective in significantly($p<0,05$). While the improvement in the left and right trapezius muscle activation. EMG-BF results were found more effective ($p<0,05$). Goniometry, movement distance measurements, MMT, NDI, NPDI, value has been observed improved in all directions.
Conclusions: Individual with CNP the training of relaxation with EMG-BF is more efficacy than conservative physiotheraphy about pain, muscle strength, range of motion, sleep quality, depression and quality of life. EMG-BF with relaxation training was concluded with the conservative physiotherapy it can suggest to obtain in clinical.

Keywords: Biofeedback, Electromyography, Neck Pain, Trapezius, Physiotherapy, Relaxation

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EXAMINATION THE RELATIONSHIP BETWEEN CHRONIC BACK PAIN, CHRONIC NECK PAIN AND SLEEP PROBLEMS IN DENTISTS AND STUDENTS OF DENTISTRY

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Abstract:
Purpose: Dentists are at high risk for neck and back pain. They often assume static positions that are uncomfortable and asymmetric. Chronic back and neck pain affect person's daily routine such as social relationships, nutrition, emotional and psychological states, sleep quality etc. The most important of these is sleep quality. Insufficient sleep could well be related to the increased prevalence of musculoskeletal pains.
The study was conducted to examine the relationship between chronic back pain, chronic neck pain and sleep problems in dentists and students of dentistry.
Methods: This study performed in Yeditepe University Faculty of Dentistry with 40 dentists and students of dentistry. The inclusion criterias are working actively, looking at least minimum five patient everyday, standing position long time. The average age of participants was 23,70 ± 2,87 years. Neck Disability Index(NDI) were used to examine neck pain of participants, Oswestry Low Back Pain Index were used for back pain of participants, Pittsburgh Sleep Quality Index were used to evaluate sleep quality of participants. SPSS was used for statistical analysis.
Results: Results showed that there was a difference in NDI, ODI, PSQI and VAS values between dentists and students of dentistry (3th, 4th, 5th classes).
Conclusions: However,that differences between the groups were not systematic.

Keywords: Back Pain, Neck Pain, Dentists, Insomnia, Chronic Pain

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EXERCISE CAPACITY, MUSCLE STRENGTH AND QUALITY OF LIFE IN PHYSICAL ACTIVE AND INACTIVE HEMATOPOIETIC STEM CELLS RECIPIENTS

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Abstract:
Purpose: Hematopoietic stem cell transplantation (HSCT) recipients are exposed to deconditioning arising from physical inactivity, muscle weakness, exercise intolerance and poor quality of life (QOL) which causes cardiopulmonary disorders. Impairments in exercise capacity, pulmonary functions, muscle strength, blood levels, fatigue and QOL of inactive recipients have not clearly investigated, yet. Comparing aforementioned outcomes in active/inactive recipients was aimed.
Methods: Recipients (post-transplantation status>100 days) were divided into inactive (<5.000 steps/day) (n=20, 48.5±14.93years) and active (≥5.000 steps/day) (n=16, 40.81±13.09years) groups and compared. Physical activity (metabolic holter), exercise capacity (6-Minute Walk Test (6MWT), peripheral muscle strength (dynamometer), pulmonary functions (spirometer), blood levels (total blood count), fatigue (Fatigue Severity Scale) and QOL (European Organization for Research and Treatment of Cancer QOL Questionnaire) were assessed.
Results: Demographic characteristics were similar between groups (p>0.05). Hemoglobin, albumin, total protein levels and quadriceps femoris muscle strength (means=247.6N/61.3% versus 312.1N/68.9%) were statistically lower in inactive group compared with active group (p<0.05). Pulmonary functions, 6MWT distance (means=82.79% versus 86.77%), handgrip strength, fatigue severity (33.85 versus 34.94 scores) and QOL-subscales scores were similar between groups (p>0.05). However active groups' 6MWT distance (43.5m) was higher than inactive recipients, is over clinically important difference 25m (post-hoc power=32.2%).
Conclusions: Recipients with sedentary lifestyle have more impaired lower extremity muscle strength, blood levels and clinically decreased exercise capacity. On the other hand, all recipients have similarly impaired upper extremity muscle strength, fatigue and QOL. Physical activity counseling along with progressive resistance and aerobic trainings are crucial for survived HSCT recipients in late engraftment period.

Keywords: Stem Cell Transplantation, Physical Activity, Exercise Capacity, Muscle Strength, Pulmonary Functions

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THE LONG-TERM RESULTS OF THE LOWER EXTREMITY STRENGTHS AND SPATIO-TEMPORAL PARAMETERS OF GAIT IN SUBJECTS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Abstract:
Purpose: The aim of this study is evaluating postoperative long-term aspect of gait pattern, muscle strength and function in subjects with ACL reconstruction.
Methods: 19 subjects (3 female-16 male, age: 31 ± 8.25, BMI: 27.83 ± 4.06) who underwent ACL reconstruction using hamstring tendon graft were included to study at 26.94 ± 13.89 months. Spatio-temporal parameters of the gait were measured with the BTS G-Walk device (GSensor®, BTS Bioengineering S.p.A., Italy). The device was secured to the L4-L5 intervertebral space of the participating individuals by means of a belt. The subjects were assessed for gait cycle times, stance phase-swing phase ratios and single-double support rates. Isometric evaluation of quadriceps femoris and hamstring muscles was performed with a 60 degree knee flexion in sitting position with an isokinetic dynamometer (Cybex NORM®, Humac, CA, USA). Subjects received 3 submaximal warm-up exercises followed by 5 repetitive tests. Single leg hop test was used for functional evaluation. After a trial jump, the test was repeated 3 times. The distance was measured and recorded in centimeters. Statistical analysis was performed with the SPSS 22.0 software.
Results: There is no difference between the operated and non-operated side gait cycle time (p:0.386), stance phase ratios (p: 0.965), swing phase ratios (p: 0.486), double support phase ratios (p: 0.825) and single support phase ratios (p: 0.747). Extensor (p: 0.001) and flexor (p: 0.044) peak torque values obtained from the isokinetic system were found lower on the operated side. The single leg hop distance (p: 0.002) was also found lower on the operated side.
Conclusions: Although 26.94 ± 13.89 months was over the ACL reconstruction surgery, it was observed that the loss of strength between the two extremities is continuing. These force deficits are reflected not only in daily activities such as walking, but also in functional activities such as jumping. After ACL reconstruction, especially in athletes, giving importance to sport-specific neuromuscular training and continuing exercise programs in the long term after surgery may be useful in removing force deficits and increasing functionality.

Keywords: Anterior Cruciate Ligament, Muscle Strength, Walking, G-Walk, Isokinetic

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THE TEST-RETEST RELIABILITY OF THE SPINAL CURVATURE MEASUREMENT IN THE FRONTAL AND SAGITTAL PLANES WITH SPINAL MOUSE

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Abstract:
Purpose: Spinal Mouse is a safe, practical and easy device to perform measurement of spinal curvature. Although there are a few reliability studies, it is insufficient. The aim of this study was to investigate the reliability of Spinal Mouse measurements in adolescent population.
Methods: Sixty one participants (34 male, 27 female) were included in the study. The mean age of the participants was 16.05±1.01 years (BMI: 21.47±3.16). Frontal and sagittal plane curvatures were evaluated with Spinal Mouse. To test the test retest reliability, evaluations were repeated by the same physiotherapist. Test retest results were analyzed using the Intraclass Correlation Coefficient (ICC) method.
Results: It was found that sagittal plane thoracic spine curvature (ICC: 0.900) and lumbar spine curvature (ICC: 0.914) measurements have almost perfect reliability. The frontal plane thoracic spine curvatures were poor reliability (ICC: 0.458) whereas frontal plane lumbal spine curvatures were moderate reliability (ICC: 0.534).
Conclusions: Sagittal plane curvatures measurements showed high reliability in Spinal Mouse evaluation but lower reliability in frontal plane. Spinal Mouse can be used clinically as a reliable method to evaluate curvatures especially in sagittal plane. In order to interpret the assessment on the frontal plane, there is need for more studies assessing more participants.

Keywords: Spinal Mouse, Spinal Curvatures, Technology Assessment,Test-Retest Reliability

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THE EFFECTS OF VIRTUAL REHABILITATION TECHNOLOGY ON FUNCTIONAL OUTCOMES IN PATIENTS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Abstract:
Purposes: The aim of this study was to investigate the effects of virtual rehabilitation technology which provides visual and auditory stimulus aimed for educating and controlling the joint on pain, range of motion, postural stability, and functional status in individuals with ACL injury.
Methods: Thirty-seven patients with ACL reconstruction were participated in the study. The patients were randomly divided into two groups. Control group (n=18) received ultrasound, transcutaneous electrical nerve stimulation, electrical stimulation, exercise, and cold packs. In intervention group (n=19), in addition to conventional physiotherapy, virtual rehabilitation treatment was taken with visual and auditory stimulus for a total of eight weeks, three sessions per week. Pain, range of motion, postural stability and functional status were measured with Visual Analog Scale, Universal Goniometer, Pedalo Sensamove System, Lysholm Knee Scale, respectively.
Results: Virtual rehabilitation significantly improved all functional outcomes in patients with ACL injury ($p<0.05$). A significant difference between the groups was found in postural stability and functional status in favour of the intervention group ($p<0.05$).
Conclusions: According to the results, virtual rehabilitation may be beneficial on postural stability, and functional status to treat patients with anterior cruciate ligament reconstruction.
Acknowledgements: This study was supported by Marmara University, Scientific Research Research Projects Committee (Project Number: SAG-C-DRP-200716-0374) and TÜBİTAK, The Scientific and Technological Research Council of Turkey (Project Number: 115E351).

Keywords: Virtual Rehabilitation, Technotherapy, Ligament Injury

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DOES VIRTUAL REHABILITATION AFFECT KNEE PROPRIOCEPTION, AGILITY AND POSTURAL STABILITY?

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Abstract:
Purposes: The purpose of the study was to examine the effects of virtual rehabilitation on knee proprioception, agility, and postural stability in healthy and sedentary adults.
Methods: Twenty-two healthy and sedentary adults studying in Marmara University were participated in the study. Virtual rehabilitation was given with a Nintendo Wii device for a total of four weeks, three sessions per week. Knee proprioception, agility, and postural stability were measured with Biodex Pro System 4, Zig – Zag Agility Test, Pedalo Sensamove System, respectively. All assessments were repeated in baseline and after 4-week rehabilitation program.
Results: Virtual rehabilitation significantly improved level of agility ($p=0.001$) and postural stability ($p=0.028$) in healthy and sedentary subjects. However, no significant difference was found in measurement of knee proprioception ($p<0.05$) in these people.
Conclusions: According to the results, virtual rehabilitation may be beneficial on agility and postural stability in healthy and sedentary individuals. The results of this study may assist physiotherapists in adding a new therapeutic modality to rehabilitation to use in clinics. We suggest that new studies may search the changes of these clinical parameters in patients who have proprioceptive, balance and agility deficits.
Acknowledgements: This study was supported by Marmara University, Scientific Research Projects Committee (Project Number: SAG-E-120314-0058).

Keywords: Virtual Rehabilitation, Proprioception, Agility, Postural Stability

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ATTITUDES OF UNDERGRADUATE PHYSIOTHERAPY STUDENTS TOWARDS INFORMATION AND COMMUNICATION TECHNOLOGIES USE

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Abstract:
Purpose: To investigate the attitudes of undergraduate physiotherapy students towards the using of information and communication technologies (ICT).
Methods: This study, which is a descriptive survey, conducted among 173 undergraduate physiotherapy students (3rd and 4th year; 112 women; mean age, 22.05±1.91 years). "Technology Attitude Questionnaire of Physiotherapy Students", which was prepared by us and composed of 16 questions, was used to assess the attitudes of undergraduate physiotherapy students towards ICT use.
Results: Only 35.3% of students reported they felt adequate about ICT and 80.3% of pointed out that they did not attend a class about ICT. The prevalence of ICT use was highest in the mobile phone (97.7%), notebook (85.6%) and internet (72.8%) with 8.83±2.63, 7.01±2.25 and 5.39±1.64 hours using per day, respectively. They indicated that they generally use their computer for the purposes of internet access (69.4%), watching TV/video (67.5%) and education (55.5%) whereas they usually prefer to use mobile phone for talking/sending messages (85%), social media access (78.6%) and sending/receiving photos, videos, and audio messages (74.1%). Total 81% of students reported that technology use in physiotherapy has important role for improvement of the patient's functionality and 85.5% of them indicated that they would use technology in their professional life.
Conclusions: ICT using was highly prevalent among undergraduate physiotherapy students but its educational application was limited compared with general purposes. Although they have an opinion about the importance of using technology in physiotherapy, they feel themselves inadequate in using ICT. Hence, technology use in physiotherapy education should be encouraged.

Keywords: Keywords: Information And Communication Technology, Physiotherapy, Technology Attitudes, Education

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INFORMATION AND COMMUNICATION TECHNOLOGIES UTILIZATION IN GERIATRIC POPULATION

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Abstract:
Purpose: To investigate the general utilization of information and communication technologies (ICT) in geriatric population.
Methods: The descriptive study included 54 (29F, 25M; 73.98± 6.61 years) geriatric people from nursing home. They have been staying at nursing home for average 4.83±3.64 years. "Technology Utilization Questionnaire" which is 13 items structured questionnaire, was used to evaluate general utilization of ICT in geriatric population.
Results: Only 18.5% of geriatric felt themselves sufficient to use ICT effectively and 9.3% of them stated that they had an education about ICT utilization. The majority of them (70.4%) do not follow the social media. The prevalence of ICT utilization was highest in mobile phone (100%), internet (40.7%) with 10.64±10.72, 1.79±0.36 hours using per day, respectively. However; only 4 geriatric people use the desktop computer and tablet or notebook (7.4%) and they prefer the utilization of computer for internet (27.8 %). Mostly geriatrics did not use computer for playing computer games (92.6%), for listening to music (75.9%) and for educational purposes (83.3%). Total 72.2% of geriatrics pointed out that the technology utilization is an essential for socialization and participation in society and the importance of ICT usage for daily life was 8.31±1.83 out of 10.
Conclusions: Although the geriatric population is aware of the importance of technology use in daily life and role in socializing, the utilization of ICT in daily living was found low. The use of technology in the geriatric population should be encouraged and they should be supported with ICT utilization educations.

Keywords: Information, Communication, Technology, Utilization, Geriatrics

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COMPARISON OF SATISFACTION OF PHYSIOTHERAPISTS WORKING IN DIFFERENT FIELDS IN TERMS OF TECHNOLOGICAL EQUIPMENT ACCESSIBILITY LEVELS

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Abstract:
Purpose: This study aims to compare the satisfaction levels of physiotherapists working in private institutions or public institutions and organizations in terms of technological equipment accessibility levels in the working environment and conditions.
Methods: One hundred and fifty physiotherapists working in Istanbul were included in the study. Seventy nine of the participants were working in private institutions (Group 1) and 71 in public institutions and organizations (Group 2). After receiving the demographic information of the participants, "Work Environment Satisfaction Questionnaire of Physiotherapists" which was prepared by us was applied face to face. In the sub-parameters of the questionnaire, the working environment and conditions were questioned in terms of technological equipment accessibility levels.
Results: The mean age of Group 1 was 29.32 ± 5.92 years and that of Group 2 was 33.63 ± 9.08 years (p = 0.01). The total score of the questionnaire was 58,54 ± 15,24 in Group 1 and 43,24 ± 13,36 in Group 2. Total score of the 'Working Environment and Conditions' subscale was 8,35 ± 2,57 in Group 1 and 4,96 ± 2,68 in Group 2. It was found that Group 1 was superior in terms of the total score of the questionnaire applied and the satisfaction level in terms of 'Working Environment and Conditions' subparameter (p = 0,00).
Conclusions: This study showed that physiotherapists working in private institutions are more satisfied with the working environment and conditions in terms of technological equipment accessibility levels than physiotherapists working in public institutions and organizations.

Keywords: Physiotherapist, Satisfaction, Technological Equipment Accessibility

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EFFECTS OF ROBOTIC WALKING EXERCISES ON SPASTICITY AND MOBILITY IN STROKE PATIENTS: A PILOT STUDY

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Abstract:
Purpose: Walking exercises are an important part of neurologic rehabilitation. This study was conducted to investigate the effects of robotic walking exercises on lower extremity spasticities of stroke patients and their mobility gains by comparing them with a control group selected randomly.
Methods: 13 Stroke patients in the age range of 37-71 years participated voluntarily in this study. 7 stroke patients, getting conventional treatment and robotic rehabilitation, were selected as the Working Group and 6 stroke patients, getting only conventional treatment, were selected as the Control Group. The physiotherapists applied Modified Ashworth Scale (MAS) and Rivermead Mobility Index (RMI) before the treatment and after the treatment period of 3 weeks.
Results: Within group comparisons before and after the treatment revealed a statistically significant improvement in mean scores of MAS (p=0,017) and RMI (p=0,003) in Working Group. In the Control Group, a significant improvement was only found in RMI (p= 0,007) score after the treatment. When the groups were compared in terms of change score, it was seen that Working Group recovered more than the Control Group in terms of RMI (P=0,019).
Conclusions: In this study, it was found that robotic walking exercises positively affect spasticity and mobility in stroke patients. Scientific studies involving more participants are needed.

Keywords: Stroke, Robotic Walking Exercises, Spasticity, Mobility

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THE RELATIONSHIP BETWEEN PULMONARY FUNCTIONS AND PLANTAR PRESSURE DISTRIBUTIONS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Abstract:
Purpose: Chronic obstructive pulmonary disease (COPD) is associated with a limp, a shuffle or other walking abnormalities which are appeared parallel with COPD severity. One of the possible explanation of these reported disorders during walking could be related with poor peripheral muscle strength which is commonly seen in this population. It is not only led to disturb biomechanical aspects of normal walking, it may also alter plantar pressure distribution which is essential for proper co-contraction mechanisms of lower extremity muscles (1-3). However, the literature is lacking in this field and therefore we aimed to investigate whether severity of COPD was associated with altered plantar pressure distributions during walking.
Methods: 18 individuals diagnosed with COPD (51-78 years old, mean age: 62.3±7.6) were recruited to the study. Severity of COPD classified with Global Initiative for Chronic Obstructive Lung Disease (GOLD) according to the value of expired volume in 1s (Forced Expiratory Volume in 1 s or FEV1). Stage 1 corresponds to FEV1≥80% of predicted; stage 2 50%≤FEV1<80% of predicted; stage 3 30% ≤FEV1 < 50% of predicted; stage 4 FEV1< 30% of predicted (4). Measurement of FEV1 performed using with spirometer according to ATS/ERS criteria. Plantar pressure parameters for both feet were assessed by using EMED pedobarography device (Novel, Munich, Germany). The subjects were asked to walk barefoot 5 times for each foot. Data was analysed by dividing into 3 zone; hindfoot, midfoot and forefoot. Maximum force (normalized to BW) and peak pressure were calculated. Spearman correlation test was performed for statistical analysis.
Results: 2 patients were in stage 2 according to GOLD, 8 patients in stage 3 and 8 patients in stage 4. There was a good correlation between the FEV1 and maximum total foot force, maximum hindfoot force (rho: 0.531, p=0.023; rho: -0.480, p=0.44, respectively). However, there was no correlation between the FEV1 and other area force values, and peak pressure of foot.
Conclusions: Our results showed that increase in severity of COPD cause to increase in maximum total force foot decrease in maximum hindfoot force. It may be related with walking style of patients such as limb or shuffle caused by severity of COPD. Next studies should be designed with more participant to determine whether there was a relationship between COPD stages.
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Keywords: Chronic Obstructive Pulmonary Disease, Pulmonary Functions, Plantar Pressure Distributions

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DEVELOPMENT OF ELECTRO-MODULAR ANTISPASTICITY DEVICE (EMAC)

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Abstract:
Purpose: The aim of study is to improve EMAC. This device is developed for ankle-foot which is completely local production. İt has 4 component which have already used in clinics electrotheraphy, movement of joint, hot pack/cold pack agents and auditory biofeedback. These will be very helpful to physiotherapists for clinical use. İn addition, it will increase the effectiveness of the treatment and decrease costs.
Methods: 3D drawing of the device was carried out between November 2017 and January 2018. In the second phase, 30 physiotherapists (mean worked for 6.25±1.50 years on average) working in the clinic and 15 physiotherapy practitioners (mean worked for 14.75±4.75 years on average) were interviewed about the device in the "effectiveness questionnaire" between March and January 2018. In the hird phase, The device was simulated in 3D in SolidWorks program about workability, feasibility and productivity tests. Expected values and productivity test results were recorded and compared with the Pearson correlation test.
Results: A positive correlation was found between expected values data and productivity data (respectively $p<0.001$,$r=1,00$). İn addition, a positive correlation was found between physiotherapists and physiotherapy pratctitioners opinions as well(respectively $p<0.001$,$r=1,00$). Results showed high satisfaction values.
Conclusions: EMAC will be available, conveinent and easy to use for especially post stroke and acute ankle foot injury patients in clinics. This device will be envisaged as a technology that users without limitation of time and space allows access to public and private usability such as they can buy for use at home. The device will be applied over 10 patients for 4 weeks after completion and the results will be completed in June 2018. Our study was supported within the scope of 2209-A-University Student Research Projects Support Program.

