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Original Research

Fifth World Congress of Sports Physical Therapy Scientific Abstracts

International Federation of Sports Physical Therapy, NFFs Faggruppe for Idrettsfysioterapi og Aktivitetsmedisin, International Journal of Sports Physical Therapy

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The International Journal of Sports Physical Therapy is pleased to publish abstracts from the 5th World Congress of Sports Physical Therapy, which will take place in Oslo, Norway, June 14-15, 2024. The theme of the Congress is "From Science To Clinical Practice." The variety of presentations during this congress are examples of the contemporary sports physical therapy research activities taking place around the world.

The abstracts presented in the following pages were selected by the Scientific Committee, which included members from the International Federation of Sports Physical Therapy. It should be noted that abstracts have not been reviewed by the Editorial Board, Associate Editors or Editor-in-Chief of the International Journal of Sports Physical Therapy.

After careful review by an international team of reviewers, research abstracts will be presented by authors at the World Congress.

Each abstract presents only a brief summary of a research project / presentation and does not permit full assessment of the scientific rigor with which the work was conducted. While the abstracts offer only preliminary results that may require further refinement and future validation, they do serve an important role of sharing new research ideas from around the world. This sharing of ideas helps to encourage worldwide dialogue among researchers, clinicians, and educators that will ultimately contribute to the sports physical therapy body of knowledge.

Notice: The abstracts below are presented as prepared by the authors. The accuracy and content of each abstract remain the responsibility of the authors.

"PREP TO BE PRO"—DEVELOPING AND IMPLEMENTING AN EDUCATIONAL PROGRAM FOR YOUTH ELITE ATHLETES IN SPORTS ACADEMY HIGH SCHOOLS IN NORWAY

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ABSTRACT

Introduction: Due to the substantial burden of health problems among youth elite athletes we have developed a holistic, health-promoting, and injury-preventing educational program, across all sports (1).

Objectives: The aim is to contribute to athletes' overall health and to empower young athletes to make thoughtful, balanced choices that prioritize their long-term goals while navigating the challenges of sport and adolescence.

Study design: "Prep to be PRO" is a ten-module teacher-/coach-driven program, anchored in relevant competency and learning objectives mandated by the Norwegian Directorate of Education.

Setting: The program is athlete-centered and includes practical and theoretical sessions on relevant sport-specific physiological and psychological demands in high-level sports. The modules focus on growth and maturation, how to manage load progression and transition periods, overload, burnout, recovery, sports nutrition, and mental health. **Participants/study population:** A questionnaire-based pilot study was performed among 158 coaches and 1101 students at 9 different schools.

Interventions: In the development phase, we conducted meetings and practical workshops for school administrators and coaches to encourage the adoption and sustainability of the program. We also designed an evaluation form for the pilot.

Main Outcome Measurements: A pilot questionnaire consisting of 21 questions.

Results: A large majority of the coaches (83.8%-96.5%) answered "to a large or very large extent" in questions about the relevance of the program for the students. The students reported increased independence; 91.1% stated that "Prep to be PRO"-instructions improved self-confidence and 95.2% planned to integrate the knowledge acquired in their daily training.

Conclusions: The pilot indicated that "Prep to be PRO" empowers elite youth athletes to assume responsibility for, and to be more aware of the complexity related to, -their overall health. The program will be implemented at sports academy high schools in Norway throughout 2023-24, and

each school and sport will be monitored for research purposes.

KEYWORDS

Injury prevention, Sports academy high schools, Youth elite athletes

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A ONE-YEAR PROSPECTIVE STUDY OF INJURY OCCURRENCE AND BURDEN IN 102 BRAZILIAN PARA ATHLETES

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ABSTRACT

Introduction: Injuries may limit para athletes' training and daily activities, affecting their sports performance and social participation.

Objectives: To assess injury occurrence and associated burdens in Brazilian para athletes throughout a season.

Study design: Prospective longitudinal study.

Methods: Data were collected between January and December 2022 at two Brazilian Paralympic Reference Centers. Para athletes from athletics, swimming, powerlifting, and taekwondo were included. A total of 102 athletes (25 females, 77 males) were studied using the Oslo Sports Trauma Research Center Questionnaire to record injuries, on a weekly basis, for 50 weeks. Incidence was calculated as the number of new cases divided by the time at risk in hours. The result was multiplied by 1000 to obtain the rate per 1000 hours of sport participation. Weekly prevalence was calculated by dividing the number of para athletes reporting an injury by the number of questionnaire respondents each week. A risk matrix graph was used to estimate burden.

Results: The majority of injuries were located in the shoulder (306;24.0%), ankle (217;17.1%), knee (187; 14.7%), and thigh (117;9.2%). The injury incidence rate was 24.2 per 1000 athlete hours (95%CI 23.4-25), and the mean weekly injury prevalence was 44.5% (95%CI 42.1–46.9). Injuries with a gradual onset were most common, with an incidence of 9.2 injuries per 1000 athlete hours (95%CI 8.9-9.5), while sudden onset injuries had an incidence of 8.2 injuries per 1000 athlete hours (95%CI 7.7-8.7). Twenty-three percent of all injuries caused at least one day of time-loss, with gradual onset injuries in the shoulder, knee, ankle, and thigh presenting the highest burdens.

Conclusions: Brazilian para athletes experienced a high incidence, prevalence and burden of injuries through- out the season. Practitioners working with para athletes should carefully monitor the occurrence and burden of shoulder injuries in non-ambulant athletes and ankle/knee/thigh injuries in ambulant athletes.

KEYWORDS

Injury, Incidence, Prevalence, Burden, Para athletes

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A QUALITATIVE STUDY EXAMINING YOUNG ATHLETES' PERCEPTIONS AND EXPERIENCES WITH PAIN AND INJURY FOLLOWING ACUTE OR OVERUSE INJURY

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ABSTRACT

Introduction: Adolescence is a crucial period of musculoskeletal development. Despite the benefits of sport in this period, there is an inherent risk of injury that poses a threat to physical activity as well as future musculoskeletal health.

Objectives: The objective of this study is to gain insight into adolescents' experiences with sport-related pain and injury, and their return to sport.

Study Design: Qualitative study design using single person semi-structured interviews.

Methods: We included athletes aged 15-18 years old who had suffered a sports related injury that impacted their sports participation/performance. Included participants were interviewed in their school using a semi-structured

interview guide which had previously been piloted on adolescents with injury. Interviews were recorded and transcribed. Reflexive thematic analysis was used to inductively identify themes without any preconceptions of the data. Recruitment continued until data saturation.

Results: Seventeen interviews were included for data analysis (9 male, 8 female; mean age: 16years). Athletes had various injuries including bone fractures, muscle/ligament injury, back pain, shoulder dislocation and Osgood-Schlatter Disease. The thematic analysis revealed four major themes that influence adolescents' path from pre- injury to return to sport. This included mental challenges, overtraining, social influences, and player confidence on return to sport. Players often felt pressure to overtrain and play through pain to retain their place on the team as they felt they were one of the stars of the team and they also expressed the importance of sport in their lives which could be a positive motivation but can also cause feelings of isolation during injury.

Conclusion: There are a range of social, emotional and cognitive factors that can positively and negatively affect adolescents' journeys while injured. This may be important information to mitigate future injury risk and to guide adolescents successfully through injury rehabilitation.

KEYWORDS

Adolescence, Injury, Interviews, Qualitative, Sport

REFERENCES

NA

ACUTE EFFECTS OF STRETCHING FOR MOOD SYMPTOMS AND AUTONOMIC MODULATION IN MIDDLE-AGED WOMEN.