Keywords: Health, Mechatronic, Treatment, Physiotherapy

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LOW BACK PAIN LEAD TO LOSS IN PROPRIOCEPTION SENSE OF TRUNK IN YOUNG INDIVIDUALS

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Abstract:
Purpose: Although pain is a protective sense of the body to avoid further injuries, it may influence other somatosensory and somatomotor inputs related with its region. On the other hand proprioception is one of the most important somatosensory input that protect body from injury. Evidence suggests that pain have counfounding influence on muscle inhibition and proprioception in knee problems. Therefore the aim of the study was to investigate whether low back pain, which is so common health problem even in young individuals, lead to loss in proprioception sense of trunk.
Methods: Thirtyeight individuals aged between 19 and 47 were voluntarly participated in the study. Pain intensity was assessed with VAS. Roland Morris and Ostwestry disability scales were questioned to see disability level. Propioception of trunk was measured by belt with laser pointer.
Results: Low back pain intensity was found to be correlated with proprioception sense of trunk in lateral flexion movement. ($p=0,004$, $r=0,461$) There was no correlation between pain intensity and proprioceptive measurements of flexion and extension movements ($p>0.05$) as well as disability scores ($p>0.05$)
Conclusions: We have revealed that pain can disturb proprioception sense of trunk especially in lateral flexion direction even the subjects were so young. The association of pain with proprioception sense of trunk should prompt future studies to reveal influence of pain on somatosensory factors in low back pain.

Keywords: Low Back Pain, Proprioception, Trunk

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VALIDITY AND RELIABILITY OF THE MARVAJED PROTOCOL IN THE EVALUATION OF SHOULDER PROPRIOCEPTION

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Abstract:
Purpose: The aim of this study was to determine validity and reliability of the MarVAJED device that developed for training and controlling joint in shoulder proprioception.
Methods: Thirty (21.80±1.71) healthy cases who are studying at Marmara University, Health Science Faculty involved in this study. After recording cases' demografic data, their proprioception evaluation is made with Biodex® Pro Sistem 4 and MarVAJED device. Upper component of MarVAJED device was fixed to projection of T12 in front of the body and body side that as referance point during the measure of the flexion and abduction, respectively. The other component was fixed on the anterior and middle part of the deltoid during the measure of the flexion and abduction, respectively. Cases were requested to sit on to Biodex® while MarVAJED device was on their body simultaneously. Their shoulder joint was assessed at 30°/60° according to Biodex®. The cases were kept waiting for 5 seconds at each position to learn the test positions hereafter requested to find this positions while the eyes were closed. When cases said "I found", value on the devices were recorded by two evaluators separately. Each evaluation was repeated 3 times and average of values were compared. Values in this study were assessed by variance analysis of repeated measures. Tukey post hoc test used for dual comparison and Pearson Correlation test used for correlation.
Results: The correlation between the Biodex Pro System 4 and the MarVAJED Proprioception Protocol was positive in all angular measurements(p=0.000). Cronbach's Alpha value was 0.993.
Conclusions: According to the results of this study, the relationship between Biodex® and MarVAJED device was excellent. It's determined that MarVAJED is valid and reliable system in shoulder proprioception evaluation. Positions used in this study can be choice as referance in the future for shoulder evaluation.

Keywords: Marvajed, Proprioception, Shoulder

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THE EFFECTS OF 4-WEEK REHABILITATION ON VISCOELASTIC PROPERTIES AND FUNCTIONAL OUTCOMES IN STROKE PATIENTS

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Abstract:
Purpose: The purpose of this study was to examine the effects of 4-week rehabilitation on muscle viscoelastic properties, level of functional independence, and stroke impact in patients with stroke.
Methods: Twenty-five patients diagnosed with chronic stroke were participated in the study. Subjects had no history of lower extremity injury, vestibular or postural stability problems. Primary outcome was muscle tone, muscle stiffness and elasticity of rectus femoris and biceps brachii in the study. Secondary outcomes were level of functional independence and stroke impact. The patients were evaluated with a Myoton in pre– and post – treatment. They had conventional rehabilitation programs with neurodevelopmental therapy five times a week for 4 weeks.
Results: There were statistically significant improvements in measures of level of functional independence and stroke impact ($p<0.05$) between pre- and post – treatment. On the other hand, there were no significant differences in terms of tone, stiffness, and elasticity ($p>0.05$).
Conclusions: According to the results of our study, 4-week rehabilitation may not significantly cause any change on biomechanical and viscoelastic properties of the muscles. Rehabilitation improved the functional outcomes such as functional independence, and stroke impact. We suggest that future studies may examine the changes of biomechanical and viscoelastic properties in patients with stroke compared to healthy subjects.

Keywords: Stroke, Rehabilitation, Outcome

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THE EFFECTS OF DUAL – TASK TRAINING ON MOBILITY AND FUNCTIONAL CAPACITY IN GERIATRICS WITH CHRONIC STROKE

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Abstract:
Purpose: The purpose of our study was to investigate the effects of dual – task training on mobility, and functional capacity in geriatrics with chronic stroke.
Methods: Twenty geriatrics with diagnosed with stroke were participated in our study. Mobility and functional capacity levels were measured with Rivermead Mobility Index, Stair Up&Down respectively. Hand grip strength was also evaluated with pinch meter and hand dynamometer. In addition to conventional physiotherapy-rehabilitation and neurodevelopment treatment approaches, dual – task training was applied five times in a week for 8 weeks. After the treatment, all assessments were repeated.
Results: There were statistically significant improvements in measures of mobility and functional capacity between pre- and post – treatment in both groups ($p<0,05$). On the other hand, no significant difference was observed in terms of hand grip strength ($p>0,05$).
Conclusions: Based on our findings, we found that dual – task training applied as an adjunct to conventional physiotherapy and rehabilitation and neurodevelopment treatment approaches may be beneficial on mobility and functional capacity. Dual-task training may be considered as part of the rehabilitation process in geriatrics with chronic stroke. Therefore, treatment protocols including dual-task training may be beneficial for the physiotherapists who were working in stroke clinics.

Keywords: Stroke, Geriatrics, Mobility, Functional Capacity

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ATTITUDES OF PHYSIOTHERAPISTS TOWARDS INFORMATION AND COMMUNICATION TECHNOLOGIES UTILIZATION

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Abstract:
Purpose: To investigate the attitudes of physiotherapists towards the utilization of information and communication technologies (ICT).
Methods: The descriptive study included 88 physiotherapists (74F, 14M; 31.56±8.28 year, 2.60±1.09 years of working experience). "Technology Attitude Questionnaire of Physiotherapists", which is 20 items structured questionnaire, was used to evaluate attitudes of physiotherapist towards ICT utilization.
Results: The study revealed that total 43.2% of physiotherapists were self-sufficient in ICT utilization and 75% of them did not get any education about ICT. The prevalence of ICT utilization was highest in mobile phone (100%), internet (97.7%) and desktop computer (78.4%) with 4.74±4.18, 4.74±4.18 and 2.23±2.70 hours per day, respectively. The prevalence of technology usage in physiotherapy and rehabilitation as an assessment tool and treatment approach was 60.2% and the importance of ICT usage was reported 7.36±1.83 out of 10. While Functional Electrical Stimulation (FES) (%69.3), Extracorporeal Shock Wave Therapy (ESWT) (67%), Virtual Reality (VR) (67%) and Low-Level Laser Therapy (64.8%) were experienced by physiotherapists, only 10.2% of participants used tele-rehabilitation. While 62.5% of the participants reported that use of ICT in physiotherapy and rehabilitation has an importance to improve the physical function of the patient, 88.6% of the participants have opinion that technology could not take place of physiotherapy.
Conclusions: The technology attitudes of physiotherapists were commonly in electrotherapeutic agents and VR and less of the participants use the tele-rehabilitation in practice. Although technology will not take the place of physiotherapy, utilization of novel technology should be widespread as a part of physiotherapy and rehabilitation.

Keywords: Information And Communication Technology, Physiotherapy, Technology Attitudes

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DEVELOPMENT OF TURKISH MOBILE APPLICATION FOR SIX MINUTE WALK AND SHUTTLE WALK TESTS AND INVESTIGATION OF USABILITY

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Abstract:
Purpose: The aim of study is to improve a Turkish mobile health Application (TMHA) for Six Minutes Walking and Shuttle Walk Tests. The application is planned to record real-time data and archive it, to prevent loss of information, to reduce the equipment requirement and to investigate the suitability of the tests with the scales in the clinic and the ease of use by the users.
Methods: Application software was carried out between January- March 2017. In the second phase, sixty healthy students (mean age 21.21±0.96 years) and 30 patients (mean age 62.96±7.06 years) with lung disease were evaluated.
Individuals were tested with the mobile application according to international procedures. The walking distance (WD) and the expected distance (ED) were recorded. A mobile phone application user satisfaction survey (MPAUSS) was applied to 102 users for assessment to satisfaction. Pearson correlation and frequency analysis was applied to statistical analysis
Results: A positive correlation was found between clinical data and mobile application data (WD, ED) of two different groups (respectively $p<0.001$,$r=1,00$, $p<0.001$,$r=1,00$). MPAUSS results showed high satisfaction values.
Conclusions: TMHA is available, conveinent and easy to understand for patients and healthy people. This application is envisaged as a technology that users without limitation of time and space allows access to public and private networks such as the Internet without using a cable etc. to exchange data or to communicate without interruption. Our study was supported within the scope of 2209-A-University Student Research Projects Support Program.

Keywords: Cardiopulmonary,Exercise,Mobile Healthy

**TUBİTAK 2209-A University Student Research Projects Support Program*

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FINGER ORTHOSES DESIGN BY COMPUTER AIDED DESIGN PROGRAM FOR 3D PRINTING

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Abstract:
Purpose: The purpose of this study was to design the more appropriate and low cost finger orthoses for the patients with finger deformity by using Computer Aided Design (CAD) program.
Methods: One healthy case's finger height and width measurement was taken at 4 mm intervals to make the orthosis. Computer Aided Design program was used to obtain a solid model for rapid production with 3d printer. Scetch planes were created using 'ellipse command' according to height and width in each plane. Then all planes were combined with the "Loftand" the finger shape was obtained. By adding the filter to the end of the finger, it was aimed to create a model that was more suitable for the main model. Finger model was placed in a rectangle solid model and it was cut with extrusion. So, finger mold was obtained. Proksimal interphalangeal (PIP) joint's palmar area of the finger mold was extruded by spline command according to 3 point principles. The solid model was recorded as STL to prepare for 3D printing.
Results: Nineteen scetch planes were used for finger that was 8 cm. There were 4 mm intervals between each plane. This deformity orthesis's thickness and length will be 2 mm and 4 cm, respectively. A finger deformity orthesis's cost will be reduced by 20 %.
Conclusions: We designed a deformity orthoses for Romatoid Artrit by using 3 point principle in the current study. We think that the CAD program will eliminate the need to create orthosis mold for each patient.

Keywords: Finger Orthoses , 3d Printing, Physiotherapy

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THE EFFECTS OF EXERCISE PROGRAM ON STABILITY LIMITS OF ATAXIC PATIENTS

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Abstract:
Purpose: Stability limits is the ability to keep the gravity center of the body within the limits of the support surface and is a part of the biomechanical constraints of the most important components of postural control. Sensory and motor limitations that occur after neurological disorders cause misperception of the stability limits, leading to loss of balance and falls. Stability limits are also seriously affected in ataxia patients. The aim of this study was to evaluate the effect of 8-week exercise program on stability limits objectively and subjectively.
Methods: 20 cerebellar ataxic individuals whose mean age was 34.00±9.15 were included in the study. Indiviuals were treated for 3-days in a week, 1-hour in each day for 8 weeks. Stabilization, balance and functional exercises, which were created by considering the individual needs of the patients, were applied in exercise programs. The assessments were administered by a blind physiotherapist before-after treatment program. Stability Limits were assessed objectively with Computerized Dynamic Posturography, Stability Limits Test(SLT) and subjectively with Functional Reach Test(FR). Also disease severity were measured with International Cooperative Ataxia Rating Scale(ICARS).
Results: FR, total-ICARS scores were improved after exercise program($p<0,05$). SLT, posture and gait subparameter of ICARS were not changed($p>0,05$).
Conclusions: FR is a frequently used test in neurological rehabilitation clinics. Although the results of our study did not show any changes in post-treatment walking and posture, and these results were consistent with the posturographic results, the improvement in FR was questionable in terms of the accuracy of the test for our disease group.

Keywords: Ataxia, Stability Limits, Postural Control, Assessment

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THE COMPARISON OF COMPUTERIZED DYNAMIC POSTUROGRAPHY TEST RESULTS OF ATAXIC AND HEALTHY INDIVIDUALS

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Abstract:

Purpose: Computerized Dynamic Posturography(CDP) is well documented in literature as an objective method of differentiating sensory,motor and central adaptive functional impairments of balance.It assesses the integration of visual,vestibular and somatosensory systems.The aim of our study was to compare CDP results,which are accepted as the gold standard in assessing balance in ataxic and healthy individuals.

Methods: 20 ataxic(13females,7males) and 20 healthy(8females,12males) individuals were included.Sensory Organization Test(SOT),Limits of Stability Test(LOS) and Unilateral Stance Test(UST) were used in CDP.The parameters evaluated in SOT were the composite equilibrium score, scores of 6 conditions assessing the proprioceptive(C1,C2,C3),visual(C4),vestibular(C5,C6) system scores.In LOS ,parameters like reaction time,movement velocity,directional control,maximum and end-point excursion were evaluated.In UST the speed of postural oscillations were evaluated while standing on one leg in eyes opened-closed positions.

Results: The mean age of ataxic and healthy individuals were 34,158,65 and 31,256,33 years, respectively.There were statistically significant differences between the composite equilibrium scores,C1,C2 and C3 scores in SOT of ataxic and healthy individuals($p<0,05$).There were statistically significant differences at 4 positions in UST and there were statistically significant differences at LOS parameters,especially directional control and end-point excursion in several directions between ataxic and healthy individuals($p<0,05$).

Conclusions: It was found that the ability of using proprioceptive system of ataxic individuals were poor while maintaining balance,they were unable to overcome the narrowed support surface thereby increasing postural oscillations.In addition,they haven't been able to achieve a controlled-targeted weight transfer,like healthy individuals.There is a need for studies to increase the number of cases for the results to be normative in posturographic values of ataxic individuals.

Keywords: Ataxia, Balance, Posturography

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EFFECT OF SITTING HEIGHT ON MUSCLE ACTIVATION LEVELS OF LOWER EXTREMITY DURING SIT TO STAND

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Abstract:
Purpose: It is known that healthy adults perform the sit to stand(STS) activity approximately four times per hour. It's thought that one of the most influential factors in STS is sitting height.Aim of this study is the investiation of activation levels of Rectus Femoris(RF),Biceps Femoris(BF),Tibialis Anterior(TA) and Soleus(SOL) muscles in healthy adults during STS from diffirent sitting heights.
Methods: 15 healthy volunteers(9M,6F) were included in this study.After receiving demographic information of individuals,Noraxon superficial electromygraphy(EMG) device was used to asses the activation of bilateral RF,BF,TA and SOL muscles.EMG records were taken bilaterally at position of maximum voluntery isometric contraction(MVIC) and during STS activities from three different heights by setting individuals' ankles in neutral positions and knee flexion angles at 30°-60°-90°.Records were analyzed by Noraxon myoMUSCLE EMG Analysis Software.
Results: The average age of the individuals were 29.60±7.46. Statistically significant difference was found between activation levels(%MVIC) of bilateral RF,TA and left BF during STS from three different heights($p<0.05$).
Conclusions: When the results of the study were examined; it's seen that the muscle activation levels of the STS,which is known to be influenced by many individual and environmental factors,decreased with the increase of sitting height.As the sitting height of individuals increased,the number of active motor units and muscular effort during STS decreased.According to these results,STS that is challenging for many patients with orthopedic or neurological problems in everyday life,will become much easier with individual regulation of environmental factors such as sitting height.Individuals who make STS activities easier will make their daily lives more functional and independent.

Keywords: Sit To Stand, Sitting Height, Electromyography, Muscle Activation

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DETERMINATION OF UPPER EXTREMITY AND TRUNK KINEMATICS IN WASHING THE FACE ACTIVITY

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Abstract:
Purpose: Daily life and participation are significantly affected in individuals with pyhsical, cognitive and emotional problems.Aim of this study is to describe normal kinematic properties of the washing face activity which is one of self-care and hygiene activities related to level of independence in ADL and to define normative data that can be used for task-oriented and technology-assisted rehabilitation approaches.
Methods: 46 right-dominant healthy subjects (22 males, 24 females) were included in the study. C7T1, L5S1,T12L1 joints and bilateral upper extremity joints's kinematic changes were recorded during activity by using MVN Awinda IMU sensors.Measurements were performed on same conditions for each participant(3 repetitions,started and finished anatomic position) and mean angular changes of joints were calculated.
Results: Average age of participants was found to be 25.73±4.17 years and mean completion time of the activity was 7.82±1.35 seconds.Example of data obtained from the joints(starting-max-finishing values),flexion/extension angles are listed as follows.Angular changes in C7T1 are 18.51±3,62°/23,93±2,39°/17,21±3,27° flexion.Angular kinematics in T12L1 are 1,12 ±0,90°/11,39 ± 1,18°/0,85 ± 1,08 ° flexion. Angular kinematics in L5S1 2,51±2,03°/25,63 ± 2,65°/1.9 ±2,44° flexion. Angular kinematics in right glenohumeral joint described as 2,14±4,53° extension/64,57±11,86 °flexion/2,75±5,26°extension.Angular kinematics in right elbow described as 12,52±8,10°/129,73±10,70°/12,26± 8,96° flexion. Angular kinematics in right wrist described 10,19 ± 9,00°/ 48,10 ± 13,16°/10,94 ± 9,76° flexion.
Conclusions: This is the first study which described the kinematic values of upper limb and trunk joints during bilateral- symmetrical activity with IMU sensors.We believe that the results;(i)will contribute to technological rehabilitation systems and understanting of normal motor control mechanisms,(ii)will determine to priorities for rehabilitation.

Keywords: IMU Sensors, Kinematic Analysis, Activity Analysis, Motion Analysis

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A NEW HOME TRACKING SYSTEM WITH MICROSOFT KINECT IN ELDERLY PEOPLE: A PILOT STUDY

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Abstract:
Purpose: The aim of this study is to develop and evaluate the accuracy of the home tracking system which measures functional mobility and heart rates of elderly people who lives alone at home and transfers those data to the health care professionals.
Methods: The study included 12 elderly people with a mean age 69.66±3.25 who residing in a local nursing home. Functional mobility of participants were analysed with the system(Microsoft Kinect 2.0 and a mini PC) installed at their rooms for 8 hours. Their heart rate measurements were taken at distances of 1 meter, 2,5 meters, 4 meters both manually and with the use of the software system.
Results: Accuracy rates for functional mobility were found 100% for standing on the ground, 67% for standing on the elevated surface, 83% for sitting on the ground, 83% for sitting on the elevated surface, 50% for lying on the bed, and 50% for walking. There was no statistically significant difference between manually and system-measured heart rate values at the distances above($p>0.05$).
Conclusions: The system measured functional mobility and heart rates with a high degree of accuracy. It is thought that this pilot study should be supported by further analysis and software improvement.

Keywords: Software, Posture,Nursing Homes, Elderly

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THE EFFECTIVENESS OF VIRTUAL REALITY BASED REHABILITATION IN PATIENTS WITH KNEE OSTEOARTHRITIS – A PILOT STUDY

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Abstract:
Purpose: We aimed to investigate the effects of virtual reality based rehabilitation on muscle strength of lower extremities, range of motion(ROM), pain, proprioception, balance, kinesiophobia and functional status in patients with knee osteoarthritis.
Methods: Twenty patients (16 female, 4 male) with knee osteoarhritis aged 40 to 65 years (58.2 ± 7.58) who were at stage of 2-3 according to the Kellegren Lawrence radiological evaluation were included in the study. The patients were randomly divided into two groups as study group (conventional physiotherapy + virtual rehabilitation) and control group (conventional physiotherapy). Electhrotherapy and exercise program were applied to both of the groups along 5 days a week for 6 weeks but virtual rehabilitation only applied to study group via the system MarVAJED. ROM, pain, kinesophobia, proprioception, balance, muscle strength and functional status of the patients were evaluated at the beginning and end of treatment.
Results: At the end of the treatment positive significant difference were found between two groups in muscle strength (isokinetic), balance, proprioception, kinesophobia and functional status while for ROM values a significant increase was found only in the virtual rehabilitation group ($p<0,05$). In comparison between the groups, proprioception, ROM, functional status and balance scores were significantly increased in the virtual rehabilitation group according to the control group; and kinesophobia decreased significantly ($p<0,05$).
Conclusions: According to our results that combined exercise programs with virtual reality had positive effects on ROM, proprioception, balance and functionality when applied together with conventional physiotherapy. Physiotherapy and rehabilitation programs, including virtual reality, are expected to be more successful than conventional physiotherapy.

Keywords: Knee Osteoarthritis, Virtual Reality, Rehabilitation

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A VIRTUAL REALITY BASED EXERCISE DESIGN WITH PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION

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Abstract:
Purpose: The aim of this study is to develop a computer system that analyses the movement patterns of proprioceptive neuromuscular facilitation (PNF) techniques which are used to facilitate and strengthen muscle groups in order to improve functional movement.
Methods: The study included 9 female and 6 male university students (mean age=21.2 ±2.21) with different anthropometric features. The PNF upper and lower extremities movement patterns were taught to the system which consists of a motion tracking device (MicrosoftKinect2.0) and a mini PC which runs a combination of machine learning and pattern recognition algorithms by demonstrating the movement patterns 10 times.
Results: The accuracy rates for the PNF movement patterns were 100% for upper extremity flexion-abduction-external rotation and extension-adduction-internal rotation; 98.6% for upper extremity flexion-adduction-external rotation and extension-abduction-internal rotation; 90% for lower extremity flexion-abduction-external rotation and extension-adduction-internal rotation; and 93.3% for lower extremity flexion-adduction-external rotation and extension-abduction-internal rotation.
Conclusions: The combination of exercises aimed at improving functional movements in activities of daily living with technology is thought to be both facilitating and support for health professionals. Our system which is developed to be used at home measures the PNF movement patterns that healthcare experts use to increase functional movement with high accuracy.

Keywords: Proprioceptive Neuromuscular Facilitation, Movement Pattern, Occupational Therapy

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DOES VIRTUAL REALITY BASED REHABILITATION EFFECTS COGNITIVE FUNCTION OF CHILDREN WITH HEMIPLEGIC CEREBRAL PALSY?

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Abstract:
Purpose: Cerebral palsy (CP) is a comprehensive term covering non-progressive motor and cognitive impairment syndromes caused by lesions of the brain occurring early in development. The aim was to evaluate the effects of virtual reality (VR) based, the rehabilitation program for children with CP on cognitive abilities and independence in activities of daily living (ADL).
Methods: Twenty-two participants with hemiplegic CP with 11.18 ± 3.37 years mean age was conducted to the study. Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-Ch) and Wee-Functional Independence Measurement (WeeFIM) were used to assess children. Each child received two VR sessions in a week for 6 weeks. Sessions were between 45 and 60 minutes in duration. Training was performed using the Microsoft Kinect for PC games software, including running, jumping, boxing, and kicking in both standing and sitting positions.
Results: Twenty-two children with hemiplegic CP (10 females and 12 males) were included. After 6 weeks of intervention, all scales of Dotca-Ch and independence in ADL (WeeFIM) were repeated. There was a statistically significant increase in the differences between the pre and post interventions ($p<0.05$).
Conclusions: Our results showed that 6 weeks of VR based rehabilitation increased cognitive skills and independence in activities of daily living. Using VR in cognitive rehabilitation and to enhance independence in ADL were recommended in hemiplegic CP rehabilitation and researchers.

Keywords: Cerebral Palsy, Cognitive Function, Cognitive Rehabilitation, Virtual Reality

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RELIABILITY AND VALIDITY OF THE CANADIAN OCCUPATIONAL PERFORMANCE MEASURE IN PEOPLE WITH MULTIPLE SCLEROSIS

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Abstract:
Purpose: This study was conducted to determine whether people with Multiple Sclerosis (MS) was designed to investigate the validity and reliability of Canadian Occupational Performance Measure (COPM).
Methods: People with MS scores of 24 or higher were included in the study to the Mini Mental State Examination. People with any neurological, mental, and physical illnesses accompanying MS were not included in the study. The correlation between COPM and Expanded Disability Status Scale (EDSS) and Multiple Sclerosis Multiple Sclerosis Quality of Life-54 physical and mental scores (MSQoL-54) was assessed for external validity. For reliability, test-retest was performed with 1 week search and Cronbach' a coefficient was checked.
Results: When external validity of COPM was examined, there was a moderate and high correlation between MSQoL-54 and EDSS scores. In consequence of these examinations, it was determined that the COPM was a valid measurement. On the reliability test, test retest and internal consistency coefficient were checked. Cronbach's a internal consistency coefficient was evaluated after re-testing with one week's search. Cronbach's a was found to be in the range of 0.9-1.
Conclusion: COPM was found to be a valid and reliable measurement tool that can be used academically and clinically in many diseases and disorders, especially people with MS.

Keywords: Canadian Occupational Performance Measure, Reliability, Validity, Multiple Sclerosis

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WHERE/WHO DO YOUNG WOMEN TAKE INFORMATION ABOUT EXERCISE? - PRELIMINARY REPORT

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Abstract:
Purpose: There is so much unreliable information about exercise in the internet. Due to easy acces to internet, young women may prefer using internet than consulting a physiotherapist. Our purpose is to determine where or who young women prefer to take information about exercise.
Methods: Participants of this study consists of 233 women (mean age: 32.57±8.03 yrs; mean BMI: 23.65±3,75 kg/m2) who came to health care center in Denizli, Turkey. After demograhic data were recorded, young women were interrogated about their exercise knowledge, exercise behavior and injury history with multiple choice questions.
Results: The descriptive statistics of our study showed that; 49.78% of women thinks they have enough information to exercise and they are informed from internet (58.97%), doctors (32.47) and physiotherapists (20.51%) in respectively. They prefer to get exercise information from doctors (43.77%), internet (32.61%) and physiotherapist (28.32%) respectively. 30.47% of participants do exercises showing on TV programs and 11.26% of these participants get injured while doing.
Conclusions: Most of women participating in this study prefer to be informed by internet,which is an unreliable information source about exercise, over physiotherapists. This situation may be because of the fact that physiotherapy hasn't recognised well yet in Turkey. Although we found a small ratio, women may get injured while doing exercises showing on TV. So mainstream programs about exercise on TV must do warnings to prevent injuries.

Keywords: Internet, Exercise Knowledge, Women Health

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ESTIMATING OF BALANCE STATUS IN HEMIPARETICS: AN ARTIFICIAL NEURAL NETWORK IMPLEMENTATION

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Abstract:
Purpose: The aim of the study is to estimate balance status of hemiparetics using an Artificial Neural Network(ANN) implementation.
Methods: Fourty-five hemiparetics(Female:14,Male:31) were included. Balance Evaluation Systems Test(BESTest) was used to evaluate balance status of the participants. We also used Functional Reach Test(FRT), One Leg Standing Test(OLST) (left and right side), 6 Meter Timed Walk(6MTW), and Timed Up&Go Test(TUG) to predict the BESTest total score. IBM SPSS Statistics 21 was used to analyze descriptive statistics. Matlab Neural Network Toolbox was used to build ANN and Multiple Linear Regression (MLR) models.
Results: Mean age of the sample was 54.24±8.19 years. Mean of the BESTest total score, FRT, OLST-left side, OLST-right side, 6MTW and TUG were 26.99±7.12, 12.23±13.23 cm, 11.44±10.71 sn, 12.86±10.44 sn, 18.77±14.01 sn and 71.11±16.91 sn, respectively. The designed ANN included five inputs and one output. The number of hidden layers of this ANN with a single hidden layer has been tested from one to ten. Randomly, the data set was used for learning(70%), evaluation(15%), and testing purposes(15%), respectively. The results obtained from this study showed that, it was observed that ANN estimations were in agreement with the measured BEST test total score as well as with the MLR estimations(Root mean squared error-RMSE- for ANN:3.86, forMLR:6.97).
Conclusions: We found modeling through ANN as a promising and useful tool to estimate balance status of hemiparetics. Predicting balance status of hemiparetics makes contribution to plan the most suitable rehabilitation program providing useful and better suggestions to establish home modification and relevant exercise program.

Keywords: Postural Balance;Stroke;Artificial Intelligence

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THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, CARDIORESPIRATORY ENDURANCE, ACTIVITY AND PARTICIPATION LIMITATIONS, AND QUALITY OF LIFE FOR ANTERIOR KNEE PAIN.

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Abstract:
Purpose: This study was planned for evaluating the relationship between physical activity, cardiorespiratory endurance, activity and participation limitations, and quality of life for anterior knee pain.
Methods: This research was evaluated among 60 patients; research group of 30 patients having anterior knee pain (randomly selected from the orthopedic and traumatology clinics) and control group of 30 patients. International Physical Activity Questionnaire was used to evaluate level of physical activity, 12 minutes walking test was used to evaluate cardiorespiratory endurance, Notthingam Health Profile was used evaluate quality of healthrelated quality of life, Lysholm Scale was used to evaluate functional disorder, Activity of daily living scale was used to evaluate level of activities of daily living, Community Integration Questionnaire was used to evaluate participation in community. In this study, New York posture Analysis scale was used to evaluate the posture, Dr. Lowet' s manuel muscle test was used to evaluate muscle strength and antropometric measurements were applied to the participants.
Results: As a result of this study, level of physical activity, cardiorespiratory endurance and quality of life of the anterior knee pain group was found to be less than control group ($p<0.05$). In anterior knee pain group, functional disability was increasing while activities of daily living was decreasing ($p<0.01$). This research also showed that the social integration of anterior knee pain group was decreased ($p<0.05$).
Conclusions: Anterior knee pain affected functional capacity, physical activity level, functional disability, activity of daily living and quality of life in negative manner.

Keywords: Anterior Knee Pain; Physical Activity; Quality Of Life; Functional Disability; Community IntegrationA

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NEW ASSISTIVE DEVICE: RGO-CHAIR

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Abstract:
Purpose: Most patients with spinal cord injuries use wheelchairs to transfer from one place to another, but they need to stand and walk with orthoses to improve their condition. The purpose of our work; to design a mobility device that is easier to use in daily life, able to meet needs, and to make the patient actively participate in the movement.
Methods: We are developing an assistive device using RGO. In this new device, we did not include electric systems such as battery. Suspensions planned in design provide sitting and standing positions with the active participation of the patient. In the sitting position, the design functions as a wheelchair with the added wheels, but with the RGO support in the standing position, it becomes a mobility device.
Results: RGO and wheelchair transitions will remove the need for extra mobility equipment outside the house. If the patient's fatigue appears to be a limitation for mobility at the RGO position, the patient can continue to use the same device by turning it into a wheelchair. In addition, the performance the patients have to demonstrate to be mobile will affect their overall physical capacity and health positively.
Conclusions: The RGO-CHAIR have superiorities to compare the other mobility devices, because it differs from them in terms of needing at least 2 assistive devices for out-of-home mobilization, energy limitation in robotic designs, low rate of distance travel, the cost and the weight of the device.

Keywords: Mobility, Rehabilitation, Assistive Device

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DEVELOPMENT PROCESS OF REHABILITATIVE GAMES

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Abstract:
Health systems provide the opportunity for treatment and rehabilitation of patients in specific rehabilitation centers or in hospitals with follow-up of exercise. Rehabilitation games, developed using various sensors and virtual reality technologies, can be used both in the clinical setting and in the home environment for patients who have difficulty in reaching the clinic or who will be at home for follow-up. Thus, the possibility of interruption in treatment is minimized.
The most important difference of the games developed for rehabilitation from other games is that the games can be arranged according to the diseases and symptoms and the degree of exercise can be measured. Experts can adjust and prescribe the properties of applications such as speed, object size, difficulty level, etc. In this way, rehabilitative games become applications that support the controlled movement of the patients, provide hand-eye coordination and make therapeutic exercises more motivating.
In the rehabilitative games, providing flexibility to the expert in defining the targets and determining the time and points according to the needs of the patient are the most important elements to be planned in the design phase. In this way, the expert can easily make the patient exercise more than desired and prevent various complications.
A normal digital game development process has the most basic Designing-Prototype Development-User Feedback steps. However, in rehabilitative game this process can be determined as Design, Prototype Development, Expert feedback, Analysis, Improvement, Healthy user feedback, Analysis, Improvement, patient user feedback, Analysis, Improvement.

Keywords: Rehabilitative Games, Virtual Rehabilitation

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TECHNOLOGICAL APPROACHES FOR JOINT REHABILITATION

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Abstract:
Along with objective assessment, new approaches which increase patient participation and do not reduce their motivation in the rehabilitation process are needed for restoring the range of motion, increasing the muscle strength and notifying the person before reaching risky boundaries for the joint in locomotor problems affecting the joint, for gaining the control of joints in neurological problems, for restoring proprioception which are reduced after arthroplasty and ligament injuries.
In this study, we present a survey of two technologies, inertia sensors and camera based technologies, which have been used for joint rehabilitation process. Camera-based systems provide to assess motion with three-dimensional (3D) real-time anatomical landmark position data without attaching any devices to the patient. Due to the rehabilitative games developed by using 3D anatomical positions and range of motion, the rehabilitation process becomes more motivating and regular for the patient. The main advantage of camera based system is making the exercises without attaching any device to the patients.
Similarly, inertia sensors used in certain joints, such as the knee, hip, elbow and shoulder, are adaptable to intelligent mobile devices to measure inertia, acceleration and angular velocities while providing high-speed feedback at wireless environments. With inertia sensors, exercises can be done without time and location dependence, environment lighting problem and patient positioning and daily life activities of patients can also be followed.
With both sensor technologies, planned tele-rehabilitation approaches can be performed by collecting data, analyzing and re-orienting the patient, adding new exercises or levels to the treatment program.

Keywords: Tele-Rehabilitation, Rehabilitative Games

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THE SUITABILITY EVALUATION OF DIFFERENT VIRTUAL REHABILITATION SYSTEMS

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Abstract:
Purpose: Virtual reality systems improve patient's practice, motivation and commitment to rehabilitation. This great motivation results in better motor and psychological gain. Availability, acceptance and security of use are key factors in the usability of the virtual rehabilitation system. While there are studies in the literature evaluating the effect of virtual reality on physical performance, the number of studies investigating the usability and inadequacy of these methods for patients is limited. The purpose of our study was to evaluate the usability and inadequacies of different virtual rehabilitation systems.
Methods: The study was conducted in the Virtual Rehabilitation, Biomechanics and Performance Analysis Laboratory of the Marmara University, Faculty of Health Sciences. 32 volunteer healthy subjects were included in the study. Suitability Evaluation Questionnaire (SEQ) was applied to participants who involved in virtual rehabilitation program with Nintendo Wii (NW) or Interactive Floor (IF) for at least 3 weeks.
Results: Totally 32 individuals (NW: 16, IF: 16) (age: 22,84 ± 4,26 years old; height: 167 ± 8,4 cm; weight: 62,62 ± 17,02 kg) have participated in the current study. The mean SEQ score for NW was 53,93 ± 5,56 and for IF was 51,62 ± 4,84. There was no statistically significant difference between NW and IF scores ($p>0,05$).
Conclusions: In our study, it was determined that NW and IF showed high suitability. There was no significant difference between the evaluation of the two systems. It is planned to continue to study by increasing the number of participants.

Keywords: Virtual Rehabilitation, Usability, Suitability Evaluation

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THE ACUTE EFFECTS OF DIFFERENT MUSCLE CONTRACTIONS ON VISCO-ELASTIC CHARACTERISTICS OF MUSCLE IN HEALTHY SUBJECTS

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Abstract:
Purpose: The purpose of the study was to determine which of the three muscle contractions, isometric, isotonic or isokinetic contraction, has the most significant acute effect on the muscle tone, elasticity and stiffness in quadriceps femoris (QF) and hamstring muscle.
Methods: The study was conducted in the Virtual Rehabilitation, Biomechanics and Performance Analysis Laboratory of the Marmara University, Faculty of Health Sciences. 16 volunteer healthy subjects were included in the study. The visco-elastic characteristics of QF and hamstring muscles were evaluated with MyotonPRO myotonometer. Participants performed isometric, isotonic, and isokinetic knee-extension exercises as 3 sets of 10 repetitions. Evaluations were performed before and after exercise in the lying position.
Results: Sixteen physically active and healthy adults (8 female, 8 male; age:22.75±3.19 years, height=168±8.89 cm, weight=66.31±15.52 kg, body mass index=23.31±4.09 kg/m2) participated in the study. There was a significant difference in only muscle tone of QF after isokinetic exercise ($p=0.043$). However, no significant differences were found in muscle stiffness ($p=0.438$) and elasticity ($p=0.623$) of QF after isokinetic exercise. After isometric and isotonic exercises, no changes were seen in any visco-elastic properties ($p>0.05$). There were no significant differences in visco-elastic characteristics of hamstring after isometric, isotonic, and isokinetic exercises ($p>0.05$). There were no significant differences between the different types of exercises ($p>0.05$).
Conclusions: Our results show that one–session isokinetic exercise may improve the muscle tone of QF. We suggest that future studies may examine the effects of different type of exercises on long-term changes of muscle tone in healthy adults.

Keywords: Muscle Contraction, Quadriceps Muscle, Muscle Tone, Elasticity, Stiffness

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THE EFFECT OF INTERACTIVE FLOOR ON BALANCE

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Abstract:
Purposes: Interactive floor is a brand-new rehabilitation style that you can work wherever possible. It can be used several different areas and groups, including paediatrics and adults. The purpose of the study was to examine the effects of interactive floor on balance in healthy and sedentary adults.
Methods: A total of fourteen (8 female and 6 male) healthy and sedentary adults were participated in the study with a mean age of 22.29 (±1.684) and a mean body mass index (BMI) of 20.99 (±2.110). All participants filled out the questionnaire which composed of sociodemographic characteristics, BMI and exercise level. Interactive floor rehabilitation was given with an Interactive Floor Projector device for a total of five weeks, three sessions per week. Balance were measured with Y Balance Test, respectively. All assessments were repeated in baseline and after 5-week rehabilitation program.
Results: Interactive floor rehabilitation program significantly improved level of posterolateral extension both dominant ($p = 0.011$) and non-dominant ($p = 0.011$) lower extremities. No significant difference was found in posteromedial extension both dominant and non-dominant lower extremities ($p < 0.05$).
Conclusions: According to the results, interactive floor may be beneficial on balance in healthy and sedentary individuals. We suggest that new studies may search the changes of these clinical parameters in patients.

Keywords: Balance, Interactive Floor, Rehabilitation

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DOES LOW BACK PAIN AFFECT PHYSICAL ACTIVITY AND DEPRESSION LEVEL?

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Abstract:
Purpose: Low back pain is a musculoskeletal system problem that affects many people in all groups. The purpose of the study was to investigate possible risk factors for the presence of low back pain in bankers and teachers and to compare the relationship between low back pain, physical activity level and depression level.
Methods: The study was conducted with a sample of 100 individuals (50 bankers and 50 teachers) and all of them were surveyed questionnaire with a face-face interview technique. The questionnaire was composed of sociodemographic characteristics, occupational working conditions, the presence and duration of back pain and the factors which are related to back pain. After the demographic information of the participants was taken, FITTE Index, Oswestry Disability Index and Beck Depression Scale were filled.
Results: Bankers had significantly the highest level of amount of smoking ($p=0.002$) and the lowest level of job satisfaction ($p=0.027$). Significant difference was also found in total Oswestry Disability Index score and total Beck Depression Scale score, total FITTE Index score and weekly regular exercise duration, and Body Mass Index and years of employment between two professions ($p<0.001$).
Conclusions: According to the results, as the severity of the pain increases, the level of depression also increases in both professions. In this sample, the FITTE index score did not show any significant relationship between level of pain and depression. We suggest that new studies and samples may search the changes of these clinical parameters in individuals.

Keywords: Low Back Pain, Physical Activity, Depression

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IS HYPERTENSION A MATTER OF IMPORTANCE FOR GERIATRIC INDIVIDUALS? A NINTENDO WII EVALUATION STUDY OF THE BALANCE

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Abstract:
Purpose: A majority of elderly people are living with hypertension and about one third of people aged 65 years and older report at least one fall each year. This study was designed to evaluate the relationship between the balance performance of the geriatric hypertensive and normotensive individuals and find out the effect of hypertension on the balance behavior of the elderly individuals.
Methods: Sixty-one geriatric individuals aged 65 years old and over were included in this study. KATZ Index of Activities of Daily Living, Standardized Mini-Mental State Examination, Geriatric Depression Scale, Hand Held Dynamometer and Goniometer were used to evaluate the general medical and physical status of the patients. Gait was measured by Timed Up and Go Test and balance performance was measured by Nintendo Wii. The systolic and diastolic blood pressures were measured before the balance test.
Results: Hypertensive individuals finished Timed Up and Go test in longer durations than the normotensive individuals ($p<0.05$). Parameters of "Completed seconds in Wii Single Leg Balance Test", "Performance score in Wii Single Leg Balance Test" and "Wii fit age" between both hypertensive and normotensive groups were determined significant in the statistical analysis ($p<0.05$).
Conclusions: Hypertension seems to affect different parameters of balance among elderly individuals. For controlling the balance, elderly individuals should consider their high blood pressure beside their falling history. We think that evaluating the balance in hypertensive geriatric individuals should be considered as an important part of the evaluation process.