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ABSTRACT

Introduction: Middle-aged women are influenced by mood symptoms such as anxiety which may be associated with autonomic modulation[1]. Stretching improves mood symptoms and increases parasympathetic activity. How- ever, there are no reports that examine these indicators simultaneously[2,3].

Objective: To investigate the acute effects of stretching on mood symptoms and autonomic modulation in middle-aged women.

Methods: Twenty-five middle-aged women (age: 51.8 ± 4.4 years) enrolled in this study. Each participant completed two conditions (static stretching and control) for 25 minutes each on separate days in a random order. Static stretch- ing was conducted with a whole-body program. The mood symptoms were measured using the State Trait Anxiety Inventory (STAI) questionnaire. Total score, subscales of anxiety-present and anxiety-absent were calculated pre- and post- intervention. Autonomic modulation was measured by heart rate variability (HRV). The HRV indices which assess parasympathetic activity were calculated with the root mean square of successive differences (RMSSD) and high-frequency power (HF) pre- and post-intervention and again 30 minutes later (PRE, POST-0, POST-30). The RMSSD and HF were transformed using the natural logarithm. Two-way repeated-measures analysis of variance was performed, and the Bonferroni test was used for post-hoc comparisons.

Results: In the stretching condition, mood symptoms, especially state anxiety indicated with STAI-total (PRE: 34.2

± 7.7; POST-0: 29.6 ± 6.7, p = < 0.001) and positive mood state determined with STAI-anxiety absent (PRE: 22.5 ± 6.9; POST0: 19.1 ± 6.3, p = < 0.001) were significantly improved after stretching. However, there were no significant changes with RMSSD and HF with either POST-0 or POST-30 in both stretching and control condition (p = 0.068– 0.808).

Conclusion: Stretching immediately improved mood symptoms in middle-aged women. However, autonomic mod- ulations were unchanged after stretching. Therefore, stretching is an effective intervention for mood symptoms in middle-aged women.

KEYWORDS

autonomic nerve activity, menopause, mental health, static stretching

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ADOLESCENTS' EXPERIENCE WITH SPORTS-RELATED PAIN AND INJURY AND THEIR JOURNEY TO RETURNING TO SPORT: A SYSTEMATIC REVIEW OF

Qualitative Research

Oral

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ABSTRACT

Introduction; Sports related pain and injuries are common in adolescent athletes who may experience unique challenges. Injury and burn out throughout adolescence remains one of the primary drivers of premature drop out from sport and therefore it is fundamental to explore the experience of adolescents with injuries and their difficulties and successes in returning to sport.

Objectives; The aim of this review is to synthesise qualitative studies examining adolescents' experience with pain and injury arising from sports participation.

Study Design; A Systematic review of Qualitative research.

Methods; This review was prospectively registered on Open Science Framework. A systematic search of PubMed, Embase, and Sports Discus was carried out up to January 2023. Studies were included based on a pre-set inclu- sion/ exclusion criteria. There were no restrictions based on injury type once the injury or pain was sports related. Studies were appraised using the CASP (critical appraisal skills programme) checklist. Data was synthesised using meta aggregation.

Results; 16 qualitative studies were included (n=216 participants). Participants presented with either severe knee injuries (n=8 studies), concussion (n= 5 studies), or various musculoskeletal injuries (n=3). Study quality was re- ported as high overall. The synthesised findings revealed that regardless of injury diagnosis, adolescents experi- ence a mix of positive (motivation to rehab and return to sport, optimism) and negative emotions (fear of re-injury, isolation, depressive responses) throughout recovery. Common coping strategies were to ignore symptoms, modify activity levels, or seek support.

Conclusion; In conclusion, this systematic review sheds light on the multifaceted experiences of adolescent athletes dealing with sports-related pain and injuries. Motivation and support play crucial roles in adolescents' desire to return to sports, but that this can be accompanied by a pervasive fear of re-injury and social isolation. This provides insights to address the unique needs of adolescents as they navigate the path to recovery.

KEYWORDS

Adolescent experiences, concussion experience, meta aggregation, sports injury, qualitative synthesis

REFERENCES

NA

BIO-BANDING IN SOCCER: A SCOPING REVIEW

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ABSTRACT

Introduction

Bio-banding (BB) is a strategy used in sports to level out the differences in growth, maturation and development in children and youth during training and non-offical competition. Instead of grouping athletes based on chronological age, they are grouped based on their biological maturity status.

OBJECTIVES

Bio-banding in soccer has been proposed to assist in the process of identifying, selecting and developing talents and reduce the risk of injury. The aim of this study was therefore to identify primary research on bio-banding in soccer relating to the; technical/tactical-; physical-; psychological-, social-; and medical-dimension of performance.

STUDY DESIGN

A scoping review following the PRISMA-ScR guidelines was used to identify research from the databases of Sport- Discus, Medline and ORIA NORD from its origin to October 2022 using bio-banding as the primary search term. Primary research on BB in soccer, written in English or a Scandinavian language with full text, was included. An additional search was performed in referencelists, Google Scholar and grey literature.

RESULTS

The study identified 20 studies from 2018 to 2022 on the use of BB among 9- to 18-year-old soccer players (N=1951), coaches/stakeholders (N=8) and parents (N=80). In terms of outcome measures there were 10 studies related to the technical- and/or tactical dimension; 15 to the physical-, 9 to the psychological-; 5 to the social-; and 4 to the medical-dimension.

CONCLUSION

Players, coaches/stakeholders and parents identified both advantages and disadvantages with the use of BB. The outcome measures support the potential use of BB in soccer through identification, selection, player development and risk of injury. However, the evidence is limited, so further studies are warranted, especially among female soccer players. To facilitate a more holistic and integrated approach to banding in soccer, the study proposes a biopsychosocial model for further development.

KEYWORDS

Scoping review; Bio-banding; Soccer; Football; Maturation

REFERENCES

None

BODY COMPOSITION, CORE STABILITY, FLEXIBILITY, BALANCE AND PSYCHOLOGICAL STATE IN FEMALE ATHLETES WITH PRIMARY DYSMENORRHEA: A CASE-CONTROL STUDY

POSTER

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ABSTRACT

Introduction: Primary dysmenorrhea (PD), painful menstruation in the absence of pelvic pathology, is a common gynecological condition that affects between 45 and 95% of menstruating women (1). Among the parameters as- sociated with PD, body composition, core stability, flexibility, balance and psychological problems are prominent (2,3). The high incidence of PD in female athletes (4) has led to the need for more comprehensive investigation of these parameters that may affect PD in these athletes.

Objectives: To compare body composition, core stability, flexibility, balance and psychological state in female ath- letes with and without PD.

Study design: A case-control study.

Methods: Nineteen athletes with PD (PD group, age=20 (19-23) years) and 17 athletes without PD (control group, age=21 (18-24) years) were included. Body composition with Tanita BC601 device, core stability with McGill-trunk endurance tests and Sahrmann test, flexibility with sit-and-reach test, balance with Y-balance test and psychological state with Athletic Psychological Skills Inventory were evaluated on days off menstruation.

Results: The branches of athletes in the PD group were volleyball (n=17), rugby (n=1) and swimming (n=1). The branches of athletes in the control group were volleyball (n=11), basketball (n=4) and swimming (n=2). Daily training time of PD and control groups were 60 (30-120) min and 60 (30-120) min, respectively. The pain intensity of PD group was 7.3(4.4-10) cm. Waist-hip ratio (p=0.06) in PD group were higher than control group. Trunk flexor (p=0.029), extensor (p=0.015), right (p=0.001) and left lateral flexor endurance (p=0.018), Sahrmann (p<0.001) and sit-and-reach scores (p=0.004) were lower in PD group than control group. There were no differences in other parameters between groups (p>0.05).