Keywords: Hypertension, Geriatrics, Falls, Virtual Reality

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ASSESSING THE USABILITY OF A 'NOVEL EXOSKELETON FOR HAND REHABILITATION' DEVICE FROM THE PERSPECTIVE OF PHYSIOTHERAPIST: A QUALITATIVE ANALYSIS RESEARCH WITH IN-DEPT INTERVIEW

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Abstract:
Purpose: A novel exoskeleton with use four-bar linkage mechanisms for hand rehabilitation was recently developed by Marmara University Mechatronics-Rehab-Lab researchers. The aim of our study is to asses the usability of the designed exoskeleton for hand rehabilitation.
Methods: In-dept interviews with focus group (the designer of device, one experienced hand therapist and one physiotherapist researcher who is working technology rehab) were conducted. Our open-ended interview queries with participants encouraged them to describe their experience while designing the device or usability of the prototype exoskeleton for hand rehabilitation. The focus group discussed the ten topics (mechanical design, passive and active joint angle, tendon gliding mechanism, passive motion, active motion, resistive motion, advantages and disadvantages for clinical uses etc.). The focus group members use the exoskeleton while interview was going on. We took notes and audiotaped interviews from the focus group. After in-dept interview we coded the major topics.
Results: Compared to others, a simple mechanism is designed and produced suitable for the hands bio dynamics. The physiotherapists specified that the linkage mechanism is a great idea for flexor tendon gliding after flexor tendon injury repair for clinical hand rehabilitation. A minimal traction error found while doing active finger manipulation.
Conclusions: A novel exoskeleton with use four-bar linkage mechanisms useful for hand rehabilitation for flexor tendon injuries and has a great advantage for supporting hand exercisers at home. Only some ergonomic designs needed before developing last version of device.

Keywords: Exoskeleton, Hand Rehabilitation, Usibility Analisis

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EFFECT OF AGE, GENDER AND ANTHROPOMETRIC VARIABLES ON MORPHOLOGICAL AND MECHANICAL PROPERTIES OF FOOT INTRINSIC MUSCLES IN ASYMPTOMATIC INDIVIDUALS

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Abstract:
Purpose: One of the reasons of the high prevalence of foot disorder in females, obese and older individuals may be the differences in the architectures and mechanical properties of intrinsic foot muscle because intrinsic foot muscle is primer structure which support foot archs. The purpose of this study was to investigate the effect of age, gender and anthropometric variables on morphological and mechanical properties of foot intrinsic muscles in asymptomatic individuals.
Methods: This study was carried out in 60 asymptomatic sedentary individuals (34 females, 26 males) between the ages of 20 and 49 years (mean age=30.2±8.5). Stiffness and thickness of flexor hallucis brevis (FHB), flexor digitorum brevis (FDB), and abductor hallucis (AbH) muscles were measured with an ultrasonography device.
Results: Thickness of FDB ($p=0.002$), FHB ($p<0.001$) and, AbH ($p=0.003$) were higher in males compared to females. Thickness of FHB ($p=0.019$) and AbH ($p=0.034$) but not FDB ($p=0.850$) were higher in obese individuals compared to individuals with normal weight. Age had negative fair to moderate correlation with thickness of FDB ($r=-0.42$, $p=0.001$), FHB ($r=-0.30$, $p=0.021$) and, AbH ($r=-0.35$, $p=0.007$). Body mass index had fair to moderate correlation with thickness of AbH ($r=0.30$, $p=0.023$), FHB ($r=0.43$, $p=0.001$) and a negative fair correlation with stiffness of AbH ($r=-0.31$, $p=0.018$) and FHB ($r=0.33$, $p=0.011$).
Conclusions: The result of present study suggest that the high prevalence of foot disorder in obese and older individuals may be related to changes in morphological and/or mechanical properties of foot intrinsic muscles.

Keywords: Gender, Aging, Obesity, Foot, Ultrasonography

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DEVELOPING AN OBJECTIVE MEASUREMENT METHOD WITH THE LEAP MOTION SENSOR FOR HAND AND WRIST'S RANGE OF MOTION: VALIDITY AND RELIABILITY STUDY

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Abstract:
Purpose: Our aim of this study was to develop a low cost, clinically easy to use measurement method with the Leap motion sensor for objectively evaluating range of motion (ROM), and to investigate the validity and reliability of this application.
Methods: An ROM measurement method called as HandROM by us was developed with leap motion sensor. In order to assess the validity and reliability of HandROM, 35 healthy individuals were included in the study, who did not have any hand/wrist problems between the ages of 18-40 years. The wrist flexion/extension, radial/ulnar deviation, supination /pronation, 1-5th fingers' MCP flexion/extension ROM measurements were performed with a universal goniometer and HandROM.
Results: The mean age of the cases was 27.92±2.62 years. There was only a statistically significant difference between the averages of radial and ulnar deviation measurements for goniometer and HandROM ($p<0.001$). Statistically significant correlation was found between goniometer and HandROM measurements for hand wrist flexion/extension, radial/ulnar deviation, supination/pronation, thumb flexion/extension, 2nd finger flexion, 4th finger extension and 5th finger flexion ($p<0.01$). Cronbach's alpha coefficients of significant correlations were between 0.72-0.88.
Conclusions: We have presented an easier and more objective method for goniometric measurement of the hand as an alternative. HandROM allows valid and reliable measurement of hand's ROM for clinicians and multiple angles of various joints can be measured simultaneously and quickly without the need for various goniometers. HandROM's sensitivity needs to be improved in future studies since HandROM is not as sensitive as to measure MCP joint flexion and extension accurately.

Keywords: Range Of Motion, Wrist, Hand, Joint

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SYSTEMS ANALYSIS AND EXERGAMING DESIGN FOR DISABILITIES BY USING EEG SIGNALS IN VRE

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Abstract:
Purpose: Technological developments can lead to innovative solutions for existing patient needs in medical science for many perspectives. The current situation must be evaluated from a different point of view for these needs. The use of video game, an important aspect of the concept of entertainment, in the process of patient rehabilitation increases the quality of the treatment or healing process.
Methods: In this study, an exergaming design application was used to use EEG signals as a triggering element for interaction (yaklaş, dondür vs) of objects in a VRE (Virtual Reality Environment). The developed application is specially designed for use in physiotherapy of individuals with physical disabilities. Ease of evaluation of EEG signals is important for sustainable design because of its stability and reliability of manipulation. For this design, a need analysis was first made for the individuals who need special treatment. The input and output of the application, which is customized to use various game themes, are designed to be run in VRE.
Results: When the existing applications with similar characteristics are examined, it is realized that the design subject to this research is an important achievement in VRE. At the same time, the individuals who constitute the target group are concerned with psychological associations in the rehabilitation process because of their contribution to the enjoyment.
Conclusions: In conclusion, The designed application contributes positively to the acceptance of the situations of physically disabled newly formed persons. In addition to the concept of virtual reality in the next stage, sound and haptic features can also be included in the framework of the concept of increased reality. This will enable more efficient designs to be realized.

Keywords: Medical Informatics, EEG Signals, Brain - Computer Interface, Biomedical Engineering, Man-Machine Systems,Virtual Reality

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THE WEARABLE ASSISTIVE IOT SAMPLE FOR PHYSICAL DISABILITIES: INTERACTING WITH BENDING

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Abstract:
Purpose: Nowadays, the demand of patients who need assistive technologies to make their lives easier are varied. The need of assistance for physical disabilities comes to the forefront in terms of its attributes. However, improvements in innovative technologies continue to offer solutions to meet these needs. For this purpose, it is important to develop hardware and software interfaces that are limited by patient needs. In this context, the designs that can communicate with each other, which can be expressed by the concept of IOT (internet of thing) today. Controlling these systems over the internet makes it easier to use these interfaces.
Methods: In this study, an embedded system design driven by a microcontroller, which can be worn as a glove for the use of patients in need of physical support, has been implemented. There are flex sensors on the outer surfaces of the fingers of the glove that change their resistance by bending. With the triggering of the sensors, an interface which communicates wirelessly over long distances is activated. This interface is used to notify the mobile phone of the nurse over the internet of warning signals. At the same time, this interface on the distant also alerts the nurse by sound and light. These patient needs are designed in the following way; need for eating, water drinking need, cleaning, change of lying or sitting shape and emergency.
Results: As a result of this study, the patient can reach the staff for fundamental needs from multiple channels just by moving the fingers. Therefore, through this project patient satisfaction and comfort improved distinctly.
Conclusions: It is not difficult to re-organize the hardware and software interfaces established in this study according to new needs. This increases the sustainability of the designed system. In the next step, needs analysis can be done to provide for the use of patients in different need groups.

Keywords: Embedded Systems, Man-Machine Systems , Medical Informatics, IOT, Biomedical Engineering, Wearable Technologies

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THE DEVELOPMENT OF DIGITAL GONIOMETER AND INVESTIGATION OF CLINICALLY USABILITY

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Abstract:
Purpose: Digital goniometer has been a limited production in Turkey. The aim of this study was to design low cost, ergonomic and functional digital goniometers to use in different joints.
Methods: Two different goniometers were designed for upper-lower limb joints and hand-finger joints The joint parts in the designs were produced by 3D prototyping using the solid model drawn in the SolidWorks program. The remaining parts were designed by PVC boxes.
Using the potentiometer as a voltage divider, the analogue inputs of the microcontroller system and the voltage value were digitally read as 10 bits . The measured value was converted into angle value via software. The button on the goniometer was added to the algorithm to hold the measured value. 30 young healthy adults, without musculoskeletal, neurological, systemic conditions, were included. Evaluation contained three times of active motion after one passive motion. The same procedure was repeated by another digital goniometer by the same practitioner. Pearson Correlation Analysis was applied to investigate the relationship between the obtained data.
Results: Assessments were repeated by designed goniometers and another electronical goniometer. Statistically significant correlation was detected (r=0.960, p=0.001) between the findings.
Conclusions: The 11 types of goniometers, which had the novel electronically design, were produced. Furthermore, health professionals could use goniometer in various clinics by means of different size and features of goniometers.

Keywords: Digital Goniometer, Usability, Physiotherapy

**Tübitak 2209-A-University Student Research Projects Support Program*

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DESIGN, DEVELOPMENT, RELIABILITY AND VALIDITY OF SMARTPHONE MOBIL APLICATION FOR POSTURE ANALYSIS

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Abstract:
Purpose: Mobile health applications are supported through mobile technology devices. The purpose of this research is to develop mobile healthcare application in Turkish language that records and archives real-time data allowing for static static posture analysis, prevents loss of information, enables tests to be performed in different environments, reduces the need for equipment for testing, and investigates the consistency of tests with bioprint posture analysis system.
Methods: The mobile application software was implemented. 18 volunteers(mean age 13.38±8.79 years)were included in the study. The cases were photographed anteriorly, posteriorly and laterally. Taken photos were transferred to mobile application. The interrater reliability was tested by comparing the evaluations of two independent raters who conducted the assessment on the same day. The intrarater reliability (test-retest) was tested by the same rater by comparing the results of repeated assessments with a three days interval. Spearman correlation analysis was applied to investigate the relationship between mobile application and bioprint posture analysis.
Results: There was a strong correlation ($p<0.01, r=0.653$) between the data obtained from mobile application and bioprint posture analyzes (anterior, lateral and posterior)in both groups. There was no statistically significant difference intrarater ($p<0.001, r=0.955$) and interrater evaluations ($p<0.001, r=0.926$).
Conclusions: A mobile application in Turkish language with the same qualities as the computer based bioprint device was developed. The technological production can analyze posture objectively on different planes and store the data. Moreover, it was a cost-effective production.

Keywords: Mobil Application,Posture Analysis, Physiotherapy

**Tübitak 2209-A-University Student Research Projects Support Program*

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INVESTIGATION OF IMMEDIATE EFFECT OF SCAPULA MOBILIZATION ON SHOULDER PROPRIOCEPTION IN SUBACROMIAL IMPINGEMENT SYNDROME

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Abstract:
Purpose: There is limited data regarding the effects of scapular mobilization on shoulder biomechany and proprioception.The objective is investigation of immediate effect of scapula mobilization on shoulder proprioception.
Methods: Twenty subjects with subacromial impingement syndrome (11 women, 9 men; mean age 46.95±13,98) were included to our study. Shoulder Pain and Disability Index(SPADI) was used for evaluating the functional disability of patients. Kinesiophobia was evaluated by Tampa Kinesiophobia Scale(TKS) and shoulder proprioception was evaluated by laser pointer before and after treat scapular mobilization intervention session. To evaluate shoulder proprioception, the matching performance was evaluated in terms of error magnitude (absolute and signed) in internal rotation(0˚-55˚), external rotation(0˚-10˚), flexion ve abduction(55˚-90˚-125˚) directions. Three trials were performed, and the average of the three trials was used for analysis. Scapular mobilization was implemented after the first assessment and renewed all assessments immediately.Scapular mobilization intervention consisted of applying superior and inferior gliding, rotations, and distraction to the scapula of the affected shoulder.
Results: There were 11 women (48,78±14,14 years) and 9 men yaş (45,45±14,34 years).In comparison to baseline values joint position error of internal and external rotation at both angles; flexion and 55˚ abduction at horisontal plane were significantly decrease after scapular mobilization intervention session (p<0,05).There were significant reductions for the second assessments compared to initial assessments of VAS and TKS scores (p<0,05).
Conclusions: Scapular mobilization has positive effects on shoulder joint position sense and movement control.Scapular mobilization should be a part of scapular impingement syndrome rehabilitation to improve the sensory awareness of mechanoreceptors and to restore the neurosensory mechanisms of joint capsule.

Keywords: Shoulder İmpingement,Scapular Mobilization,Proprioception

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THE CORRELATION BETWEEN GRAVITY CENTER AND WAIST/HIP CIRCUMFERENCE RATIO

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Abstract:
Purpose: The aim of this study was to determine if there is correlation between Gravity Center (GC) and Waist-Hip Circumference Ratio.
Methods: This study was conducted in Marmara University Health Science Faculty Department of Physiotherapy and Rehabilitation. 18 cases ages between 20-46 were included in this study. Inclusion criteria were having Body-Mass Index (BMI) more than 25, don't have any orthopaedic and balance problems. Cases were evaluated with Fizyosoft® Balance System developed for Nintendo Wii© game console. Fizyosoft® Balance System is an assessment method which gives GC data as anterior, posterior, left and right lateral sides. This system gives motion data in 15 seconds and 30 seconds as an indication of balance values. After taking cases' waist/hip circumference, their GC and balance values were evaluated with Fizyosoft® Balance System.
Results: The mean age of the cases was 23.28±5.86. 6 of cases were female, 12 of cases were male. 7 of cases were obese and 11 of cases were overweight. Their BMI average was 29.09±4.93. There was no correlation between Waist/Hip Circumference Ratio and GC (p=0,268). There were no significant differences between obese and overweight cases in terms of GC (p=0,556) and 15/30 sec. balance values (p=0,684 and 0,390). GC of both groups were left-posterior side. There was no correlation between BMI and distance of GC.
Conclusions: It's known that obese cases' GC have changed. According to this study, BMI don't effect distance of GC from center point. We think that distance of GC don't change but GC area can be different in obese cases.

Keywords: Gravity Center, Waist-Hip, Circumference Ratio.

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EFFECT OF TECHNOLOGICAL REHABILITATION APPLICATION ON UPPER EXTREMITY FUNCTIONS IN A CASE WITH HEMIPARATIC CEREBRAL PALSY - CASE REPORT

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Abstract:
Purpose: The purpose of this study was to investigate the effect of a visual feedback education system addition to Neurodevelopmental Therapy (NDT) rehabilitation program on upper extremity functions of a child with cerebral palsy.
Methods: A 12-year-old female patient with hemiparatic cerebral palsy was assessed for functional gait (Childhood Health Assessment Questionnaire (CHAQ)), joint range of motion (goniometer), grip strength (dynamometer), pinching force (pinchmeter), spasticity (modified Ashworth scale), hand skills (Minnesota Hand Skill Test (MHST)), gross motor function (Gross Motor Function Classification System) and reaction time (RT) (were assessed with Cogniboard® Light Trainer) prior to the treatment program. Following the evaluation, a total of 8 sessions of NDT-based upper extremity rehabilitation (35 minutes) and Cogniboard® Light Trainer training (10 minutes) were performed in 5 weeks. The same evaluations were repeated after the treatment.
Results: A 5-degree limitation at supination was improved; at CHAQ, difficulty of ability to wash and comb hair and push and open a door when she has to turn a door knob changed into without any difficulty from with some difficulty. Placement of the object by MHST was 24 seconds faster, placement of the object bilaterally was 1 minute 22 seconds faster; RT was faster by 1.58 sec. No other assessment parameters were changed. When she was asked about her ideas and her findings of developments in her hemiplegic side after the new rehabilitation program, she reported that she was pleased with the new program, and said that she was not able to hold a ball by her hemiplegic side when it is throwed to her while playing outside. She wanted to continue the new program.
Conclusions: The addition of visual feedback education system to the rehabilitation program increased the utilization of patient's hemiplegic side and positively influenced her views on the rehabilitation program and the patient wanted the continuation of this approach. The addition of technological rehabilitation practices to the NDT-based rehabilitation programs has been envisaged to be beneficial.

Keywords: Cerebral Palsy, Upper Extremity Functions, Technological Rehabilitation.

**This study was supported by Marmara University Scientific Research Projects Unit.*

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AN OVERVIEW TO TECHNOLOGY-ASSISTED UPPER EXTREMITY REHABILITATION FOR CERVICAL SPINAL CORD INJURIES

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Abstract:
Purpose: Robot-assisted rehabilitation has been reviewed several times in studies on the effects of lower extremity functions and walking parameters on individuals with spinal cord injury (SCI). However, studies on upper extremity functions that are important in individuals with tetraplegic SCI are limited. The aim of this study was to provide an overview of the feasibility and outcomes of robotic assisted upper extremity training for individuals with incomplate cervical SCI.
Methods: Studies involving patients with incomplete cervical SCI conducted between 2008 and 2018 were screened in the Medline, Cumulative Index and Nursing and Allied Health Literature (CINAHL) and PubMed databases.
Results: Fourty seven articles were found with the key words. 12 articles were involved to this study, 7 different technology-assisted devices were used in these articles. The number of participants were between 1 and 12. Acording to these studies, enhancements were found in motor performance, functional and performance-level measures of the upper extremity. However there were no noteworthy differences in upper-extremity muscle strength. This study is limited due to the small number of articles, low-sample sizes and the heterogeneity of devices and training protocols.
Conclusions: Preliminary prove proposes that technology-assisted interventions are safe, feasible and can decrease dynamic assistance provided by physiotherapists.

Keywords: Spinal Cord Injury, Upper Extremity, Technological Devices, Exoskeleton, Technology-Assisted Rehabilitation

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SENSORY INTEGRATION THERAPY INTERVENTION IN PATIENTS WITH CEREBRAL PALSY. INTRODUCING A NEW TECHNOLOGY IN BALANCE TESTING

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Abstract:
Purpose: The purpose of this study was to evaluate the effect of Sensory Integration(SI) Therapy intervention on sitting balance, proprioception, functionality and motor levels in patients with cerebral palsy (CP).
Methods: Fourteen patients were included in this study. 12 sessions of SI therapy were performed for all the patients which included vestibular, proprioceptive and tactile activities. Evaluations were performed before and after the treatment. The Pedalo Senasamove Balance device was used to evaluate the balance and proprioception of the patients by using the Center of Pressure (COP) sways. The functionality was evaluated by Pediatric Evaluation of Disability Inventory (PEDI) and motor level was evaluated by Gross Motor Function Measure (GMFM-88).
Results: No significant difference in balance and proprioception was found before and after the intervention ($p>0.05$). All parameters of PEDI showed to be better after the intervention ($p<0.05$) except parameter of caregiver's social functions. The patients showed better results in parameters of sitting, standing, walking, running, jumping and total score in GMFM-88 after the intervention($p<0.05$).
Conclusions: SI therapy seems to be an effective method to be applied for the CP patients which can be used as an independent treatment method for this patients and can also be a complementary method to the other treatments used in CP patients. Pedalo Sensamove which is a portable and not an expensive device can be a useful and easy to use device for evaluating the balance and proprioception in the pediatric population.