Conclusions: While waist-hip ratio was higher in athletes with PD than athletes without PD; core stability and flexibility were lower. These parameters related to sports performance should be considered in management of female athletes with PD.

KEYWORDS

Female athlete, primary dysmenorrhea, body composition, balance, dynamic stabilization

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BREAST PAIN AND TRAUMA IN PROFESSIONAL WOMEN'S BASKETBALL – NEXT STEPS FOR AWARENESS AND ACTION

ORAL

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Edward Kane (University of St. Augustine for Health Sciences, San Marcos, CA)

ABSTRACT

Introduction: Participation in professional women's sports has increased dramatically in the last few decades. Research on the prevalence and potential consequences of breast trauma sustained during participation in profes- sional sports is scarce despite the documented consequences of trauma to the breast sustained outside of sports participation, including motor vehicle collisions (1), seatbelt (2), and blunt force trauma (3).

Objectives: Investigate the prevalence, description, and effects of breast pain and trauma among athletes in the French Feminine Professional Basketball League.

Study design: Cross-sectional study from a sample of convenience.

Methods: Female athletes from six French professional basketball teams were invited to participate. A thirteen-question survey was administered electronically to sixty-six

athletes that included questions regarding demograph- ics and breast trauma during participation in basketball.

Results: Fifty-eight athletes participated. Nearly one-third (27.6%, n=16) of the athletes reported breast trauma. Fourteen of the sixteen athletes provided additional information regarding their trauma. Fourteen (100%) athletes reported pain, with an average pain rating of 5.6 (0-10 scale). Three (21.4%) athletes reported bruising/discoloration, three (21.4%) reported lumpy/hard mass development, and two (14.3%) reported swelling/inflammation. Four (28.6%) athletes missed practice and/or competition. Six (42.9%) athletes reported their trauma to medical staff, and three (21.4%) of those received treatment.

Conclusions: All athletes who reported breast trauma reported experiencing moderate pain. Pain and other injuries had adverse effects on practice and/or competition. As part of the medical team, the sports physical therapist is in prime position to assist with educating on the importance of awareness of sports-related breast trauma. Strategies need to be implemented to reduce the occurrence and encourage follow up of breast trauma for women par- ticipating in sports, including education on the importance of reporting breast trauma as well as exploring proper breast protection and determining potential sequela for this sensitive topic important to women's health.

KEYWORDS

basketball, breast, pain, trauma, injury

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CAREER PREVALENCE OF CONCUSSION AMONG ADOLESCENT FEMALE AND MALE HANDBALL PLAYERS: A CROSS-SECTIONAL STUDY.

ORAL

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ABSTRACT

Introduction: While sports-related concussions (SRC) are recognized as a serious concern for young athletes, research remains limited regarding the prevalence of and risk factors for SRC in handball.

Objectives: To investigate the career prevalence of SRC in adolescent handball players and investigate any potential differences based on sex, age, playing position and playing level.

Study design: Cross-sectional study.

Methods: Players from Swedish handball-profiled high schools were during 2020–2023 invited to participate in the ongoing Swedish Handball Cohort study. At baseline, the participants completed a questionnaire assessing their ex- periences with current and past SRC sustained during their handball careers. Prevalence ratios (PR) were calculated with corresponding 95% confidence intervals (CI) using multivariable generalized linear models.

Results: A total of 1,545 players from 22 schools were included. The self-reported career prevalence of SRC in the total population was 423 (27 %). Goalkeepers had a twofold higher prevalence compared to wing players (PR 2.28, 95 % CI 1.73–3.01) and the prevalence was also higher for backcourt players compared to wing players (PR 1.40, 95% CI 1.08–1.82). Furthermore, the prevalence was higher in 2nd grade students (PR 1.22, 95 % CI 1.01–1.47) and 3rd grade students (PR 1.34, 95 % CI 1.09–1.64) compared to 1st grade students. The PR between line players and wing players was 1.37 (95 % CI 0.98–1.90) and the PR between female players and male players was 1.12 (95 % CI 0.96–1.32). There was no difference between national level players compared to regional level players (PR 0.99, 95

% CI 0.83–1.19).

Conclusion: Goalkeepers and backcourt players showed a higher prevalence of SRC compared to wing players. The prevalence was also higher in 2nd and 3rd grade students compared to 1st grade students. No difference was seen between national level players and regional level players.

KEYWORDS

adolescent, concussion, handball, traumatic brain injury, youth sport

REFERENCES

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CHANGES IN FOOT AND ANKLE MUSCLE PENNATION ANGLES FROM NON-WEIGHT-BEARING TO WEIGHT-BEARING POSITIONS

POSTER

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ABSTRACT

INTRODUCTION

The architectural features of muscles (muscle thickness (MT), cross-sectional area (CSA), pennation angles) respond to different stimuli (strength training, immobilization, weight-bearing, etc.). It is imperative to understand the changes in architectural features of the muscles to understand their functional changes. While changes in MT and CSA in foot and ankle muscles have been studied, changes in pennation angles have not yet been studied.

OBJECTIVE

This study is aimed to investigate the changes in pennation angles in foot and ankle muscles from non-weight- bearing (NWB) to weight-bearing (WB) positions.

STUDY DESIGN

This is a retrospective case-control study. Sixty (23.06 ± 3.16 yrs., 74.67 ± 19.72 kgs, 169.50 ± 8.69 cm,) individuals participated in the study.

METHODS

Pennation angles were measured *in vivo* using ultrasound imaging in NWB (sitting) and WB (standing) positions. Three images were taken, and the average was calculated, for the following muscles: Tibialis Anterior (TA), Tibialis Posterior (TP), Peroneals, and Abductor Hallucis (AH). The probe was placed at 20%, 30%, and 50% of the shank length for TA, TP, and peroneal muscles, respectively. For AH, the probe was placed 2 cm distal to the medial malleolus. The probe was oriented along the muscle fibers. An independent sample t-test was used to analyze the differences between pennation angles measures in NWB and WB positions.

RESULTS

There was no statistically significant difference found between NWB and WB positions for TA, TP and AH muscles. However, pennation angles increased significantly (p=0.04) for peroneal muscles in the WB position compared to NWB.

CONCLUSIONS

Changes in muscle architecture are associated with changes in muscle function. Changes in pennation angles in peroneal muscles show greater force production in the functional position compared to NWB positions. Pennation angles may be considered when assessing muscle force for peroneal muscles.

KEYWORDS

Ultrasound imaging, assessment, force production, lower leg

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COGNITIVE BEHAVIORAL PHYSICAL THERAPY IN CHRONIC MUSCULOSKELETAL CONDITIONS: A SYSTEMATIC REVIEW

Oral

Dr. Abbis Jaffri (Creighton University), Dr. Ryan Greenfield (Creighton University), Dr. Sean Kelley (Creighton University)

ABSTRACT

INTRODUCTION

Despite the enhancement of physical therapy treatment interventions, the prevalence of chronic musculoskeletal conditions is increasing. Therefore, new holistic treatment interventions are implemented by physical therapists to improve clinical and patient-reported outcomes.

OBJECTIVE

To critically assess the literature focused on the effect of psychologically informed physical therapy interventions in improving outcomes associated with chronic musculoskeletal conditions.

STUDY DESIGN

Systematic review.1,511 total subjects from 19 different studies were included in this systematic review: one study on Knee osteoarthritis (O.A), eight studies with chronic low back pain (CLBP) patients, four studies with chronic neck pain (CNP), and two studies with patellofemoral pain (PFP).

MATERIALS AND METHODS

A search of electronic databases including PubMed, CINHAL, psychological and behavioral sciences, SPORTdiscus, and Scopus was completed between January 2000 to January 2023. Randomized control trials (RCTs) with an outcome of interest including the VAS (visual analog scale), FABQ (fear avoidance belief questionnaire), ODI (modified Oswestry Disability index), Tampa Scale for Kinesiophobia, and functional outcomes.

RESULTS

No superiority of CBPT was observed for improving pain and function of knee OA. For the CLBT patients, disability improved in 7/8 studies, pain improved in 5/8 studies, and fear in 4/8 studies. For PFP, one study showed immediate improvements in pain and disability compared to controls but no difference at 6 months. All four CNP studies showed improvements in pain in the groups receiving CBPT, no improvement in disability was observed with CBPT in CNP, two of the four studies looked at kinesiophobia or pain related to fear and both studies found improvements with CBPT compared to the control group.

CONCLUSION

While initial results are promising, high-quality RCTs following CONSORT guidelines are required to further evaluate the efficacy of CBPT and determine optimal clinical pathways for addressing pain, disability, and fear developed because of chronic musculoskeletal conditions.

KEYWORDS

holistic therapy, treatment, intervention, psychological impairments

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COMPARISON OF THE DISTANCE BETWEEN THE TALUS AND THE LATERAL MALLEOLUS DURING SINGLE-LEG DROP LANDING IN INDIVIDUALS WITH AND WITHOUT CHRONIC ANKLE INSTABILITY**

Poster

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ABSTRACT INTRODUCTION

Lateral ankle sprain (LAS) has high recurrence rate, which has considered to be associated with chronic ankle

instability (CAI). Ankle instability in individuals with CAI has seemed as a risk of LAS re-injury, and LAS often occur during landing. A previous study used ultrasound imaging to measure the distance between the talus and lateral malleolus as an assessment of ankle instability. In previous study, this distance was greater in individuals with CAI than without[1)]. However, the distance has been only evaluated statically, and dynamics of the distance during landing is unknown.

OBJECTIVES

To evaluate dynamics of the distance between the talus and lateral malleolus during single-leg drop landing and compare between with and without CAI.

Study design: Cross-sectional study

METHODS

In total 12 adults (22 feet) were participated in this study, and they were divided into the healthy group (12 feet) and the CAI group (10 feet). The task movement was single-leg drop landing from a 30 cm high box. The distances between the talus and lateral malleolus during landing were measured using the ultrasound synchronized with a motion capture system[2)]. The analysis was conducted from 400 ms before to 400 ms after initial contact (IC). To compare the distances between healthy group and CAI group, unpaired t-test was conducted.

RESULTS

The distance was significantly greater in the CAI group than the healthy group from 400 ms before to 400 ms after IC ($p<0.01$).

CONCLUSIONS

The distance between the talus and the lateral malleolus was greater in the CAI group compared to the healthy group during drop landing, and this may reflect the ankle instabil-

ity and be a risk for LAS re-injury. The result of this study suggests the necessity of compasating the ankle instabiltity of individuals with CAI during landing by taping, orthosis, muscle training and so on.

Keywords

Key words (3-5): ankle instability, lateral ankle sprain, motion capture system, ultrasound imaging

References References: (up to 3)

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CONSTRUCT VALIDITY OF THE SIDEWAYS SHOULDER SWAY TEST FOR ASSESSMENT OF SENSORIMOTOR CONTROL OF THE GLENOHUMERAL JOINT

Poster

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ABSTRACT

Introduction: Reduced sensorimotor control of the shoulder joint has been proposed as a risk factor for overuse injuries in overhead athletes. Sway length in a one-armed prone plank has been suggested as a method for mea- suring sensorimotor control. The Shoulder Sway Test (SST) has been developed to measure sensorimotor control outside the laboratory.

Objective: To assess "known-group validity" of the SST by evaluating the "between-arm difference" in sway in senior volleyball athletes compared to soccer athletes. We hypothesized that volleyball athletes have greater "between-arm difference" in sensorimotor control of the shoulder joint compared to soccer athletes.

Study design: Known-group validity study.

Methods: 61 adult male and female volleyball and soccer athletes were divided into groups: Volleyball athletes (VA), Volleyball athletes with dominant shoulder pain (VASP) and Soccer athletes (SA). Athletes were tested in an upper limb weight bearing sideways plank with the lower extremities resting on step platforms to the iliac crest measuring sway of the proximal humerus using an iPhone 6 and the application "Physics Toolbox Sensor Suite" with 100 Hz sampling frequency. Sway was defined as a summation of the horizontal acceleration vectors. The tests were done prior to team practice at the athletes' clubs.

Results: There was no statistically significant "between-arm difference" in sway for VA (mean = 165.1 [95% CI, -242.7 ; 572.9]), SA (mean = 406.7 [95% CI, -136.6 ; 950.0]) or VASP (mean = 148.7 [95% CI, -221.9 ; 519.3]). Additionally,

there was no statistically significant difference between groups, including VA and SA (mean = -241.6 [95% CI, -888.5 ; 405.6]) or VA and VASP (mean = 16.4 [95% CI, -621.0 ; 653.7]).

Conclusion: The SST lack "known-group validity" in measuring sensorimotor control of the shoulder in adult active volleyball and soccer athletes. Further research is needed to investigate potential validity in other groups.

KEYWORDS

Overhead athletes, Sensorimotor control, Shoulder joint, Validity

REFERENCES

No references

CURL-UP EXERCISES IMPROVE ABDOMINAL MUSCLE STRENGTH WITHOUT WORSENING INTER-RECTI DISTANCE IN WOMEN WITH DIASTASIS RECTIABDOMINIS POSTPARTUM: A RANDOMISED CONTROLLED TRIAL

ORAL

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ABSTRACT

Introduction: Diastasis recti abdominis (DRA) is defined as midline separation of the two rectus abdominis muscles along the linea alba and is highly prevalent postpartum. Systematic reviews have concluded with insufficient evidence to recommend any specific exercise protocol in the treatment and curl-ups have traditionally been discouraged for women with DRA.

Objectives: What is the effect of a 12-week, home-based, abdominal exercise program containing head lifts and abdominal curl-ups on inter-recti distance (IRD) in women with DRA 6 to 12 months postpartum?

Study design: A two-arm, parallel-group, randomised controlled trial with concealed allocation, assessor blinding and intention-to-treat analysis

Methods: Seventy primiparous or multiparous women 6 to 12 months postpartum, having a single or multiple preg- nancy following any mode of delivery, with a diagnosis of DRA. The experimental group (n=35) was prescribed a 12-week standardised exercise program including head lifts, abdominal curl-ups and twisted abdominal curl-ups 5 days a week. The control group (n=35) received no intervention. The primary outcome measure was change in IRD measured with ultrasonography. Secondary outcomes were: observed abdominal movement during a curl- up; global perceived change; rectus abdominis thickness; abdominal muscle strength and endurance; pelvic floor disorders; and low back, pelvic girdle and abdominal pain.

Results: The exercise program did not improve or worsen IRD (eg, MD 1 mm at rest 2 cm above the umbilicus, 95% CI -1 to 4). The program improved rectus abdominis thickness (MD 0.7 mm, 95% CI 0.1 to 1.3) and strength (MD 9 Nm, 95% CI 3 to 16) at 10 deg; its effects on other secondary outcomes were trivial or unclear.

Conclusions: An exercise program containing curl-ups for women with DRA did not worsen IRD or change the sever- ity of pelvic floor disorders or low back, pelvic girdle or abdominal pain, but it did increase abdominal muscle strength and thickness.

KEYWORDS

Curl-up; Diastasis recti abdominis; Exercise; Postpartum; Randomised controlled trial.