Keywords: Virtual Reality, Pediatrics, Cerebral Palsy

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THE CORRELATION BETWEEN BALANCE MASTER© SYSTEM AND PEDALO© SENSAMOVE BALANCE TESTS

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Abstract:
Purpose: The aim of this study was to compare the Balance Master© Assessment System (BMAS) with Pedalo© Sensamove Balance Test (PSBT).
Methods: 31 healthy cases that are studying at Marmara University participated in this study. Mean COG Sway Velocity Difference (%), Rytmic Weight Shift (deg/sec and %) and weight bearing tests were used in BMAS. Unilateral and bilateral tests (that gives data like performance, 4 direction deviation (deg/sec), and percent) were utilized in PSBS. The percentile balance values between the right and left stance were subtracted from each other and assessed relation with Mean COG Sway Velocity Difference in BMAS. Spearman Correlation test was used to compare Pedalo Stance Phase Performance and Weight Bearing Difference (Left/Right) in BMAS.
Results: The mean age of cases was 22±2,28. There was no correlation between Pedalo Left/Right Difference and BMAS Center of Gravity (COG) sway eyes open differences (p=0.858). We did not determine correlation between Pedalo Stance Phase Performance and Weight Bearing Difference (Left/Right) in BMAS (p=0,913).
Conclusions: In conclusion of this study, there was no correlation between Pedalo© Sensamove Balance Test and Balance Master© Assessment System. We think that the reason why there is no relationship between the two devices may be platform differences. In the future, the balance master will be able to make the platform dynamic by using its own special padding.

Keywords: Pedalo©, Balance Master©, Balance Test

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DIAGNOSIS IN PHYSICAL THERAPY AND REHABILITATION WITH A ROBOTIC POINT OF VIEW

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Abstract:
Purpose: Over the last two decades, studies on robotic systems for rehabilitation have gained momentum. The use of robots in rehabilitation increasing day by day due to its features such as the ability to perform movements with absolute accuracy, objective evaluation, positive contributions in terms of transportation, cost and duration of treatment and remote access. Robots can be used for diagnosis due to their high accuracy of measurement capabilities as well as for use in therapeutic exercises. In this study, it is aimed to examine the concept of diagnosis in rehabilitation with a robotic point of view.
Methods: Presenting biomechanical parameters such as joint range of motion, grasping force, joint force, and biological signals such as muscular contraction level and brain activity to doctors will make it possible for doctors to admit more patients by reducing their workload and contribute to the evaluation of the diagnosis and treatment process. At this point, the sensors come into prominence. Encoder, goniometer, accelerometer and gyroscope are used to measure joint range of motion and load cell, force sensor, pressure sensor and touch sensors are used for force measurement. Muscular contraction levels and biological signals resulting from brain activities also provide important information to doctors during diagnosis. These signals are measured by EMG and EEG sensors.
Results: Sensors are selected according to the purpose of use, such as resolution, repeatability, sensitivity, measurement range and linearity.
Conclusions: This paper describes the importance and contribution of robots to diagnosis in rehabilitation, biomechanical and biological measurements made for diagnosis, and the types and characteristics of sensors used for these measurements.

Keywords: robotics, rehabilitation, diagnosis

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IMMEDIATE EFFECT OF MULLIGAN TRACTION STRAIGHT LEG RAISE TECHNIQUE ON GAIT CHARACTERISTIC AND RANGE OF MOTION

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Abstract:
Purpose: Limited passive hamstring flexibility might affect kinematics, performance, and injury risk during running. The aims of this study to investigate the immediate effect of mulligan traction straight leg raise (Mulligan's TSLR) technique on range of motion and gait characteristic in subjects with hamstring tightness.
Methods: 15 asymptomatic subjects of 18 to 30 years of age (mean body height: 1.70 ± 0.6 mean body mass index: 21.5 ± 2.6 kg · m-2) with bilateral hamstring tightness were enrolled in this study. The outcome measures were assessed by popliteal angle measured by universal Goniometer. Gait analysis was done with an accelerometer (BTS G-Walk). Gait parameters and popliteal angle were measured pre- and post-intervention.
Results: Mulligan's TSLR technique showed significant improvement in Popliteal angle ($p < 0.001$). It was found that there was no significant difference in spatiotemporal gait parameters ($p > 0.005$). The results of the study showed that Mulligan's TSLR technique increase pelvic obliquity ($p = 0.023$). Likewise, Mulligan's TSLR technique increased pelvic rotation ($p = 0.017$).
Conclusions: Mulligan's TSLR technique is effective in increasing the hamstrings flexibility in asymptomatic subjects. It was also found that this technique increased pelvic oscillation during the gait cycle by increasing the hamstring flexibility.

Keywords:

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EVALUATION OF THE EFFECT OF LOW LEVEL LASER THERAPY IN PERSON WITH TEMPOROMANDIBULAR JOINT PROBLEMS

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Abstract:
Purpose: The aim of this study was to investigate the effect of low level laser therapy (LLLT) in people with temporomandibular joint (TMJ) problems.
Methods: 24 student with TMJ problems were randomized to the Exercise group (EG) (n = 12) and the LLLT group (n = 12). TMJ activity-resting pain severity, dysfunction and palpation sensitivity on tmj and neck, psychological status, severity of sensitivity on temporal and masseter muscles, neck pain and quality of life were assessed. Both groups had a 10 session treatment consisting of correct posture training, cervical and TMJ stretching and strengthening exercises. LLLT (wavelength: 808nm, dosage: 10j/cm2, mean output power: 1200mW duration:12 seconds for per point) group was additionally applied to the most tender four points in masseter and temporal muscules. Wilcoxan test and Mann Whitney U tests were used in addition to descriptive analyses for statistical analysis.
Results: Significant decrease was found in both of TMJ, cervical pain, palpation, severity of dysfunction, sensitivity to masseter and temporal muscles, TMJ and cervical range of motion after treatment in both groups ($p < 0,05$). There was a significant improvement in the severity of algometer and pain especially in the LLLT group ($p < 0,05$).
Conclusions: It was found that LLLT in addition to exercise program affect to tenderness of the chewing muscles, TMJ pain and range of motion for subjects with TMJ problems. It is predicted that the number of cases is higher and that long-term effects studies are needed to obtain clearer data.

Keywords: Temporomandibular Joint Problems, Low Level Laser Therapy, Pain, Exercise

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ACCEPTANCE OF WEARABLE DEVICES IN PATIENTS WITH PULMONARY HYPERTENSION

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Abstract:
Purpose: Pulmonary Hypertension (PH) is characterized by decreased exercise capacity and limited physical activity participation. Wearable devices are suggested for the evaluation of physical activity participation in PH. The aim of this study is to investigate the acceptance of wearable devices in patients with PH.
Methods: Fifty-nine PH patients (mean age=52.2±14.1/years, 48 women, 11 men) were included in the study. Physical activity duration, energy expenditure, number of steps and average MET level was monitored with SenseWear® Armband (BodyMedia Inc.). Each patient was instructed to wear the Armband for the whole day (except when showering or bathing) for a minimum of three consecutive days. The armband was positioned on the patients' right upper arm at the midpoint of the triceps brachii.
Results: Mean number of steps was 5391.1±4462.3 and mean MET level was 1.2±0.2. The mean on-body time percentage was 94.6% of three days. Clinically meaningful data were provided from fifty-two patients (88%) who wear the device at least 80% of the three days. Body-on time found negatively correlated with MET level (p=0.016, r=-0.313). There was no correlation between body-on time and age, number of steps, follow-up duration or gender.
Conclusions: The results of this study showed that patients with PH, particularly with low MET level, highly tend to accept wearable device based activity monitoring. An advantage may be that the Armband is not set-up and manage by the patients. Further research needs to investigate different wearable technologies which can control by the patients in the long term.

Keywords: wearable devices, pulmonary hypertension, physical activity

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EFFECT OF VIRTUAL REALITY GLASSES ON BALANCE IN PATIENTS WITH LATERAL ANKLE SPRAIN

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Abstract:
Purpose: Ankle injuries are among the important factors that cause loss of balance. The aim of this study is to investigate the effect of exercises made with game-based virtual reality (VR) glasses on balance improvement in patients with a lateral ankle sprain.
Methods: The study was conducted patients with 25 lateral ankle sprains, aged 25-45 years who were referred to the physiotherapy and rehabilitation in florence nightingale hospital. Patients were divided into 2 groups and each group was given a classical physiotherapy program. The classical physiotherapy program includes electrotherapy [Ultrasound (1MHz, continuous, 5min); Tens (20min); cold pack (15min)] and exercises (range of motion, stretching, strengthening and balance). The exercises for the treatment group were made with VR glasses and the control group were made without glasses. The SPSS 22.0 Package Program was used for the statistical analyses. A p value of less than 0.05 was considered statistically significant.
Results: The mean age of the patients was 34.00±6.86, the mean body mass index(BMI) was 26.46±1.03kg/m2, and the distribution between the groups was homogenous. Disability index, balance scales and pain scores improved in all patients after treatment($p<0.05$). The treatment group treated with VR glasses was found to have a statistically better improvement in disability($p=0.009$), flamingo($p=0.013$), Y balance anterior($p=0.016$), posteromedial($p=0.009$) and posterolateral($p=0.009$) tests than control group.
Conclusions: As a result of this study it has been determined that there is more improvement in the balance of patients with lateral ankle sprains who were treated with VR glasses.

Keywords: virtual reality glass, ankle, sprain

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USING OF ASSISTIVE TECHNOLOGY FOR BLIND STUDENTS

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Abstract:
Purpose: The aim of this study is to determine the preference of the assistive technology for the visually impaired students in education field.
Methods: This study was carried out with 10 visually impaired students studying at a state university. In our study, a qualitative question form created by researchers to assess the using of assistive technology were used.
Results: The mean age of participations (6 women, 4 men) participated in the study was 19.20.±1.47. 80% of the participants were using the screen and document reading software, especially the JAWS program. All of the participant used Audio format materials, smart mobile phone and smartphone screen readers. It was found that 20% of participants used Braille translation software and computer printers. It was found that 10 % of participants used Voice recorders.
Conclusions: According to the results we have obtained from our study, it seems that participants often benefit from assisstive technology of listening to written materials. Participants do not prefer the technological tools to write notes such as Electronic Braille Notebooks. It is thought that it would be beneficial to carry out new studies investigating the reasons for not using braill alphabet. It is thought that it is important to investigate the level of knowledge about these technologies in order to prepare both the course content and the exam questions of the academic staff.

Keywords: Assisstive tecnology, blind students, education

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EFFECT OF SHOE MODIFICATION ON POSTURAL ALIGNMENT IN CHILDREN WITH MOTOR DEVELOPMENT PROBLEM

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Abstract:
Purpose: Children with motor development problems have poor postural alignment, especially in their lower extremities which may affect all kinetic chain. Genu recarvarcum is one the most common deformity in this population. Shoe modification by altering heel height is an approach to minimize hyperextension of knee. Therefore, the purpose of the study was to investigate the effect of shoe modification on postural alignment of children with motordevelopment problem.
Methods: Ten children (mean weight 28 kg, mean height 122,9 cm) aged between 4 and 11 were participated in the study. Goniometric measurements in upright position were used to normalize body alignments of children to determine proper heel height within the scope of shoe modification. Reducing knee hyperextension to 5 degrees was a key point as genu recurvatum is defined as knee extension greater than 5 degrees. Proper shoe modification was determined specific to each subject.
Postural alignment from anterior, posterior and lateral views was assessed by using Posturography (PosturePrint TM, Biotonix, Canada) before and immediately after shoe modifications. Markers were placed to anatomical reference points of subjects and photographic assessments were performed by the system. Wilcoxon signed rank test was used to analyze the data.
Results: There was no statistically significant difference in postural alignment measures between with and without shoe modifications in all planes.
Conclusions: Although modifying shoe to normalize knee extension degree of children with genu recurvatum had different impacts on postural chain in anterior, posterior and lateral planes, these differences were not significant. Further studies may involve larger sample size.

Keywords: shoe modification, genu recurvatum, motor development problem

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IMPEDANCE CONTROL IN THERAPY ROBOTS

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Abstract:
Purpose: Researches on rehabilitation robotics have increased rapidly last 20 years. Rehabilitation robotics are grouped into different forms according to their properties. They can be divided into two main groups as therapy robots and assistive robots. Therapy robots aims to apply the therapeutic exercises that physiotherapists applied to the patients. There are several types of exercises such as passive, active, active assist, active resist and manual. Control strategies used in rehabilitation robotics are determined the type of exercises. Feedback mechanism is an important part of the control strategy of the system. Rehabilitation robotic systems requires to be interacted with humans. Position, force, EMG signal can be used as feedback mechanisms. In these interactive systems, the robotic design is so crucial that a control strategy is designed to based on the dynamics of robotic design. The control strategy called impedance control, adjust the mechanical parameters of the interaction between robotic design and human. Human-robot interaction shows nonlinear behavior. For this reason, impedance control is one of the most used control strategy in the rehabilitation robotics. Impedance control is used with various control types such as adaptive, robust, model reference and intelligent control techniques in recent studies. Different types of therapeutic exercises can be performed with this advanced control technique in one robotic design. Impedance control provides the relationship between position and force in the system. Impedance control is more suitable for mechanical devices which are interacted with human.

Keywords: impedance control, rehabilitation robotics, therapeutic exercise

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AN EXOSKELETON ROBOTIC DEVICE FOR UPPER LIMB TRAINING AFTER STROKE: PILOT CASE SERIES

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Abstract:

Purpose: Stroke is a leading cause of long-term disability in adult population and more than half of the survivors are left with significant impairment. Rehabilitation options are still limited to address the need for effective recovery from motor impairment, especially for upper limb functions. In the last decade, robotic-assisted arm training has been an emerging research topic. However, there is still fundamental need to study safety, feasibility and effectiveness of each device before implementing them into standard rehabilitation protocols. In this case series we demonstrate results from a pilot clinical trial aiming to evaluate an robotic exoskeleton specifically designed for rehabilitation of arm motor functions.

Methods: Two chronic left hemiplegic patients (Case1: male, 66 yo, 48 months since stroke ; Case 2: female , 58 yo, 12 months since stroke onset) participated in the study. Modified Ashworth Scale (MAS), Fugl Meyer (FM), isokinetic system (Biodex), Barthel Index (BI) were used before and after treatment to assess spasticity, motor recovery, proprioception and muscle strength, and ADL, respectively. Participants underwent a total of 12 sessions (60 min/session, 3 sessions/week, during 4 weeks) robotic-assisted arm training by using a robotic exoskeleton device, HoustonBionics ExoRehabUE1 (Istanbul, Turkey).

Results: Both participants have demonstrated improvement in all outcome measures, with a higher improvement in proprioception. None of the training sessions were missed due to excessive fatigue or lack of motivation. Moreoever, they reported high motivation to participate in the treatment and demonstrated considerable increase in virtual game scores.

Conclusions: Robotic-assisted arm training with the HoustonBionis ExoRehabUE1 device is well tolerated, and found to be feasible in rehabilitation of arm impairment after stroke. Improvement in movement and sensory functions were observed. Preliminary results from this pilot trial will be used for a randomized clinical trial with a larger sample size.

Keywords:

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EFFECTS OF RIGID AND ELASTIC TAPING ON THE SENSE, FORCE AND PAIN THRESHOLD

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Abstract:
Purpose: In this study it is aimed that to investigate the effect of rigid and elastic taping on the sense, force and pain threshold on healthy sedentary individuals.
Methods: 38 male healthy sedentary individuals between 18-25 age group are included in the study. Groups are randomly divided into two sections namely elastic and rigid groups. Knee is chosen for implementing area. Also, monofilament test is chosen for senses, algometer test is chosen for pain threshold, 60 degree/sec. and 180 degree/sec. angular speed isokinetic dynamometer tests are used for force. İn the context of elastic taping, facilitation taping is applied on the quadriceps muscle and patellae correction taping is used.
As a rigid taping patellar tendon and quadriceps muscle are supported by pulling to mediale. Bands are stayed on the participants for a week. Monofilament and algometer tests are performed pre and post application. Isokinetic tests are carried out just after implementation, one day later from implementation and one week from implementation. Test results are compared by appropriate statistical analysis methods.
Results: Mean difference ($p<0.05$) is found in the data which is gathered from the monofilament sense tests pre and post the elastic and rigid taping implementations. However, mean difference can not be seen on algometer tests ($p>0,05$). When 1st, 2nd and 7th days' angular speeds of isokinetic test applied participants are compared, mean differences ($p<0,05$) in different levels are observed. However, mean difference ($p>0,05$) can not be monitored between groups for isokinetic test.
Conclusions: Although, there is a significant decline in monofilament sense test and a remarkable incline in various aspects of force data after 1 week; difference could not be found between groups in both implementations.

Keywords: Elastic Taping, Rigid Taping, Algometer, Monofilament, Isokinetic

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THE EVALUATION OF MYOFASCIAL STRENGTH SPREAD OF HEALTH INDIVIDUALS ON ANTAGONIST MUSCLE

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Abstract:
Purpose: This study aims to demonstrate the changes in antagonist and agonist muscle strength after implementing strength education on dominant leg antagonist muscle.
Methods: This study consists of 16 participants (8 males, 8 females). Each individual in this study attended to strength education program for dominant Quadriceps, muscle for 3 days in a week. In the test program for dominant and nondominant leg quadriceps and hamstring muscles before isokinetic force training, the participant was asked to perform 1 set of 5 knee flexion and extension at 60 ° / s with maximum force. It is then required to pause for 3 minutes and perform 20 knee flexion-extensions at 300 ° / s with maximum power. The same procedure was repeated on the other extremity and data were recorded. These measurements were repeated at the beginning and end of the study. Participants were given dominant leg quadriceps strength training for 4 weeks, 3 times a week for 5 times at 60° and 20 times for 300°/s. The participant applied a counter-force to the resistance of the knee during the knee-extensor, brought the knee to the extensor, released the knee without applying any force, and the extremity spontaneously flexed by the effect of gravity.
Results: After the program, dominant leg Quadriceps and hamstring muscles show a statistically significant increase ($p<0.05$). In addition to this, nondominant leg Quadriceps and hamstring muscles showed a significant increase($p<0.05$). In terms of physical data, no significant relationship data has been obtained ($p>0.05$). The study could not find meaningful result between dominant and nondominant leg fat portion, fat mass and muscle weight in individuals participated in this study ($p<0.05$).
Conclusions: As a result of the program, it is found out that there is a strength increasing antagonist muscle and in fascial networks ways. There is strength transmission for both antagonist and agonist muscles.

Keywords: Myofascia, Force, Transmission

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AWARENESS OF USING ASSISTIVE DEVICES IN ELDERLY PEOPLE

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Abstract:
Purpose: The study was performed to evaulate the awareness of use of assistive devices in elderly people.
Methods: Study was performed with 18 people Geriatri Units of Hacettepe University Occupational Therapy Department. Questionnaire of 8 questions was used to evaluate the awareness of use of assistive devices by the individual.
Results: Seven (38.9%) male and 11 (61.1%) female subjects with average age of 74.27 ± 8.49 were included in study. When assistant device information of participants was questioned, 44,4% of the respondents didn't have any information about assistive devices and 55,6% of them had knowledge. It was determined that 38.9% of participants used assistive devices in the past. When accessing assistive device is examined, 27.8% of participants didn't have access to assistive devices; 50% of caregivers and 5,6% of them were accessed through medical companies. In terms of use of assistive devices, 44.4% of participants used canes; 27,7% used weekly tablet formulator; 16.6% used non-slippery cane tip; 11.1% used long-stemmed bath sponges, toilet elevator, non-slip shower mat; 5.5% used wheeled walker, cordless wheelchair, manual wheelchair, wheelless walker, bleeder, transfer assistant, multiple lid assistants.
Conclusions: The results of study show that elderly people need to raise their awareness about daily living assistive devices and how to access assistive devices. It is thought that informative trainings on assistive devices and technology will be useful. It is suggested that further studies should be performed that examine the effect of increased awareness on daily life participation and quality of life.

Keywords: Elderly people, Assistive devices, Awareness

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WHAT DO PHYSIOTHERAPISTS KNOW ABOUT TECHNOTHERAPY?

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Abstract:
Purpose: Aim of this study was to examine information of physiotherapist that work in Hatay about technotherapy.
Methods: Twenty four physiotherapist that work in Hatay were included in the study. The questions that were asked following: Q1: Do you know what is the virtual reality, Q2: What does augmented therapy mean, Q3: What do you know about technological equipment to help patients that have communication problems, Q4: What do you know about wearable rehabilitation technology, Q5: What do you know about robotic rehabilitation, Q6: Do you use any technologic equipment in your treatment, Q7: Did you have technology lesson during university education. The first 5 questions' answers were assessed as "false", "true" or "do not know" and the last two questions as "yes" or "no" by an assistant professor.
Results: Fourteen females, ten males aged between 22-60 (29.83±8.81) totally 24 individuals were included in the study. Their mean occupation duration was 6.58±7.67 years. Questions results are following: Q1: 23 of their answers were true, 1 was false; Q2: All of them answered as do not know; Q3: 1 of them answered as false, 1 of them as true and 22 of them as do not know; Q4: 1 of them answered as false, 1 of them as true and 22 of them as do not know; Q5: 18 of them answered as true, 6 of them as false; Q6: 6 of them answered as yes, 18 of them as no; Q7: 5 of them answered as yes, 19 of them as no.
Conclusions: We found that most of the physiotherapists have little information about technotherapy. So technotherapy education should be more common in universities and physiotherapists should follow new developments more.