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Sandra B Gluppe, Marie Ellström Engh, Kari Bø, Immediate Effect of Abdominal and Pelvic Floor Muscle Exercises on Interrecti Distance in Women With Diastasis Recti Abdominis Who Were Parous, *Physical Therapy*, Volume 100, Issue 8, August 2020, Pages 1372–1383, https://doi.org/10.1093/ptj/pzaa070

DEVELOPMENT AND INTRA-TESTER RELIABILITY OF A NEW STRENGTH ASSESSMENT PROTOCOL ON FEMALE POLE DANCERS

Poster

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ABSTRACT

Introduction: Pole dancing (PD) is a very demanding sport that combines dancing and acrobatic figures around a vertical pole (1). There is little research that has done and it is limited in epidemiological data and grip strength (1)(2)(3). **Objectives:** The aim of this study is to create a strength assessment protocol in 3 different sport specific positions for female athletes of PD and its intra- tester reliability. **Study design**: This was an observational study for intra-tester reliability. **Method:** For this study a total of 32 female athletes were recruited as volunteers. The participants had different level of experience and they were assessed at 3 different basics for PD positions. The assessment happened at two different days with a 5-7 days gap between them. The positions were the shoulder abduction and adduction and the hip adduction. Participants did not resent any pain, injury or surgery at the assessment areas and also there were not in the menstruation phase of cycle. The procedure included three trials for each side and each position. Every trial had five seconds duration and repeated after two minutes break. A hand held dynamometer (Activ5, Activ-Body) was used and stabilized with straps on the pole. **Results**: The reliability was established comparing the 3 trials of each measurement day and the last 2 trials of each day between them and the means of the trials of each day were compared between two days. The results revealed high reliability rates (ICC= 0,833-0,974). The 3-trial means method presented the higher rates between the comparisons done (ICC= 0,939- 0,974), while the position with the more consistently repeated results was the abduction of left shoulder. **Conclusion**: The strength assessment protocol developed through this study could be used as a reliable and easily applicable way for assessing pole dancers' strength in clinical practice.

KEYWORDS

pole dancing, activ5, strength, reliability, sport specific

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DEVELOPMENT AND VALIDATION OF THE INTERVENTION USABILITY SCALE FOR EXERCISE (IUSE)

Poster

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ABSTRACT

Introduction: Exercise interventions are effective in treating and preventing injuries and diseases, but adherence rates are typically low. Usability testing of products has been successful in other domains (e.g. technology) by its end-user involvement and ability to detect barriers to use. No scales exist aiming to assess usability of exercise interventions.

Objectives: Develop and assess the psychometric properties of the Intervention Usability Scale for Exercise (IUSE). Study design: Instrument development / Psychometric research

Methods: Item generation and content validation involved cognitive interviews with eight exercise intervention stakeholders and ten target users from the general public. Subsequently, 526 target users from University, Qualtrics and Prolific participant panels assessed exercise programs through an online survey. Test-retest analysis, di- mensionality assessment using PCA, EFA/CFA, and bifactor models, IRT for discriminability, item information lev- els/patterns and differential item functioning, and comparison of short vs. original scale versions were conducted. Evidence of criterion, convergent, and discriminant validity was assessed.

Results: Thirty-six items were initially included, with 16 removed due to low reliability and factor loadings ($r < .05$). A 3-factor structure emerged from EFA, PCA, and bifactor models: Usefulness, Ease of Use/Learnability, and Social. Iterative evaluation led to 12 item removals, resulting in 8 final items across three subscales. Validity analyses indicated good convergent (e.g., $r = 0.79$ with Intervention Appropriateness Measure), criterion (e.g., $r = 0.71$ with Net Promoter Score), and discriminant validity ($r = 0.42$ with External Motivation), along with satisfactory internal consistency (Cronbach's alpha: 0.79-0.84).

Conclusions: The IUSE scale demonstrated promising psychometric properties. Application of the scale with collec- tion of actual uptake/adherence data is needed to assess predictive validity.

KEYWORDS

usability, implementation, exercise, adherence, scale development, psychometrics

REFERENCES

No references.

DOES THE CHARACTERISTICS OF HEAD IMPACT DURING BLIND FOOTBALL DIFFER BETWEEN PARALYMPIC GAMES? VIDEO-BASED OBSERVATIONAL STUDY

Poster

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ABSTRACT INTRODUCTION

Blind football is a para-sport played by athletes with severe visual impairments, and ranked second highest of the five levels for concussion risk rate in para-sports competition[1)]. In Tokyo 2020 Paralympic Games, there were game time and goal size changes at the blind football competition. It is possible that this may have also changed the head impact characteristics in Tokyo 2020, but this has not been examined.

OBJECTIVES

To compare the head impact characteristics during blind football competition between Rio 2016 and Tokyo 2020 Paralympic Games using the official videos.

Study design: Cross-sectional study

METHODS

All 36 official game videos from the national blind football teams participating in the Rio 2016 and Tokyo 2020 summer Paralympic Games were obtained from the International Paralympic Committee's official website channel YouTube (https://www.youtube.com/c/paralympics).) The duration of the match was 50 minutes for Rio 2016 and 40 minutes for Tokyo 2020. Eight teams participated in each Paralympic Game, which consisted of 12 preliminary games

and six ranking and final games. The videos were analyzed to assess the number of scores, number of head impacts, and their details (round, playing phase, scoring situation, impact situation, occurrence area, impact object, site of head impact, fall, and foul).

RESULTS

The total number of goals scored at the Rio 2016 and Tokyo 2020 were 23 and 45, respectively. The number of head impacts was 1,105 and 931 for Rio 2016 and Tokyo 2020, respectively. Significant differences were observed in head impact characteristics between the Rio 2016 and Tokyo 2020 among seven outcomes (round, scoring situation, impact situation, occurrence area, impact object, site of head impact, and fall).

CONCLUSIONS

Compared with the Rio 2016 Paralympic Games, the Tokyo 2020 Paralympic Games showed an increase in the number of points scored and different head impact characteristics.

KEYWORDS

blind football, head impact, Paralympics, video analysis

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EFFECT OF LIMITED DORSIFLEXION RANGE OF MOTION ON THE OUTCOME OF THE CLINICAL BALANCE TEST IN INDIVIDUALS WITH CHRONIC ANKLE INSTABILITY

Poster

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ABSTRACT

People with chronic ankle instability (CAI) demonstrate limited dorsiflexion range of motion (DFROM), leading to altered postural control. Moreover, CAI exhibits diminished posteromedial (PM) reach distance of the Star Excur- sion Balance Test (PM-SEBT), compared to healthy people. However, whether DFROM limitation affects PM-SEBT is unknown.

This study aimed to examine whether DFROM was a covariance between PM-SEBT outcomes in individuals with and without CAI. We hypothesized that DFROM affects PM reach distance.

A cross-sectional study including 20 uninjured people and 15 patients with CAI was conducted. Participants performed the weight-bearing lunge test (WBLT) and PM-SEBT. We measured the DFROM during WBLT, maximum reach distance (MRD), and lower-limb sagittal joint angles with electromyographic signals from the tibialis anterior (TA) and soleus during the PM-SEBT. All biomechanical parameters at the maximum reach point were included in the statistical analysis. We used an independent t-test to compare all variables between the control and CAI groups. Analysis of covariance (ANCOVA) was used to compare MRD between the groups while adjusting for DFROM. Significance was set at $p<0.05$.

The CAI group exhibited shorter MRD ($p=0.005$), limited DFROM ($p=0.01$), less knee flexion ($p=0.04$), and lower TA muscle activity ($p=0.008$), compared to the control group. ANCOVA demonstrated that DFROM, knee flexion, and TA muscle activity were not covariates for the comparison of MRD between the control and CAI groups ($p=0.24$, 0.09, 0.98, respectively).

This study suggested that limited DFROM did not affect PM reach distance. Clinicians should consider altered postu- ral control in people with CAI, compared to healthy people, while conducting the PM-SEBT to assess their dynamic balance ability. Future studies should employ multivariate analysis to clarify how people with CAI control their movements during the PM-SEBT.

KEYWORDS

Chronic ankle instability Dorsiflexion range of motion Dynamic balance test

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EFFECT OF MATURATION ON OVERUSE KNEE INJURY PREVALENCE: A CROSS-SECTIONAL STUDY OF YOUTH FOOTBALL PLAYERS IN JAPAN

Oral

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ABSTRACT

INTRODUCTION

Youth football players are at higher risk of knee problems due to growth. The Oslo Sports Trauma Research Cen- ter

Overuse Injury Questionnaire (OSTRC-O2) has been utilized to record overuse injuries. However, there are no reports investigating overuse knee problems in Japanese youth football players with the questionnaire and/or the influence of maturation status implied with peak height velocity (PHV) on the prevalence of overuse knee injuries.

OBJECTIVE

To investigate the prevalence of overuse knee problems in Japanese youth football players, and to ascertain the effects of maturation status on the prevalence of overuse knee problems.

METHODS

One hundred youth male football players (age: 13.1 ± 0.6 years; height: 160.3 ± 8.1 cm; weight: 49.6 ± 8.1 kg) were enrolled. The players were divided into pre-PHV (34 players), circa-PHV (29 players), and post-PHV (7 players) groups based on their maturity offset. The prevalence of overuse knee injuries was recorded using the Oslo Sports Trauma Research Center Overuse Injury Questionnaire (OSTRC-O2) from December 2023 to February 2024 (for 9 weeks). The main outcomes were the prevalence of overuse and substantial overuse injuries. The Fisher exact test was performed to examine the effect of maturation on injury prevalence.

RESULTS

The response rate to the OSTRC-O2 was 88.0%. The weekly prevalence of overuse knee injuries was 11.8 ± 1.8%. The weekly prevalence of substantial overuse knee problems was 4.2 ± 1.6%. A total of 25 overuse injuries were reported. The Fisher's exact test did not find a significant association between the maturation and the incidence of overuse injuries (p = 0.858).

CONCLUSION

The prevalence of overuse knee problems found no differences by maturation status in this study. Overuse knee problems should be monitored for longer periods to clarify the effects of maturity status on the overuse knee in- juries.

KEYWORDS

adolescent, football, overuse injuries, sports injuries

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EFFECT OF ONE MONTH ANKLE FLOSSING ON SINGLE-LEG DROP LANDINGS IN RECREATIONAL ATHLETES: A PILOT RANDOMIZED CONTROLLED TRIAL

Poster

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ABSTRACT

Introduction: Lateral ankle sprains (LAS) are the most common type of sports injury, and the single-leg drop landing (SDL) is used to assess the risk of injury. Individuals at higher risk for LAS display elevated maximum vertical ground reaction force (GRF), reduced mediolateral GRF displacement upon landing, and elevated horizontal GRF displacement in late landing phase. Improving these factors may improve injury prevention.[1, 2] Ankle flossing improves ankle function and sports performance; however, evidence regarding its effect on SDL or LAS prevention is currently insufficient.

Objectives: We examined the effects of one-month ankle flossing on SDL in recreational athletes.

Study design: Pilot randomized controlled trial.

Methods: Twenty-one healthy recreational athletes who met baseline eligibility criteria were randomly allocated into a flossing group (FLOSS), which performed active exercises (ankle plantar dorsiflexion exercises and plyomet- ric jumps) with a floss band wrapped around the ankle, and a control group (CON), which performed the same exercises without the floss band. Both groups performed the assigned interventions before every sports activity for approximately one month. Assessment measures were GRF index (maximum force, root mean square, horizontal force, and time to stabilization) during SDL, which was measured before and after the intervention. Mixed-model two-way analysis of variance was conducted for each item, using group and time as factors.

Results: An interaction between groups and times was observed for maximum vertical force during landing (p=0.02), with a 5.2%BW decrease (p=0.48) and a 21.3%BW

increase (p<0.01) in FLOSS and CON groups, respec- tively. The horizontal force from 0.4 to 2.4 s after landing decreased by 0.29%BW in the FLOSS group (p=0.02) and increased by 0.02% BW in the CON group (p=0.84).

Conclusions: One month of ankle flossing prevented a vertical GRF increase and improved horizontal stability during SDL.

KEYWORDS

- injury prevention
- lateral ankle sprain
- single-leg drop landing
- tissue flossing

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EFFECT OF SHOULDER EXTERNAL ROTATION EXERCISE WITH REAL-TIME VISUAL FEEDBACK USING ULTRASONOGRAPHY IN COLLEGE BASEBALL PLAYERS: A RANDOMIZED CONTROLLED TRIAL

Oral

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ABSTRACT

Introduction: The effectiveness of shoulder external rotation exercises (ER-Ex) in preventing shoulder and elbow disorders in baseball players is widely recognized [1)]. However, it is unclear whether educational exercises with real-time visual feedback (FB) using ultrasonography have an additive effect on facilitating rotator cuff contraction.

Objectives: This study aimed to examine the additive effect of shoulder ER-Ex with real-time visual feedback using ultrasonography.

Study Design: Randomized controlled trial.

Methods: Twenty-six players (mean age 20.5 years) were block-randomized into the ER-Ex with FB using ultrasonography group (FB-G) and ER-Ex only as the control group (C-G). The FB-G performed ER-Ex with ultrasonography FB during exercise, while the C-G performed ER-Ex without FB. Both groups performed three sets of 10 repetitions of ER-Ex in a prone position with the shoulder abducted to 90 degrees and the elbow flexed to 90 degrees. Both groups independently performed the ER-Ex for one month before their regular baseball practices.The primary out- come measure was the Kerlan-Jobe Orthopaedic Clinic (KJOC) Shoulder & Elbow Score, including total and subitem scores. Secondary outcomes included pitching performance (ball speed and elbow valgus torque) and physical function (shoulder rotation muscle strength and range of motion). These were evaluated for one month before and after the intervention.

Results: No significant changes were found in the KJOC total score, pitching performance, or physical function. However, a significant improvement was observed in KJOC subitem 1, related to warm-up time (p=0.02), with the score increasing from 78.8 to 87.2 points for the FB-G (p=0.01).

Conclusions: One month of self-exercise following the educational intervention combining ER-Ex with real-time visual FB showed no additional effects on the KJOC total score or pitching performance. However, ER-Ex with real-time visual FB could potentially contribute to reducing warm-up time.

KEYWORDS

Baseball, Injury prevention, real-time visual feedback, Shoulder external rotation exercise, Ultrasonography

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EFFECTIVENESS OF HIGH-LOAD COMPARED WITH LOW-LOAD STRENGTHENING EXERCISE ON SELF-REPORTED FUNCTION IN PATIENTS WITH HYPERMOBILE SHOULDERS: ONE-YEAR FOLLOW-UP FROM A RANDOMISED CONTROLLED TRIAL

Oral

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ABSTRACT

INTRODUCTION

Shoulder symptoms are common in patients with hypermobility spectrum disorders (HSD), but evidence for treatment is sparse.

OBJECTIVES

To investigate the long-term effectiveness of high-load versus low-load strengthening exercise on self-reported function in patients with HSD and shoulder symptoms.

STUDY DESIGN

A secondary analysis of a superiority, parallel-group, randomised trial (balanced block randomisation 1:1, electronic concealment).