Keywords: Physiotherapist, technology, education

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COMPARISON OF POSTURE AND CORE STABILITY ASSESSMENT OUTCOMES IN WOMEN WITH OR WITHOUT DYSMENORRHEA

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Abstract:
Purpose: To compare the posture and core muscle endurance between women with and without dysmenorrhea.
Methods: Fifty-two women with dysmenorrhoea (DW; mean age: 22,53±1,62) and n=16 control women (CW; mean age: 22,63±1,78) included in the study. DW divided into four groups according to their Visual Analogue Scale scores as follows: DW1 (VAS=1-3), DW2 (VAS=4-7), DW3 (VAS=8-10). Assessments was applied on most painful day during menstruation. Postural evaluation was performed with 'Posture Screen Mobile' smart phone application. Absolute error values (AEV) of head, shoulder, hip and knee and sum of the lateral AEV in sagittal plane were assessed.
Core muscle endurance assessed with Trunk Flexor Endurance, Biering-Sorensen and Side Plunk Tests. Statistical analyses were performed by using Mann Whitney-U test. The statistical results were interpreted with p values and 95% Confidence Intervals (CI).
Results: Sum of the postural AEV was significantly different between CW and DW2 (p=0,045). There was overlap on 95% CI, but 95% CI value difference between CW and DW2 contain '0'. Therefore, the difference wasn't statistically significant. There were no significant differences between CW and DW2 groups in terms of other variables (p>0,05). Posture and muscle endurance variables were not different in CW and DW2 groups (p>0,05). Only lateral trunk endurance was better in CW than DW3 group (p=0,005).
Conclusions: The study was determined that dysmenorrhea pain had no effect on posture and core muscle endurance.

Keywords: Dysmenorrhea, Pain, Posture, Physical Endurance

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EXAMINING THE EFFECT OF ASSISTIVE TECHNOLOGY WITH HOME ORGANIZATION ON PROMOTING THE OCCUPATIONAL PERFORMANCE OF AN ELDERLY PERSON: A CASE STUDY

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Abstract:
Purpose: The study was conducted to examine the effect of supporting assistive technology with home organization on the performance of an elderly person.
Methods: A 75-year-old female patient discharged from hospital was included in the study. Home visits were made and the arrangements were made according to the individual's needs of assistive technology. The Tinetti (TBGT) Test was performed to determine the dynamic balance and sitting balance of the individual. The Canadian Occupational Performance Measure (COPM) was used to identify the performance problems. The Functional independence measure (FIM) was also used to determine the functional status of the individual. After the regulations were reevaluated after 8 weeks.
Results: The individual had a TGBT score of 18, a COPM performance score of 2, a satisfaction score of 2, and an FIM score of 86. Three problems with COPM have been identified. These activities were to go the toilet at night, from one room to another room, and to do something about lifting. The use of assistive technology was carried out in accordance with the realization of these activities. After 8 weeks of the application, the evaluation was reevaluated. At the end of the evaluation, the COPM performance score was 5, the satisfaction score was 6, the TGBT score was 19, and the FIM score was 88.
Conclusions: Environmental regulation and the use of assistive technology have an effect on the performance of the activity in a geriatric individual positively. Increasing the number of samples and the use of assistive technology in advanced studies will be important in geriatric rehabilitation.

Keywords: Occupational Performance, Assistive Technology, Elderly, Home Adaptation

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ASSISTIVE TECHNOLOGY ADAPTATION IN OCCUPATIONAL THERAPY WHICH PATIENT WITH RETT SYNDROME: CASE STUDY

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Abstract:
Purpose: The aim of the work; To improve the safety and performance of the individual with Rett syndrome, environmental adaptation, caregiver training, assistive technology regulation and support are provided.
Methods: A 23 year old female patient with Rett syndrome was included as a case study. Personnel evaluations (NEH, scoliosis, sensory integrity, voluntary movement) in the clinical and domestic environments, wheelchair compliance affecting activity participation, in-home / out-of-door mobility evaluations and interventions were performed.
Results: We found involuntary movements, spasticity, scoliosis, joint deformities, hypersensitivity to sudden movements, inability to orientate and body awareness. It was seen that he was dependent on the mother in self-care and could not perform voluntary movement and hand use. It was observed that the wheelchair balance was impaired, the adductor spasticity was increased and the legs were sitting on the sacrum, the foot panel did not provide foot contact, and the chest strap was not suitable for hand use. Wheelchair arrangements were made to contact with the toe panel, the sitting angle was brought to the extention, the belt supporting the pelvis and the body was designed. For functional use with the hands, the table of wheelchair has been activated and activities have been proposed to enhance sensory input (such as playing with shaved foam). Body systems and standing panels for proprioceptive input were recommended. It was determined that the stairs were not suitable for reaching by wheelchair. The information about the external elevator application that can be made from Balkond and the ramp systems that will link to the road were given. There were warnings about the removal or fixing of potentially dangerous items inside the house. Information about maternal patient transfers and wheelchair usage was given. After the interventions the person provided a more secure and symmetrical fit. Thanks to his desk, he could join the hands to the middle line. The mother was able to transfer less energy and facilitated wheelchair adaptation and in / out mobility.
Conclusions: Home visits and caregiver trainings are important for the convenience of using ancillary vehicles. It is thought that case examples that will reveal different health problems and assistive technology applications should be increased.

Keywords: Rett Syndrome, Assistive Tecnology, Occupational Therapy, Occupational Performance

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CORRELATION AMONG COBB ANGLE, POTSI INDEX AND THREE-DIMENSIONAL TOPOGRAPHIC ASSESSMENT IN EVALUATION OF SCOLIOSIS: A PILOT STUDY

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Abstract:
Purpose: Determination of Cobb angle over radiographs or identification of the POTSI index over two dimensional photographs are the conventional methods in the diagnosis and the follow up of the scoliosis. However, evaluation of scoliosis with a noninvasive and accurate method is a matter of concern in order to eliminate the radiation exposure and to obtain reliable data.
Methods: The dorsal region of five patients (2 male, 3 female) aged between 9-16 with scoliosis were scanned with a hand-held light scanner. The value of asymmetry was evaluated with comparison of two surfaces obtained from original scans and mirrored image of the scans. The root mean square (RMS) value and POTSI index was calculated. Additionally, Cobb angle was measured over radiographs. In order to test correlation among the measurements the Pearson's correlation coefficient was calculated.
Results: The Cobb angle was measured as 21.38°±9.8, POTSI index was calculated as 16.75±6.9 and RMS as 6.1 ±3.5mm. A very strong significant correlation was determined between RMS and POTSI index (r=1, p=0.017). Any significant correlation was not observed either between Cobb angle and POTSI (r=-0.3, p=0.68) or RMS (r=-0.3, p=0.68).
Conclusions: We can conclude that while similar results are obtained with POTSI index and RMS, Cobb angle results differ from them. The limitation of our study is the number of patients. Our results need to be confirmed with future studies on a large cohort of patients.

Keywords: cobb angle, POTSI, topographic analysis, scoliosis

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TO INVESTIGATE THE EFFECTS OF MANUEL PRESSURE RELEASE AND LOW LEWEL LASER THERAPY IN PERSON WITH TEMPOROMANDIBULAR JOINT PROBLEMS AND TOGETHER WITH CERVICAL MYOFASCIAL PROBLEMS

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Abstract:
Purpose: The aim of this study was to investigate the effects of Manuel Pressure Release (MPR) and Low Level Laser Therapy (LLLT) in people with temporomandibular joint (TMJ) problems and together with Cervical Myofascial Problems.
Methods: 24 student with TMJ problems were randomized in to LLLT group (n=12) and the MPR group (n=12). TMJ activity, pain severity, TMJ and cervical range of motion, dysfunction and palpation sensitivity on tmj and neck, psychological status, severity of sensitivity on mastication and neck muscles and neck pain were assessed. Both groups had a 10 session treatment consisting of correct posture training, cervical and TMJ stretching and strengthening exercises. In MPR group MPR was additionally applied, while LLLT grup was applied LLLT to the tender points in neck and mastication muscules. Descriptive analyses, Wilcoxan and Mann Whitney U tests were used for data analysis.
Results: Significant decrease was found in both of TMJ, neck pain; dysfunction's severity, palpation index and sensitivity on the neck and mastication muscles; TMJ and cervical range of motion after treatment in both groups ($p<0,05$). When groups compared there was not significant difference between the LLLT group and the MPR group ($p>0,05$).
Conclusions: It was found that both treatment in addition to exercise program have benefit affect on people with TMJ and together with cervical myofascial problems. It is predicted that the number of cases is higher and that long-term effects studies are needed to obtain clearer data.

Keywords: Temporomandibular Joint Problems, Manuel Pressure Release, Low Lewel Laser Therapy, Exercise

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THE EFFECT OF INTERNET USAGE ON OCCUPATIONAL PERFORMANCE PROBLEMS IN A ELDERLY PERSON DIAGNOSED WITH SCHIZOPHRENIA: CASE STUDY

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Abstract:
Purpose: This study was conducted to examine the effect of internet usage on occupational performance in a elderly person who has been diagnosed with Schizophrenia according to DSM V.
Methods: The Canadian Occupational Performance Measure (COPM) was used to determine the occupational performance problems of a 74 years old individual diagnosed with schizophrenia. An intervention plan was created by associating 5 occupations identified by COPM with internet use. This intervention plan was applied for 12 weeks, 2 days a week for 1 hour. Before and after the intervention, the COPM performance and satisfaction values were measured and it was determined whether there was any change.
Results: The five occupations identified by COPM are: go to the theater, video talk, go to the cinema, follow the city buses and use social networks. The pre-intervention COPM performance score average was 1.4, and the COPM satisfaction average was 2. After the post intervention, the COPM performance average was 7 and the COPM satisfaction average was 7.
Conclusions: As a result, adding the use of internet with client-centered intervention approach affects occupational performance and satisfaction positively. Encouraging the use of the internet in elderly people is important for increasing the independence and participation of the individual.

Keywords: Occupational Performance, Canadian Occupational Performance Measure, Internet Using, Schizophrenia

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THE EVALUATION OF HOW SOCIAL MEDIA (INSTAGRAM POSTS) AFFECTS EMPLOYEE IN RESPECT TO EXERCISE MOTIVATION, PSYCHOSOCIAL STATUS AND QUALITY OF LIFE

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Abstract:
Purpose: Taking into account the growing use of social media, this research was conducted to find out the effects of the visuals shared at Instagram to health-related life quality, psychosocial behaviour and motivations to participate exercise.
Methods: The survey consisted of 38 women and 22 men as a total of 60 healthy people, aged between 23-54 years old and working as an academic or administrative staff at Uskudar University. The demographic profiles of participants are recorded. In the survey, psychosocial conditions are measured with Beck Depression Inventory and health-related quality of life is measured with SF – 36, individuals' reasons for exercising is measured with Exercise Motivations Inventory (EMI). An Instagram account opened and after the participants have started to follow this account, exercise programs, ergonomic arrangements and exercises the benefits of walking, right sleeping posture, useful effects of doing exercises shared for eight weeks period. An Instagram account opened and after the participants have started to follow this account, visuals containing up and lower extremities exercises, trunk exercises, ergonomic movements, the benefits of swimming and walking, right sleeping posture, useful effects of doing exercises shared for eight weeks period. Participants from control group did not receive these entries. After the end of eight weeks, both control and experimental groups reevaluated the surveys.
Results: At the end of the survey, when groups are compared, no significant difference is found in terms of sub parameters of BDI (p=0374) and EMI (p=0,05). At Short Form – 36, significant difference is found in terms of mental health subparameter (p=0,009) between groups while there is no significant difference at the rest of the sub-parameters (p>0,05). 63,3% of the participants has applied the suggestions on visuals 1-2 times in a week while 36,7% of never applied. Significant difference is found in experimental group between participants who applied suggestions at visuals shared Instagram and those who did not applied in terms of BDI (p=0,006), mental health(p=0,029), overall health perception(p=0,012) and physical activity (p=0,018) sub-parameters of Short Form – 36, positive health (p=0,049) sub parameter of EMI.
Conclusions: As a result, in this study motivation of individuals via using social media (Instagram) has a positive effect on mental health, health-related life quality and participation of exercise.

Keywords: Social media, inactivity, motivation

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COMPARISON OF BALANCE REHABILITATION METHODS IN STROKE PATIENTS

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Abstract:
Purpose: Cerebrovascular accident is a major health problem that limits the ambulation which affects a large ratio of the population with high frequency and mortality rates. Balance problems are the most important barrier for ambulation. It also creates fear in patients and may reduce the desire for ambulation, therefore, patients may become dependent on others in a majority of their daily life activities. Thus, balance training should be one of the main parameters in rehabilitation. The aim was to compare the effectiveness of the conventional method, the equilibrium board, with the Technobody device used in balance rehabilitation.
Methods: This study included 10 individuals with a diagnosis of hemiplegia from Mustafa Kemal University Neurology Department and aged between 40-65 years. Individual demographic information was recorded. The balance was assessed with Berg balance scale and flamingo test. While 4 individuals were treated on the balance board, other six patients were treated in balance rehabilitation on Techno Body Postural Line device. Patients were treated for 2 sessions a week, totaling 10 sessions.
Results: Eight of patients were male and two were female (mean age = 50.8 ± 7.03 years).We found that there was not a statical difference between and within groups in berg balance scale results.There wasn't a significant difference between groups in flamingo tests but we found that there was a statistical difference before and after treatment in a group that treated with Technobody balance device ($p<0,05$).
Conclusions: There was no statistical superiority between Techno body Line device and balance board in rehabilitation but as a result of clinical observations, we think that Technobody showed better results in balance rehabilitation, so it should be included in routine rehabilitation.

Keywords: Stroke, Balance, Rehabilitation

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A COMPARISON OF UNIVERSAL AND DIGITAL GONIOMETER MEASUREMENTS OF LUMBAR RANGE OF MOTION

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Abstract:

Purpose: The purpose of this study was to compare universal goniometer and digital goniometer's measurements of lumbar region.
Methods: Healthy individuals were included who did not have any disease could lead to joint motion restriction. Demographic data and ROM values assessed by universal and digital (Baseline®, Chine) goniometer were recorded. Flexion and extension motions were measured in standing from lateral. Lateral projection of lumbosacral joint was determined as pivot and movable arm of goniometer was placed in lateral projection of axilla. Lateral flexion was measured from posterior, pivot was placed along lumbosacral joint, and movable arm followed spinal processes. The average value of the measurements, repeated three times to ensure the accuracy, was recorded. Data analysis was performed with SPSS 16.0.
Results: Thirty cases (22/8, F/M) with a mean age of 21.2±1.9 years (18-30) were included in the study. Lumbar flexion ROM measured by universal goniometer was 69.3˚, extension 31.6˚, right and left lateral flexion were 35˚. According to digital goniometer measurements flexion ROM was 70.1˚, extension 31.3˚,lateral flexion angles were 35˚. There was no significant difference between two goniometric measurements of flexion (p=0.266), extension (p=0.553), right lateral flexion (p=0.947), left lateral flexion (p=0.636).
Conclusions: The results of the study showed that universal and digital goniometer measurements of ROM of lumbar region were similar. Digital goniometry provides convenience with showing the results digitally, it is a bit difficult to keep it fixed because it is a little heavy. In clinical practice, both can be used according to the physiotherapist' preference.

Keywords: Goniometer, Digital, Measurement

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THE EFFECT OF TRADITIONAL FOOT MASSAGE ON LOWER EXTREMITY FUNCTIONS IN CHILDREN WITH HEMIPARETIC CEREBRAL PALSY

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Abstract:
Purpose: The aim of this study was to investigate the effect of traditional foot massage, which added to the rehabilitation program, to balance and walk function in children with Hemiparetic Cerebral Palsy.
Methods: This study was performed on Hemiplegic Cerebral Palsy cases treated at a Special Education and Rehabilitation Center. According to Modified Ashworth Scale (MAS), fourteen subjects between 0 and 2 points participated to the study. Patients, who have a treatment in the last six months for Botulinum Toxin, advanced vision problems, lower extremity contracture and non-cooperative cases were excluded from the study. The cases divided in two groups: massage (n = 7) and control (n = 7). While the classic massage group includes the added traditional foot massage, the control group performed only physiotherapy practices. Romberg and one foot standing test (TAUD) were used to evaluate the static balance, and Up and Walk test were used to check the dynamic balance of the patients.
Results: The average age of the subjects participating in the study was 11.43 ± 3.20 (17-6). In terms of demographic data, both groups showed similarities before treatment (p> 0.05). There was no difference between groups before and after the treatments MAS, Romberg, TAÜD and Up and Walk tests (p> 0.05). In the comparison of before and after the treatment, only TAÜD values were significantly increased in both groups (p = 0.016). The obvious increases, which were seen in the comparison of before and after the MAS, Romberg, TAÜD and Up and Walk tests were similar in both groups (p> 0.05).
Conclusions: It has been determined that the addition of classical massage to the physiotherapy program has no additional effect on balance. For a better understanding about the effects of classical massage on balance and walk during hemiplegic cerebral palsy, there is a need for further studies with an increased number of cases.

Keywords:

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EVALUATION OF PHYSIOTHERAPISTS' STANDPOINT WITH REGARD TO TECHNOLOGICAL REHABILITATION

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Abstract:
Purpose: The purpose of the study was to subject into examination the technological rehabilitation use of physiotherapists, displaying activity in different fields, and their opinions on the relevant field.
Methods: Researchers asked participants to fill out online questionnaire consisting of 18 questions, through using "Google forms". Questions were categorized under three groups; personal characteristics of physiotherapist, physiotherapist's opinion on technological rehabilitation, and feedback they have received from patients. Questionnaire was sent to 500 physiotherapists via e-mail. Answers were analyzed in terms of percentage values, through use of Google forms.
Results: Questionnaire was filled out by 160 physiotherapists. 45% were working at a rehabilitation center. 89.2% thinks that technological rehabilitation is useful in each field of rehabilitation. They stated that, it increases adaptation to rehabilitation, particularly in child patients (40.7%), and positive feedback was received (54.4%). They specified that technological rehabilitation increases the patient's faith in treatment, is fun, increases recovery and reduces the workload of physiotherapists. The rate of those who think that the use of technological rehabilitation would decrease the need towards physiotherapists, was 15.2%.
Conclusions: Majority of those filling out the questionnaire, considers technological rehabilitation useful, and suggests its more widespread usage. However, usage is limited due to cost and space problems. More evidence can be accumulated with regard to use of technology in rehabilitation, if the interest in the field, and number of studies carried out are increased.

Keywords: Technology, Physiotherapist, Survey

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INVESTIGATION OF THE EFFECT OF MIRROR THERAPY ON UPPER EXTREMITY FUNCTIONS IN CHILDREN WITH BRACHIAL PLEXUS PARALYSIS

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Abstract:
Purpose: The aim of this study was to investigate the effect of mirror therapy, which added to the traditional physiotherapy program, on the upper extremity functions in children with Brakial Plexus paralysis.
Methods: Fifteen patients with Obstetric Brachial Plexus Paralysis [OBPP], who were being treated at a Special Education and Rehabilitation Centre in Istanbul participated in the study. Patients with Botulinum Toxin treatment, advanced vision problems, upper extremity contracture, and non-cooperative cases were excluded from the study. The cases divided in two groups: Mirror (n = 7) and Control (n = 8). The lesion type of children with OBPP was determined by the Mallet classification. The traditional physiotherapy program were done to the Mirror group per week 3 day, 20 min. The control group was taken to a traditional physiotherapy program that included, Patients' Joint Motion Apertures (EHA) were assessed using a universal goniometer, active extremity active movements (AHS) and hand functions were asses by using the Jebson Taylor Hand Function Test.
Results: The average age of the subjects participating in the study was 10 ± 4.09 (17-6). Mallet lesion types, AHS, Jebson Taylor Hand Function test scores of the groups were similar before treatment (p> 0.05). Before treatment the mirror groups´forearm supine EHA values were higher than the control group (p = 0.048). Both groups´ Jebson Taylor Hand Function Test scores were significantly increased at the end of treatment compared to the scores before treatment (p = 0.017 and 0.010). Mirror group wrist flexion (p = 0.041) and wrist extension EHA values were significantly increased after treatment (p = 0.041). The forearm pronation EHA values of the control group were found to be significantly higher than before the treatment scores (p = 0.043). All parameters were similar between groups after treatment (p> 0.05). Before and after the treatment Jebson Taylor Hand Function test scores were significantly higher in the control group than in the mirror group (p = 0.049).
Conclusions: It has been determined that the addition of mirror therapy to the traditional physiotherapy program has no additional effect on upper extremity functions in OBPP cases. This research is a pilot study and needs to increase the number of cases.