METHODS

A secondary analysis of a superiority, parallel-group, randomised trial (balanced block randomisation 1:1, electronic concealment) including adult patients (n=100) from primary care with HSD and shoulder pain and/or instability ⩾3 months. Patients received 16 weeks of shoulder exercises (three sessions/week): HEAVY (n=50, full-range, high-load, supervised twice/week) or LIGHT (n=50, neutral/mid-range, low-load, supervised three times in total). The 1-year between-group difference in change in self-reported function was measured using the Western Ontario Shoulder Instability Index (WOSI, scale 0–2100, 0=best). Secondary outcomes were self-reported measures including changes in shoulder-related symptoms, function, emotions and lifestyle, quality of life, patient-perceived effect, treatment utility and adverse events. A blinded analyst conducted the analyses using linear mixed model repeated measurements analysis.

RESULTS

One-year data were available in 86 out of 100 participants (79% women, mean age 37.8 years) (LIGHT 84%, HEAVY 88%). The mean WOSI score between-group difference favoured HEAVY (−92.9, 95% CI −257.4 to 71.5, p=0.268) but was not statistically significant. The secondary outcomes were mostly inconclusive, but patients in HEAVY had larger improvement in the WOSI-emotions subdomain (−36.3; 95% CI −65.4 to −7.3, p=0.014). Patient-perceived effect favoured HEAVY anchored in WOSI-emotions (55% vs 31%, p=0.027) and WOSI-lifestyle (50% vs 29%, p=0.042).

CONCLUSIONS

High-load shoulder strengthening exercise was not superior to low-load strengthening exercise in improving self-reported function at 1 year. High-load strengthening exercise may be more effective in improving patient emotions about shoulder pain and function, but more robust data are needed to support these findings.

KEYWORDS

Joint hypermobility, shoulder, high-load strength training, randomised controlled trial

REFERENCES

None

EFFECTS OF MODIFIED GET SET INJURY PREVENTION PROGRAM FOR SOUTH KOREAN NATIONAL ARCHERY TEAM: A PROSPECTIVE INTERVENTION STUDY OVER TWO SEASONS

ORAL

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ABSTRACT

Background

Olympic archery has a high injury rate among non-contact sports in Olympic Summer Games and tends to be chronic due to overuse. IOC with collaboration with OSTRC developed Get Set, an injury prevention program for Olympic athletes, and anyone engaged in physical activity. The purpose of this study is to find out whether the modified Get Set injury prevention program has a positive effect on the injury rate for Korean national archery team.

Design

Prospective intervention study. Participants.

Archers from Korean national team: control season (2018-2019), 16 archers; intervention season (2019–2020), 16 archers. Final 12 archers, excluded elimination of the national selection.

Interventions

Modified Get Set injury prevention program, archery part. Program added 5 exercises on the Get set shoulder part. 15 minutes before training, 5 days a week, twice a day, for a total of 20 weeks.

Main Outcome Measurements

The number of injuries, injured area, diagnosis and cause of injury during the two seasons. Results

There were total of 77 injuries during the control season, 62 injuries during the intervention season. The injury rate decreased by 19.48%. The injury rate at the injured area decreased in the order of cervical (69.23%), thoracic (42.11%) and shoulder (32.00%). The diagnosis of muscle and tendon decreased by 27.66% and 33.33% respectively. However, injuries related to the lumbar intervertebral disc increased by 50.00%. The cause of injury from overuse decreased by 18.46%.

Conclusions

This study shows that it is possible to prevent cervical, thoracic and shoulder injuries with modified Get Set injury prevention program for archers. There is an additional need to supplement the prevention program related to lumbar.

KEYWORDS

Get Set, injury prevention program, injury rate, archery

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EFFECTS OF TALOCRURAL JOINT MOBILIZATION ON JOINT POSITION SENSE AND CENTER OF GRAVITY IN PATIENTS WITH CHRONIC ANKLE INSTABILITY

Poster

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ABSTRACT

Introduction: Chronic ankle instability (CAI), which develops in approximately 40% of patients with internal ankle sprains, results in recurrent sprains due to a loss of joint position and proprioceptive sensations. However, few studies have examined the effects of talocrural joint mobilization on joint position sense.

Objectives: This study aimed to clarify the effects of talocrural mobilization on joint position sense and center of gravity sway in patients with CAI.

Study Design: This study was an intervention study. Measurements and interventions were performed by different examiners.

Methods: The CAI cases (20–30 years old) included 60 adult male and female patients. The criteria for inclusion included: (1) Cumberland Ankle Instability Tool Japanese version: 25 points or less[1];(2) at least one ankle sprain; and (3) a history of the ankle joint giving-way. Participants were divided into the following groups: (1) Maitland Grade II talocrural joint mobilization group; (2) Maitland Grade III talocrural joint mobilization group[2]; and (3) sham group. Random assignment was performed. All interventions were carried out by a single Orthopaedic Manual Physical Therapists.

Measurement items:(1) Positional sensory testing during ankle joint supination; (2) center of gravity sway testing in an open-eyed, one-leg standing position; and (3) ankle joint dorsiflexion angle using the distance of the great toe wall as an index.[3]

Results: The absolute error at 15° ankle joint supination improved from 4.9±2.8° to 3.5+2.2° in the Grade II group and from 4.5±1.6° to 3.4±1.8° in the Grade III group (Grade II, III: $p<0.05$). The ankle dorsiflexion angle improved from 12.4±2.5cm to 12.9±2.4cm in the Grade II group and from 13.2±2.6cm to 13.6±2.7cm in the Grade III group (Grade II: $p<0.001$, Grade III: $p<0.01$).

Conclusions: Talocrural joint mobilization effectively improved joint position sense at 15° ankle joint supination and ankle dorsiflexion angle but did not significantly impact center of gravity sway.

KEYWORDS

CAI, Joint mobilization, Joint position sense, Postural sway

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EFFECTS ON PLANTAR SUPPORT AFTER DEEP DRY NEEDLING IN POSTERIOR TIBIAL MUSCLE: A BAROPODOMETRIC DOBLE-BLIND RANDOMIZED

CONTROLLED TRIAL

Oral

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ABSTRACT

Introduction. The tibialis posterior muscle (TPM) is a major element in dynamic and passive stabilization on the medial side of the ankle and hindfoot. The presence of myofascial trigger points (MTrPs) in TPM compromises its stabilizing function in the gait.

Objectives. To analyze the immediate and short-term effect of the application of the deep dry needling (DDN) technique in the MTrP of TPM on plantar support and gait.

Methods. A double-blind randomized controlled clinical trial was performed following CONSORT guidelines. Eighty-two participants with latent MTrP in TPM were randomly assigned to receive a single session of DDN on the MTrP of TPM (n=48, intervention group) or sham DDN (n=34, control group). The plantar pressure distribution was assessed by dynamic baropodometry before intervention, and immediately, 24 and 72 hours after the intervention. The variables analyzed were the maximum and mean pressure in different areas of the plantar footprint, and the support surface and average pressure of the footprint, forefoot and hindfoot. The statistical analysis was performed using SPSS Statistics version 29.0.

Results. In the intervention group, immediately after the puncture in TPM, a significant increase in the pressure of the hindfoot ($p=0.021$) was observed, as well as in the mean pressure in the back, medial and anterior part of the foot ($p<0.01$), and a decrease in the maximum pressure in these areas ($p<0.05$), compared to the data obtained before the intervention. This change was observed at 24 hours post-intervention, but not at 72 hours. These pressure differences were not observed for the control group that received sham DDN.

Conclusions. For the first time, the current study demonstrated that posterior tibial trigger point treatment using DDN is capable of inducing changes in plantar pressures. Further studies evaluating DDN as a therapeutic strategy for tibialis posterior dysfunction are needed.