Keywords: Mirror Therapy, Upper Extremity Functions,Brachial Plexus Paralysis

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A PULMONARY FUNCTION MEASUREMENT SYSTEM BASED ON BOTH SINGLE BREATH AND REBREATHING METHODS

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Abstract:
Purpose: Pulmonary function test devices have been widely used for diagnosing pulmonary diseases, or tracking the treatment effects in the hospitals, or for various pulmonary research studies in the laboratories. In the literature, we see two major methods which have been developed to use in the test devices: a) single breath (or breath-hold), and b) rebreathing methods. These methods have their own advantages and disadvantages in terms of preparation, complexity, cost, time etc. Depending on the requirements, one method may be more preferable than the other one. There have not been any pulmonary test device based on both methods on the same time to give an option to the users. In this study, we developed and manufactured a low cost prototype, which could use any of those methods.
Methods: This proposed system consists of 2 gas analyzers for oxygen, carbonmonoxide and methane, 2 large and 2 small solenoid valves, 1 vacuum pump, 1 gas sampling pump, 1 reservoir bag, 2 flowmeters, 1 pressure transducer, 1 test gas tank (0.3% carbonmonoxide, 0.3% methane, 21% oxygen, balanced Nitrogen), an 8 channel relay card, 2 microprocessor units and a Windows PC programmed via MS Visual C#. The system was mechanically tested in terms of measurement errors, dilution correlations and so on.
Results: In the test studies, excellent correlations were obtained (R2=0.98-1.00), and the flow and dilution errors remained below 5 %.
Conclusions: In conclusion, both single breath and rebreathing methods were offered as options for users' study requirements in a single pulmonary function measurement system.

Keywords: Pulmonary Function Test, Respiratory Mechanics, Lung Capacities

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IS THE BODY MASS INDEX RELATED WITH THE BALANCE?

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Abstract:
Purpose: The Body Mass Index (BMI) is measure of body fat derived from weight and height of an individual. Balance is defined as protection of the center of gravity on the support base. The objective of this study was to evaluate the correlation between the BMI and postural balance in 18-25 year healthy individuals.
Methods: Demographic data of 40 persons, age 18-25 years taken by questionnaire. Participants BMI and balance were tested with Nintendo Wii, fit age.
Results: The mean age was 22.25±0.954(min-max=19-24) years, 33(82.5%) fast food consumption, the mean frequency of fast food 1.338±1.095(min-max=0-4) days/week, Body weight was 62.61±12.992(min-max=45-108.5) kg and height 169.03±8.666(min-max=155-190) cm. The mean duration of sitting was 7.28±2.663(min-max=3-12) hours, 6(15%) smoking, the mean amount of cigarettes 0.44±1.661(min-max=0-10) pieces/day, 10(25%) alcohol use, 2(5%) had chronic diseases, 4(10%) using drugs, BMI was 21.78±2.979(min-max=16.98-30.06), [1(2.5%) was obese, 4(10%) was overweight, 28(70%) was in ideal weight, 7(17.5%) was underweight], The mean fit age was 22.95±5.315(min-max=19-44) years and differences between self-age 3.28±4.126(min-max=0-20) years. One (2.5%) had the same age, 26(65%) had younger than from own age, 13(32.5%) had older than from own age. There was a statisticially significant relationship between BMI and gender (r=0.377;p=0.017), BMI and chronic diseases (r=-0.390;p=0.013), BMI and fit age (r=0.478;p=0.002), BMI and fit-self age categori (r=0.617;p=0.000).
Conclusions: According to results of our study, high BMI demands more displacements to maintain postural balance. In the literature there is similar results with our study. In the future studies participants should be compared about balance when they lose weight.

Keywords: Body Mass Index, Balance, Fit Age, Techno-Balance

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THE EFFECT OF THE DOMINANCY AND STABILITY IN HEALTY YOUNG ADULTS

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Abstract:
Purpose: Lateralization is priority or preference of using either right/left side of body. The general opinion in motor behavior is that there is a dominant brain hemisphere for motor control. The dominant hemisphere makes movements faster, more accurate and coordinated on other side of body compared to non-dominant hemisphere. Our aim in this study was to investigate effect of dominant/non dominant sides on balance in healthy young adults.
Methods: Demographic information of 40 healthy young adults was recorded. The balance of healthy young adults was determined using the nintendo wii balance board.
Results: 29(72.5%) female, 11(27.5%) male were included. 36(90%) had right dominancy, 6(15%) had orthopedic ilnesses, 6(15%) had dizziness, 16(40%) had vision problem, 9(22.5%) had sleep problems, mean duration of sleep 6.73±0.927(min-max=5-9) hours/day, side of balance; 1(2.5%) had neutral, 21(52.5%) had right, 18(45%) had left side balance and stand on a leg; 28(70%) right, 12(30%) left side. The mean difference between sides 6.45±7.289(min-max=0-34.2) (right=50.34±4.939(min-max=37.5-67.7)%, left=49.68±4.885(min-max=32.9-62.5)%). There was a statisticially significant relationship between dominancy and stand on a leg (r=0.509;p=0.001). There is no relationship between dominacy and side of balance, percent differences of sides (p>0.05).
Conclusions: According to study couldn't found relationship between dominance and stability. This type of study is rare in the literature. The results of a study conducted in our country didn't show any significant difference between dominant/nondominant foot static balance parameters. In a study by Kapshigay et al, on football players, they found no statistically significant difference between dominant/ non-dominant lower extremity body balance.

Keywords: Dominance, Stability, Balance, Nintendo-Wii

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THE RELATIONSHIP BETWEEN PROPRIOCEPTION OF EXTREMITIES, DYNAMIC BALANCE AND CORE STABILIZATION

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Abstract:
Purpose: The aim of this study is whether any relationship between the endurance of the core muscles and the proprioception of the extremities and dynamic balance
Methods: This study included sixty (37 female, 23 male, mean age 20.9±2.46) healthy volunteers. McGill Core Endurance Test -trunk anterior flexor test(TAFT), right lateral plank test(RLPT), left lateral plank test(LLPT), trunk posterior extensor test(TPET)- was applied to assess core stabilization (2). Pedalo® was used for dynamic balance measurement. MarvaJed was used for proprioception measurement. Specific angles were shown to participants. It was asked to find these angles with their eyes closed and the divergence angle recorded. "In case of finding the desired angle, the proprioception was saved as 0". Spearmann correlation test was used to determine the relation between the parameters.
Results: While there were no significant relationships between RLPT and shoulder-hip proprioception and dynamic balance; LLPT and shoulder-hip proprioception and dynamic balance (p-value >0,05). There were significant relationships between TAFT and shoulder-hip proprioception and dynamic balance; TPET and shoulder-hip proprioception and dynamic balance (p-value <0,05).
Conclusions: According to the results of this study, strengthening the muscles of the core in addition to conventional rehabilitation programs may accelerate recovery in a shoulder and hip injuries. This is the first study that investigates whether the core stabilization affects proprioception of extremities and dynamic balance, or not. Further studies should be carried out to interpret this link more accurately by increasing the number of cases in the future.

Keywords: Proproception, Stability, Physical Endurance

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ARE THERE ANY RELATIONSHIP BETWEEN FPI AND STATIC, DYNAMIC BALANCE AND ANKLE PROPRIOCEPTION?

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Abstract:
Purpose: The aim of this study is whether any relationship between Foot Posture Index and dynamic balance and ankle proprioception.
Methods: Fifteen female and 15 male totally 30 young adults (age range between 20-25 years) were included in the study. Static foot postures of subjects were assessed by using the 6-item Foot Posture Index (FPI). Ankle joint proprioception was measured using the Biodex System 4 Pro (Specific angles were shown to participants. It was asked to find these angles with their eyes closed and the divergence angle recorded. "In case of finding the desired angle, the proprioception was saved as 0"), a dynamic balance was assessed with Pedalo. Independent T-test was used to compare neutral and prone foot types. Pearson correlation test was used to investigate whether there was a significant relationship between foot posture index scores and other measurements. Significance was determined as $p < 0.05$.
Results: There were no significant relationships between foot posture index with dynamic balance and ankle proprioception (p-value >0,05). There was no significant correlation between dynamic balance and ankle proprioception (p-value >0,05).
Conclusions: The results showed that Ankle proprioception and dynamic balance did not differ between neutral and prone foot. These results may be due to little sample size. Further studies should be carried out to interpret that link more accurately by increasing the number of cases.

Keywords: Foot, Ankle, Proprioception

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IT IS FEASIBLE TO IMPLEMENT A TELE-REHABILITATION PROGRAM IN CHILDREN WITH JUVENILE IDIOPATHIC ARTHRITIS? PRELIMINARY ANNOUNCEMENT

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Abstract:
Purpose: Physiotherapy is an integral part of the treatment of Juvenile Idiopathic Arthritis (JIA) patients, contributing to the rehabilitation of the affected joints, either by sessions of a specialized and individualized program of exercises in the physiotherapy clinic, or by the implementation of this program at home, following education of the child and his parent / guardian. The disease chronicity combined with the psychosocial impact of the whole therapeutic process on children and parents lives,often leads to non-compliance and significant financial burden. These parameters, in the era of the economic crisis, are often difficult to manage by the families and the treatment group,but they are a stimulus to seek new physiotherapy approaches. The purpose of this study was to investigate the applicability and efficacy of a tele-rehabilitation program in JIA patients, in order to alleviate the JIA patients and their family.
Methods: Five JIA patients, 8-16 years old, participated in a tele-rehabilitation program (using personal computers,at home), as part of their physiotherapy sessions. During the sessions they performed their exercises under the supervision and guidance of a specialized pediatric physiotherapist, twice a week, for 12 weeks. Before and after the program, parents and children completed two specific questionnaires, one on quality of life (JAMAR) and the other on the applicability and effectiveness of the program.
Results: Everyone was satisfied with the program's implementation and effectiveness and wished to continue.
Conclusions: The first findings on the feasibility and effectiveness of a tele-rehabilitation program in children with JIAare satisfactory and allow the extension of this application to a larger number of patients.

Keywords: Tele-Rehabilitation, Physiotherapy, JIA, Home Exercise

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MUSCULOSKELETAL PAIN IN YOUNG ACADEMICIANS: ITS RELATION WITH ALEXITHYMIA, JOB, AND LIFE SATISFICATION

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Abstract:
Purpose: The aim of this study was to investigate whether musculoskeletal pain related to alexithymia and psychosocial factors in terms of job and life satisfaction in young academicians.
Methods: Ninety-three young academicians (73 female; mean age, 29.50±5.33 years) were included the study. Musculoskeletal pain and the pain intensity at rest, during activity, at night were evaluated by the Nordic Musculoskeletal Questionnaire (NMQ) and Numeric Pain Rating Scale (NRS), respectively. The Toronto Alexithymia Scale-20 items (TAS-20) was used for assessing alexithymia. The psychosocial factors were assessed using the Minnesota Satisfaction Questionnaire (MNQ) and Satisfaction With Life Scale (SWLS). Pearson's correlation analysis was performed. The statistical significance level was set at 0.05.
Results: There was no significant difference in presence of the NMQ, NRS, MNQ, and the SWLS between the TAS-20 subgroups ($p>0.05$). The results of the NMQ has indicated that prevalence of pain were higher in the neck (73.1%), low back (63.4%) and shoulders (55.9%). The NMQ was not related to TAS-20, MNQ, and SWLS. However, there was a negative relationship between pain intensity at rest and SWLS ($r=-0.32$, $p=0.01$). Also, pain intensity during activity was associated with SWLS ($r=-0.31$, $p=0.01$).
Conclusions: Presence of the musculoskeletal pain did not relate to alexithymia, work and life satisfication. However, increased pain intensity related to decreased life satisfaction. Therefore, the high prevalence of pain in the neck, low back, and shoulder in young academicians should not be ignored.

Keywords: Musculoskeletal Pain, Alexithymia, Satisfaction, Pain Intensity, Psychosocial Factors

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COMPARISON OF EFFECTIVENESS FOR ISCHEMIC COMPRESSION THERAPY AND SCAPULAR PNF TECHNIQUE ON PAIN, SENSOR-BASED STATIC BALANCE, SLEEP, SHOULDER FUNCTION AFTER THE TRAPEZIUS MUSCLE TRIGGER POINT TREATMENT

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Abstract:
Purpose: Myofascial Pain Syndrome(MPS) is associated with pain and stiffness and hyperirritable palpable nodules in muscle. Because of the pain, people have low level arm activity, decrease sleep quality and decrease balance with long term. Our purpose for this study, show the effectiveness of techniques and regulate balance and sleep problems.
Methods: For this study, we included 14 women that have pain on trapezius muscle TP and separated 2 groups randomly. We assessed the patient with Quick-DASH, Pittsburgh Sleep Quality Index(PSQI), Neck Disability Index(NDİ), ROM form, NPS, Shoulder Asymmetry, ICS Balance System before and after the treatment. İCT and SPNF groups had conventional treatment for 20 days and special technique is applied for 2 days in a week for 3 weeks.
Results: Before-After comparison of İCT groups values; there is a positive relationship between NDİ score (p=0,026), Quick-DASH score (p=0,018), total PSQI score (p=0,027), ROM for shoulder abduction (p=0,042), NPS for shoulder abduction (p=0,017), NPS for palpation (p=0,018), Asymmetry between shoulders (p=0,018). Before-After comparison of SPNF groups values; there is a positive relationship between NDİ score (p=0,002), Quick-DASH score (p=0,003), ROM for shoulder abduction (p=0,005), NPS for shoulder abduction (p=0,001), NPS for palpation (p=0,001), Asymmetry between shoulders (p=0,001).There is no difference between groups about ICS balance system.
Conclusions: MPS causes to sleep problem, pain, imbalance, activity limitations. After the our treatments, we see improvements about shoulder function, ROM, sleep quality and decrease the pain while sleeping, palpation, resting periods. But we didn't see any change about ICS balance system.

Keywords: Ischemic Compression, Scapular PNF, Balance

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INVESTIGATION OF LITERATURE RELATED TO USING ROBOT IN STROKE REHABILITATION

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Abstract:
Purpose: When we look at current methods used in stroke rehabilitation, it is seen that robotic rehabilitation programs are mostly used in recent years. In this study, it was aimed to systematically investigate the literature to evaluate the type of robot used in stroke rehabilitation, its purpose, its systems, motor control and functional ability.
Methods: We reviewed the articles published in PubMed, Cochrane Controlled Trials (Rehabilitation and Related Therapies) and the Center for International Rehabilitation Research Information and Exchange (CIRRIE) for the last 10 years using the keywords "Stroke", "Hemiplegia" and "Robotic Rehabilitation". The types of the robots used in the research, the purpose of use, the systems, the duration and the results are questioned.
Results: According to systematic literature review, devices used in stroke therapy can be divided into two main categories: upper extremity and lower extremity. Exoskeleton and end-effector type robots are mainly used in upper and lower extremity rehabilitation. In a recent Cochrane review; 8 robots were used for upper extremity. Six robots were found for the lower extremity. As a result; upper extremity robotic rehabilitation improves arm function in daily life activities. In addition, electromechanical gait training after stroke seems to be effective. However, it is still unclear whether robot-assisted arm training may improve upper extremity muscle strength and which electromechanical gait training device may be the most effective method for lower extremity and walking training implementation.
Conclusions: It has been determined that the use of high technology robots has a positive effect on upper and lower extremity rehabilitation after stroke. There is a need for new randomized clinical trials in stroke rehabilitation, in which long-term effects of robot use are explored and compared with other treatment modalities.

Keywords: Stroke, Robotic Rehabilitation, Hemiplegia

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A HOLISTIC PHYSIOTHERAPY PROGRAM FOR PATIENTS WITH CARPAL TUNNEL SYNDROME: A CASE SERIES

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Abstract:
Purpose: Our purpose was to determine whether outcomes could be changed after a holistic physiotherapy program includes mobilization, myofascial release, exercise, trigger point therapy, psychoneuroimmunologic therapy, and osteopathy in patients with carpal tunnel syndrome.
Methods: Three patients diagnosed with carpal tunnel syndrome were participated in this study. They were received an 8-session holistic physiotherapy program two times in a week for 4 weeks. Holistic physiotherapy program consists of mobilization, myofascial release, exercise, trigger point therapy, psychoneuroimmunologic therapy, and osteopathy. Main outcomes were Disabilities of the Arm, Shoulder and Hand (DASH) score, a visual analogue score (VAS) for pain and range of movement which were measure at baseline and at the end of the treatment.
Results: There were improvements in both of the parameters of three patients after the treatment program. While DASH scores were 79, 115, and 107 before the treatment, these values decreased to 30, 45, and 41 after the treatment. In addition, VAS scores were decreased from 9 to 0, from 7 to 2 and from 10 to 1, respectively.
Conclusions: According to the results of this study, an 8-session holistic physiotherapy program may be beneficial on pain and functional status in patients with carpal tunnel syndrome. Further studies to investigate the effects of holistic physiotherapy program in patients with carpal tunnel syndrome are needed.

Keywords: Holistic Physiotherapy, Carpal Tunnel Syndrome, Physiotherapy

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IS ISCHEMIC COMPRESSION ON ACTIVE TRIGGER POINTS EFFECTIVE BY MEANS OF FUNCTIONAL AND PHYSICAL PARAMETERS IN SHOULDER IMPINGEMENT SYNDROME?

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Abstract:
Purpose: The aim of the study was to investigate the effects of ischemic compression on pain, pressure pain threshold (PPT),
the range of the motion (ROM), muscle strength, and functionality of shoulder in patients with shoulder impingement syndrome.
Methods: Totally 40 patients (24 Female and 16 Male; mean age: 50,27±9,306 years) who had shoulder impingement syndrome with active trigger points (TPs) on supraspinatus, infraspinatus and subscapularis muscle participated in the study. After demographic data has been recorded; pain intensity, PPT, ROM, muscle strength, and functionality were assessed by visual analog scale, algometer (J-Tech Commander), digital goniometer (Baseline), dynamometer (Lafayette), Constant-Murley Shoulder Score, respectively.
The control group consisted of 20 patients who had the ultrasound (Chattangooga, 1 MHz, 1.5 watt/cm^2), TENS (Chattangooga, conventional TENS), coldpack and exercise treatment. The study group of 20 patients were treated with ischemic compression in addition to treatment methods of control group. Ischemic compression was applied on active TPs for 90 seconds. and gradually increased by patient's tolerance. All patients were treated for 15 days. All assessments were performed before and after the treatment program.
Results: All measured parameters after treatment program indicated improvements in both groups ($p<0.05$). Only PPT increased significantly in the study group compared to control group ($p<0.05$).
Conclusions: The ischemic compression applied on active TPs improved PPT better than usual treatment methods. But it is worthwhile to state that both treatment methods were effective on the measured parameters in patients with shoulder impingement syndrome with active TPs.

Keywords: Impingement Syndrome, Trigger Points, Ischemic Compression

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INVESTIGATION OF PRODUCTIVITY PROBLEMS OF PEOPLE WITH MULTIPLE SCLEROSIS

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Abstract:
Purpose: It is aimed to examine the occupational performance and productivity problems of people with Multiple Sclerosis (MS).
Methods: 82 people with MS according to DSM V criteria were evaluated in Hacettepe University, Faculty of Health Sciences, Department of Occupational Therapy. The Mini Mental State Examination (MMSE) was administered to assess the clients's cognitive skills. People who score 24 or more on the MMSE were included in the study. The Canadian Occupational Performance Measure (COPM), which measures the importance of activities identified with the individual to find out where the individual has problems, and the performance and satisfaction scores of the individual, ranging from 1 to 10 points according to the likert scale. Occupational performance problems and productivity problems were analyzed according to the determined activities.
Results: The most important 5 activities, which constitute occupational performance problems and determined by COPM, were identified. A total of 342 activities were determined according to the data obtained from people with MS, according to COPM. It was found that 47% of these activities were self-care, 32% were leisure time, and 21% were of productivity. 23% of paid or unpaid work, 72% of Household management and 5% of school and/or play are areas of productivity.
Conclusions: People with multiple sclerosis have been found to have problems in many areas. The productivity area is determined to be about 1/5 of the occupational performance. Client-centered intervention approaches in these areas are important for a more independent and productive life for the people.

Keywords: Canadian Occupational Performance Measure, Multiple Sclerosis, Productivity, Occupational Performance

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STROKE PATIENTS' KNOWLEDGE ABOUT ROBOTIC REHABILITATION

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Abstract:
Purpose: The aim of the study is to investigate the views of stroke patients about robotic rehabilitation.
Methods: Fifty-seven stroke patients (Female:20,Male:37) were included. Demographics and medical information of the patients were recorded. The questionnaire contained 15 questions about the views of stroke patients. The questions were prepared based on receiving robotic rehabilitation(RR), previously. General knowledge about RR of the subjects were analyzed with IBM SPSS Statistics 21.
Results: Mean age of the cases was 51.33±11.36 years. Mean stroke duration was 31.05±30.09 months. Right hemisphere was affected in %63,2(n=36) of the patients and %87.7(n=50) of them had Cerebrovasular Disease. Besides %50.9(n=29) of them did not hear about RR and %85.96(n=49) of them did not receive RR. Mean number of RR sections, mean duration of sections and mean day number per week were 13.88±11.38, 31.25±12.75 min and 2.25±1.16 days, respectively. Moreover %75(n=6) of the participants receiving RR(n=8, %100.0) had guidance of physiotherapists. While %50(n=4) of them found RR effective, %75(n=6) of them found conventional physiotherapy more effective.
Conclusions: Our results showed that most of the stroke patients has no idea about RR. Very few number of stroke patients had a chance to receive RR. Stroke patients would like to receive RR more, however they do not think that RR can replace conventional physiotherapy under physiotherapists' observation.

Keywords: Robotics; Rehabilitation; Stroke; Knowledge

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THE RELATIONSHIP BETWEEN HAMSTRING FLEXIBILITY AND CERVICAL RANGE OF MOTION IN HEALTHY YOUNG ADULTS: A PILOT STUDY

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Abstract:
Purpose: The aim of this pilot study was to investigate the possible relationship between hamstring flexibility and cervical range of motion in healthy young adults.
Methods: Twenty-five healthy university students with a median age of 21.0 years (9 male, 16 female) and median body mass index of 21.83 kg/m2 were included. To assess the hamstring flexibility, passive straight leg raise test was measured by a smartphone application (The Clinometer, android app, plaincode) bilaterally. The average hip flexion angle between two lower extremities was calculated and used for hamstring flexibility. Active cervical range of motion was measured by using the same smartphone application and following movements were recorded – flexion, extension, and lateral flexion. All the measurements were performed three times and the mean value was used for analysis. Spearman's rank correlation was used to evaluate correlations.
Results: No significant relationship was observed between the hamstring flexibility and following cervical range of motion parameters: flexion, extension, right lateral flexion, and left lateral flexion (p= 0.151, p= 0.735, p=0.328 and, p= 0.969; respectively).
Conclusions: According to our results, we found no evidence that indicates a relationship between hamstring flexibility and cervical range of motion in healthy young adults in this pilot study. Our results might be related to inadequate number of the participants. As hamstrings and the cervical region located on the same myofascial chain, future studies including more participants might reveal a possible relationship between these two regions.

Keywords: Hamstring Flexibility, Cervical, Range Of Motion, Smartphone App

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THE INVESTIGATION OF PHYSICAL ACTIVITY AWARENESS AND MOBILE TECHNOLOGIES IN UNIVERSITY STUDENTS

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Abstract:
Purpose: Technological developments are seen in different purposes in the field of health as in every area. For active life, today at the beginning of the systems that are becoming widespread have been developed virtual reality systems with game-based exercise programs and mobile applications such as pedometers and exercise guides. The aim of study to research the physical activity (PA) awareness, and the use of perceptions and mobile technologies in university students.
Methods: University students were applied the evaluation form and the International Physical Activity Questionare (IPAQ).
Results: The study included a total of 100 university students (65 women+35 men) (mean age: 20,88 ± 1,57 years). 71% of the students' FIT scores were below of normal levels. According to IPAQ results were 54% moderate and 22% severe PA levels. While 46% of the students were doing regular PA, it was seen that the primary purpose of doing PA was "Healthy life" (40%). The perception that PA is beneficial to health and the age at onset should be an average of 9.04 years was detected. Only 18% of the students were seen to have knowledge of technological applications. Pedometer use rate to determine walking time is 49% (average of steps per day: 8159)
Conclusions: Many of the students have insufficient PA level and don't have enough knowledge about the technological applications. Also, it is perceived that the age of onset at the PA is higher than necessary. This situation may be related to habits and social status.

Keywords: Physical Activity, Pedometer, Mobil Application, Technological Awareness

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EFFICIENCY OF NEUROLOGICAL REHABILITATION WITH RESTEP THERAPY AFTER RESORPTION OF HEMORRHAGE IN BRAIN STEM CAVERNOUS VENOUS MALFORMATION: CASE REPORT

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Abstract:
Purpose: Brain stem cavernous venous malformations are endemic venous haemangiomas and can cause to severe neurological disorders due to involvement area. Perturbation application is helpful in creating a suitable environment in gait training and it drives problem solving. Perturbation was applied to subjects by using Re-Step Rehabilitation System (Re-StepTM, Step of Mind Ltd.,Israel) which enables to implement personal perturbation pattern during walking. The aim of the study is to investigate the efficiency of ‘’ReStep Rehabilitation System” technology in neurological rehabilitation after intracerebral hemorrhage resorption of pontomesencephalon level venous hemangioma.
Methods: Eight years ago, a 18 years old female patient named Ş.Ş., was diagnosed brain stem cavernous hematoma and had clinical symptoms such as walking difficulty, balance problems and ataxia after resorption surgery. Perturbation was applied for 6 weeks with a frequency of 3 days a week in the neurological rehabilitation program. To evaluate the efficacy of the treatment, Functional Ambulation Scale (FAS), Tinetti Balance and Walking Test and Functional Indepence Measures were used for pre- and post-treatment evaluations.
Results: After evaluations, FAS stage was found stage 1 before treatment and stage 3 after treatment. The FIM score was found as 91 before treatment and 117 after treatment. Tinetti total score was found before treatment 4/26 for balance and 1/9 for walking, and 19/26 and 5/9 was found after treatment.
Conclusions: Restep therapy used in neurological rehabilitation seems to be effective on daily life activities, walking and balance.

Keywords: Perturbation, Restep, Neurorehabilitation, Brain Stem Cavernous Venous Malformations

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EFFECTIVENESS OF PHYSICAL ACTIVITY PARTICIPATION LEVEL: PILOT STUDY

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Abstract:
Purpose: Physical activity (PA) is an important part of healthy life.In every age group, regular PA has positive cardiovascular, musculoskeletal, mental and social positive effects.In young group, it is frequently seen in musculoskeletal problems due to incorrect posture.The aim of this study was to investigate the relationship between participation in physical activity and postural compliance.
Methods: University students between the ages of 19-25 were evaluated with FIT Score, IPAQ. Postural regularity was assessed by the lateral posture analysis method of "Fizyoprint" mobile application.Tilt directions were determined according to the pelvic tilt (PT) angle (10°) in practice.
Results: 40 students (mean age:21.52±1.21 years) were participated in the study.55% of the participants were found the FIT score to be weak.According to IPAQ, students (57.5%) had the most moderate physical activity.In Fizyoprint lateral postural analysis results were that pelvic position was normal in 8 patients, anterior PT in 10 patients, posterior PT in 18 patients.There was a significant correlation between FIT score and IPAQ results (p>0,005).However, there was no significant relationship between tilt angle (p>0,01).According to postural evaluation results were 7,56±5,90° at shoulder, 4,54±3,29° at waist; 6.03±4.78° in the hip and 2.85±1.77° in the knees.The amount of deviation in girls and boys was similar (p>0.05).There was no correlation between the amount of deviation and PA levels (p> 0.05).
Conclusions: According to preliminary study results, PA participation of students was moderate and low level deviation was observed in Fizyoprint analysis.This may be due to the small number of cases.

Keywords: Physical Activity, Application, Posture.

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COMPARISON THE EFFECTS OF VIDEO-BASED GAMES EXERCISES AND AEROBIC EXERCISES ON BALANCE AND MOBILITY IN ELDERLY

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Abstract:
Purpose: The aim of this study is to compare effects of Nintendo Wii Fit Plus video games and aerobic exercises in geriatric population living at nursing home.
Methods: Our study design is randomized clinical trial within geriatric population living at nursing home. One group (n=10, age=73.20±4.78 years) received video based Wii Fit Plus exercises program with Nintendo balance board, for 30 minutes during 8 weeks, two days a week. Other group (n=10, age=76.50±5.64 years) received aerobic exercises program consisting of 10-minute stationary bicycle and twenty minutes walking on a treadmill for the same duration. Primary outcome was balance; assessed by the Berg Balance Scale and Single Leg Test. Secondary outcome was functional mobility assessed by the Timed Up and Go Test. Results were compared with 21.0 version of SPSS.
Results: The demographic and clinical characteristics were similar in both groups. Post-interventional change in balance and functional mobility parameters were significant in the video games exercises group ($p<0.05$). In the aerobic exercise group no significant change was found in balance parameters ($p>0.05$). Post-treatment comparison of the two groups, showed significant difference only in balance scores ($p<0.05$).
Conclusions: It was stated that video based exercises are more effective than aerobic exercises in improving balance in elderly. In order to make a definite judgment on the effects of functional mobility further explorations involving larger sample groups is needed.

Keywords: Video-Based Exercise, Aerobic Exercise,

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ELDERLY THE EVALUATION SATISFACTION OF CHILDREN AND THEIR PARENTS FOR VIRTUAL REHABILITATION APPLICATIONS

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Abstract:
Purpose: Virtual Rehabilitation, a simulation of the real world using a computer is a form of treatment that improves human-computer interaction using multiple sensory pathways. Since it is an application requiring multiple repetition, both cognitive and physical activity, and it carries out the interest and participation of the individual at the maximum level, it is now being used as a new treatment approach. The aim of the study was to evaluation satisfaction of children and their parents on the effects of virtual rehabilitation practices.
Methods: Total 30 cases with ages 8-14, 12 with Cerebral Palsy, 8 with Attention Deficit and Hyperactivity and 10 with Obstetric Brachial Plexus Injury were included in the study. A total of 10 sessions were included in the virtual rehabilitation studies for 2 weeks with routine educational and physiotherapy sessions. Virtual rehabilitation was performed with Nintendo Wii-Fit system individually selected programs. Patients 'and parents' satisfaction with treatment was evaluated by a questionnaire of 10 questions prepared by the researchers. The results were analyzed using the SPSS 21 program.
Results: 74% of the patients said they were more willing to treat the sessions, and 87% said they found the sessions more fun than the traditional methods. 85% of the parents reported that their children were more motivated, and 69% had a positive effect in the short run.
Conclusions: In the literature, autism, attention deficit and hyperactivity have been shown to be practically viable for virtual rehabilitation in children with cerebral palsy. Positive feedback was received from children and their parents because of the form of play in our work, the effect of visual biofeedback, and the fun of treatment. In addition to traditional treatment approaches, we can say that virtual rehabilitation is an alternative method that can be preferred in pediatric rehabilitation.

Keywords: Pediatric Rehabilitation, Virtuel Aplications, Children, Parent, Satisfaction

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INFRARED (IR) SPECTRA OF SOME SCHIFF BASES OBTAINED FROM BENZALDEHIDES AND AMINO ACIDS

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Abstract:
Purpose: Infrared (IR) spectroscopy is one of the methods most commonly used for determining the structure. It is also widely used to test reactivity and reaction mechanisms involving organic molecules. During the last few decades, great attention has been focused on studies of Schiff bases not only for their pharmacological properties as anti-fungal, anti-bacterial and antitumor activity but also as potential ligands.
Methods: Three Schiff bases were synthesized by reaction of benzaldehyde and amino acids. The characterization of these compounds was performed with IR spectroscopy, molecular calculations, thin-layer chromatography, determining the melting point and other physical characteristics.
Results: IR spectra for imino groups (C=N), which are characteristic of Shiff bases, show stretching frequency of from 1629 to 1654 cm-1. The obtained spectral results were confirmed by molecular calculations using the density functional theory (DFT) performed before experimental work. The DFT global chemical reactivity descriptors were calculated for three synthesized compounds and used to predict their relative stability and reactivity. A strong to medium intensities bands are assigned to carbon nitrogen double bond C=N, with stretching frequency range between 1625 to 1650 cm-1. **Conclusions:** Theoretical results were in good correlation with experimental data. Computational methods of analysis can be a good basis for experimental work.

Keywords: IR, Schiff Bases, Dft

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EVALUATION OF ANTIPROLIFERATIVE EFFECT OF 3-CINAMOIL DERIVATE OF 4-HYDROXYCOUMARINE IN VITRO

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Abstract:
Coumarins expose multiple pharmacological effects such as antiproliferative, antimicrobial and antioxidant activity. Derivates of 4-hydroxycoumarin are the subject of numerous studies. Literature data suggest that coumarins are, among other things, potential source of new antiproliferative activity, hence the synthesis of new derivatives and studies of their biological activity is of great importance. By reaction of nucleophilic addition of synthesized precursor 3-acetyl-4-hydroxycoumarin with aromatic aldehydes, in presence of basic catalysators pyridine and piperidine, 3-cynnamoyl derivative of 4-hydroxycoumarin was synthesized. The elemental composition of the synthesized compound was confirmed by elemental analysis. The structure of the synthesized compound was confirmed by 1H NMR and 13C NMR spectrometry. This study was aimed to screen the antiproliferative effects of 3-cinamoil derivate of 4-hydroxycoumarine on human tumour cell line, as well as on normal (diploid) human fibroblasts (control cell line) in order to find some potential for further pre-clinical evaluation. The cell lines SW620 (colorectal adenocarcinoma, metastatic), MiaPaCa-2 (pancreatic carcinoma) and BJ (normal diploid human fibroblasts), were cultured. The IC50 and LC50 values were calculated from dose-response curves using linear regression analysis. Compound showing a differential antiproliferative effect at micromole concentrations. Investigated compound exerted potent antiproliferative activity and is thus suitable for further biological evaluation.

Keywords: Coumarin, Antiproliferative Effect, Pancreatic Carcinoma, Colorectal Adenocarcinoma

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IS IT POSSIBLE TO EVALUATE BOTH OF INSTANT AND SHORT TERM EFFECTS OF A NEUROPROSTHESIS WITH FUNCTIONAL ELECTRICAL STIMULATION IN A PATIENT WITH STROKE USING PEDOBAROGRAPHY?

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Abstract:
Purpose: The purpose of this case study was to evaluate both instant and short term effects of a neuroprosthesis with functional electrical stimulation (FES) in a patient with stroke using pedobarography during walking.
Methods: A 52-year-old man with left side hemiparesis caused by an ischemic stroke before 9 months was included the study. He received task-specific training incorporating a neuroprosthesis with FES for 1 hours per day/2 days per week/4 weeks. Pedobarography was performed respectively as, 1st assessment (without FES), 2nd assessment (first application of neuroprosthesis with FES) and 3rd assessment (after 4 weeks, neuroprosthesis with FES). The dynamic pedobarography was utilized for evaluation of dynamic loading parameters; point of maximum pressure (P.max) (gr/cm2), distribution of the load of forefoot (LFF) and rearfoot (LRF) (%) and distribution of the load of medial (LM) and load of lateral (LL) (%).
Results: Results of three assessments in left foot were followed as: (1st assessment; P.max;1512 gr/cm2, LFF;71%, LRF;29%, LM;27%, LL;73%, 2nd assessment; P.max;1676 gr/cm2, LFF;71%, LRF;29%, LM;62%, LL;38% and 3rd assessment; P.max;1776 gr/cm2, LFF;61%, LRF;39%, LM;54%, LL;46%).
Conclusions: We found both instant and short term improvements in the plantar pressure and distributions of the load in the involved foot of the patient with stroke using neuroprosthesis with FES. We supposed that the implantation of a neuroprosthesis with FES in patients with stroke represents a sensible and promising therapy option. Also, pedobarography can provide an purpose, repeatable, and recordable method for the evaluation for patients with stroke using a neuroprosthesis with FES.

Keywords: Stroke, Functional Electrical Stimulation, Foot

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THE THE INTER-RATER RELIABILITY OF UPPER EXTREMITY WEIGHT BEARING ASSESSMENT BY USING MODIFIED JAMAR DYNAMOMETER

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Abstract:
Purpose: The purpose of this study was to test the inter-rater reliability of the upper extremity weight bearing assessment by hand dynamometer (WB).
Methods: 20 healthy cases participated in this study Hand grip strength (GS) was measured for both upper extremities with the Jamar dynamometer. The gripping piece of the Jamar was fitted to the second level with the convex side up. Jamar was fastened on the table that was 75 cm by evaluator. Cases were wanted to stand side same axen with and to transfer their upper extremity weight on Jamar. WB was measured by two different researchers (WB1 and WB2). All measurements were repeated 3 times and the average were taken. Spearman Correlation Test was used to analyse correlation.
Results: The age average of cases' was (23.5±3.03). Cases' GS, WB1 and WB2 mean values were (77.34±28.02; 70.79±18.68; 69.43±20.69) respectively. The positive correlation was determined between GS and WB1/WB2 (p:0.001 r:0.689; p:0,004 r:0.608). There was positive correlation between WB1 and WB2 (p:0.000 r:0.927).
Conclusions: Strong intra-rater reliability was determined for testing weight bearing of upper extremity with use of modified hand grip dynamometer. For evaluating the effectiveness of rehabilitation, testing the weigh bearing of upper extremity with this technique could be a practical and accessible method in physiotherapy clinics.

Keywords: Weight Bearing, Hand Grip Dynamometer

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DOES SLEEP QUALITY AFFECT PHYSICAL ACTIVITY OF CHILDREN WITH CEREBRAL PALSY?

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Abstract:
Purpose: The aim of the study was to investigate the effect of sleep quality on physical activity of children with cerebral palsy.
Methods: The study was carried out on 20 children with Cerebral Palsy (CP) and 20 healthy children who attended the Altıntepe Özel Eğitim ve Rehabilitasyon Merkezi, Güneş Çocuk Kulübü and Tepe Tıp Merkezi. The accelerometer (MOX) was applied for 24 hours on weekdays to determine the level of physical activity for children. The MOX was applied in the vertical plane on back of the subjects. The Children's Sleep Habits Survey (CSHQ) was used to measure sleep habits. The questions were directed to the family to obtain information about sleep quality and habits of their children.
Results: There was statistically significant difference in physical activity levels between CP and healthy groups ($p < 0,05$). There was no difference in sleeping quality between children with CP and healthy ones ($p > 0.05$). In addition, there was no correlation between physical activity levels and sleeping qualities of two groups ($p > 0.05$).
Conclusions: Children with CP had lower levels of physical activity than their healthy counterparts. Their health problem did not disturb their sleep quality and so that, their sleep habits did not affect physical activity levels of children in our study

Keywords: Physical Activity, Sleep Quality, Cerebral Palsy

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EFFECT OF VIRTUAL REALITY REHABILITATION PRACTICES ON LOWER EXTREMITY FUNCTIONS IN CHILDREN WITH CEREBRAL PALSY

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Abstract:
Purpose: Virtual rehabilitation is a method created by computers giving the patients the impression of reality and offering the opportunity to work in a dynamic environment through a 3D simulation model. Our purpose was to research the effects of virtual reality rehabilitation practices made through Nintendo WiiFit Virtual Reality System (VRWii) on lower extremity functions in children with hemiparetic cerebral palsy (HSP).
Methods: 28 cases with HSP were included to the study. For lower extremity functions, Forward Functional Reach Test, Up and Go test, 6 minute walking distance, 10 m walking period and 10 stairs climbing period were evaluated. Virtual rehabilitation practices were carried out 2 days a week and for 10 sessions in total, through VRWii. In order to develop the lower extremity functions ski, tightrope walking, balance board, ball games of the system addressed towards weight bearing, balance stabilization, postural stabilization, hand-eye-feet coordination development were preferred.
Results: The mean age were 13,05±4,17.The forward functional reach test average was measured as 21.38± 10.04cm before the treatment and as 26.5±10.45cm after the treatment (AT)($p<0.01$). The Up and Go test was measured as 10.92±4.47 sec BT and 8.12±3.42sec. AT ($p<0.05$); 6 min. walking distance was measured as 318,67±95,20m.BT and 342,52 ± 88,62m. AT($p<0.001$), the 10m. walking period was measured as 16.11±4.70sec.BT and 11.07±5.44sec.AT($p<0.01$),the 10 stairs climbing period was measured as 11,38±10,04 sec.BT and 8,05±10,04sec. AT($p<0.01$).
Conclusions: The inclusion of virtual rehabilitation practices, which are motivating and which are seen as fun by children, to the treatment programs of our cases with HSP at ambulatory levels whose classic treatments continue, led to positive improvements in their lower extremity functions in a short period of time.

Keywords: Virtual Reality ,Cerebral Palsy,Rehabilitation

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THE EFFECT OF VIRTUAL REALITY TECHNOLOGIES ON THE BALANCE AND WALKING: CASE REPORT

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Abstract:
Purpose: Virtual Reality (VR) is the use of computer technology to create a simulated environment. “SeeMe” is a PC based, innovative, comprehensive, clinician–controlled exercise and diagnostic virtual reality system. SeeMe is designed to aid the rehabilitation process, and track patients' progress. It improves coordination, balance, muscle strength, range of motion, reaction times, memory. The aim of our study is to investigate the effects of SeeMe on balance and gait problems after autoimmune encephalitis.
Methods: R.A. who was diagnosed with auto-immune encephalitis at the age of 29, ending up with left hemiparesis. As a part of the neurorehabilitation program, she was taken into SeeMe treatment for 2 times/week. The effectiveness of the treatment was assessed after 6 months, using Functional Ambulance Scale (FAS) and Tinetti Balance Scale (TBS).
Results: Before neurorehabilitation program; Functional Ambulation Scale (FAS) score was found 2 and Tinetti Balance Scale (TBS) score was found 11. After neurorehabilitation program, Functional Ambulation Scale (FAS) score was found 3 and Tinetti Balance Scale (TBS) score was found 17.
Conclusions: Virtual reality provides a natural environment and visual feedback for patients. In this way, it facilitates functional improvements farther. So it should be used more widely in the field of rehabilitation.

Keywords: Virtual reality, SeeMe, Neurorehabilitation