KEYWORDS

tibialis posterior muscle, myofascial trigger point, deep dry needling, baropodometry

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EFFICACY OF RADIAL PRESSURE WAVE THERAPY IN ATHLETES WITH ACHILLES TENDINOPATHY: A RANDOMIZED TRIAL

POSTER

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ABSTRACT

Introduction:

Radial pressure wave (RPW) is widely used in clinical practice for tendinopathy and is investigated to have a syner- gistic effect with exercise therapy[1)]. However, there are no studies that have examined and compared the additive effect of RPW and exercise therapy although they are not used alone in clinical practice.

Objectives:

To compare the effects of RPW with exercise therapy versus exercise therapy alone in athletes with Achilles tendinopathy.

Study design:

Open-label randomized controlled trial. Methods:

18 athletes with Achilles tendinopathy were randomly assigned to the intervention group (n = 9) or the control group (n = 9). The intervention group received a total of four sessions of RPW once a week for 4 weeks. Both groups received instruction from the physiotherapist and performed the exercise therapy daily. Score on the Japanese version of the Victorian Institute of Sports Assessment Scale-Achilles questionnaire (VISA-A-J) were collected at baseline, 4, 16 and 24 weeks after the start of the intervention. Repeated measures analysis was used to assess the difference in an improvement in VISA-A-J variables between the groups over time.

Results:

VISA-A-J scores improved significantly in both groups over the study period, but there were no differences in

treat- ment efficacy between groups over time (p = 0.675). The mean baseline VISA-A-J scores (95% confidence interval, CI) were 63.4 (54.0 - 72.9) for the intervention group and 59.2 (49.8 - 68.7) for the control group. The VISA-A-J scores of the intervention and control groups improved over time to 76.0 (61.3 - 90.7) and 61.2 (46.5 - 75.9), respectively after four RPW sessions and to 86.8 (75.5 - 98.1) and 79.6 (68.3 - 90.9), respectively, at 24 weeks.

Conclusions:

The addition of RPW was as effective as exercise therapy alone for athletes with Achilles tendinopathy.

KEYWORDS

Radial pressure wave (RPW), Achilles tendinopathy, Exercise therapy

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ELECTROMYOGRAPHY ANALYSIS OF SCAPULAR MUSCLES DURING SCAPULAR STABILIZER STRENGTHENING EXERCISES: IMPACT OF VOLUNTARY ABDOMINAL CONTRACTION

Poster

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ABSTRACT

Introduction: Anterior pelvic tilt increases during scapular retraction exercises performed in the prone position. Changes in scapular muscle activation are unknown when the lumbar spine is stabilized by abdominal contraction. **Objectives**: The aim of the study was to investigate scapulothoracic muscle activations during scapular stabilizer retraction exercise (SRE) while maintaining lumbopelvic stability through voluntary abdominal contraction (VAC) in the prone position

Study design: Single-group repeated-measures.

Methods: Twenty healthy, physically active individuals (mean age [SD] = 23.3 [2.27], body mass index = 22.17 [1.6]) were included. Participants performed a standard scapular SRE in the prone position with four variations (arm beside the trunk, 45°, 90°, and 120° abduction) in random order. Exercises were performed both with and without VAC. A pressure biofeedback unit was utilized to measure VAC. Surface electromyographic (EMG) activity of the upper trapezius (UT), lower trapezius (LT), and serratus anterior (SA) muscles was collected during the concentric, eccentric, and isometric phases. A one-way repeated measures ANOVA was employed to compare the activity levels (%MVIC) of the UT, LT, and SA muscles.

Results: Scapular muscle activation levels were low to moderate (< 44% MVIC with VAC UT isometric phase during arm in 120°abduction). There was no significant difference between with and without VAC conditions in the three contraction phases. (all ps>0.05). UT (*concentric* phase) activity was higher during arm in 120°abduction SRE with/without VAC when compared to arm beside the trunk SRE with/without VAC (p< 0.001), in 45° abduction SRE with/without VAC (p=0.001)/(p=0.002) and in 90° abduction SRE with VAC (p=0.006). (Accordingly; 32.12 [14.2]/32.14 [11.31];13.72 [11.31]/11.14 [11.34]; 15.12 [8.98]/16.69 [12.09]; 21.47 [11.43])

CONCLUSIONS

No changes were observed in UT, AT, and SA muscle activation when VAC was performed in conjunction with SRE. UT concentric activation increased as the degree of arm abduction increased in both conditions.

KEYWORDS

Keywords: Abdominal contraction, Electromyography, Lumbar stabilization, Shoulder joint.

REFERENCES

none

EVALUATING THE EFFECTIVENESS OF THE MODIFIED ARM CARE SCREEN IN OVERHEAD ATHLETES: A GLIMPSE INTO INJURY PREVENTION

Poster

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ABSTRACT

Introduction: To reduce the risk of injuries and boost performance in overhead athletes, coaches introduce arm care programs that emphasize on strength, stability, and range of motion (Frisch et al 2017; Paraskevopoulos et al. 2023). However, these programs lack precision, making it difficult to pinpoint specific factors that increase the risk of injury in these athletes. To tackle this problem, a screening tool called the Arm Care Screen (ACS) was created, using principles from the Functional Movement Screen (FMS) (Matsel

et al. 2022). Its purpose is to identify musculoskeletal risk factors for shoulder injuries in baseball players and other overhead athletes.

Objectives: This study aimed to evaluate how effective the modified ACS is at identifying prevalent risk factors in overhead athletes participating in various sports.

Study design: Original study; Cross sectional

Methods: The study involved 62 overhead athletes with an average age of 24.5 years. These athletes underwent a comprehensive ACS evaluation, which included assessments of reciprocal shoulder mobility, total body rotation, lower body diagonal reach, and rotary stability. Two physical therapists independently measured ten musculoskeletal risk factors.

Results: The modified ACS showed moderate to strong associations (Phi values ranging from 0.273 to 0.905) with these risk factors. Sensitivity was between 0.81 and 0.88, indicating a high true positive rate, while specificity ranged from 0.43 to 0.94, indicating a moderate to strong positive rate. Positive and negative likelihood ratios varied from

1.48 to 15.92 and 0.12 to 0.38, respectively. The positive predictive value ranged from 0.58 to 0.92, and the negative predictive value ranged from 0.73 to 0.93. The accuracy of the modified ACS ranged from 0.62 to 0.91.

Conclusions: The modified ACS displayed promising diagnostic accuracy. Its inclusion of core stability assessment further enhances its potential as a valuable tool for injury prevention and athletic performance enhancement.

KEYWORDS

Overhead; Prevention; Shoulder; ACS

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EVIDENCE FOR RECOMMENDING DELAYED ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION – A SCOPING REVIEW

Oral

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ABSTRACT

INTRODUCTION

Treatment after anterior cruciate ligament (ACL) injury can initially be rehabilitation. Some patients need delayed ACL reconstruction (ACLR), but it is unclear what characterizes these patients.

OBJECTIVE

The objective of this review is to describe predictors for ACLR in patients initially treated with rehabilitation.

STUDY DESIGN

Scoping review

METHODS

A comprehensive systematic literature search was performed in the Cochrane, Embase, Medline, SportsDiscus and Web of Science databases from inception to February 21, 2023. We included articles describing characteristics in adult ACL-injured patients undergoing ACLR after minimum 5 weeks rehabilitation.

Characteristics described in at least three articles were defined as a predictor for delayed ACLR and characteristics described in less than three articles were considered less certain and defined as potential predictors. Articles were screened using Covidence by two independent reviewers. The study followed PRISMA guidelines and was originally planned as a systematic review with meta-analysis but due to limited data, a scoping review was performed.

RESULTS

18,706 studies were identified and 168 full texts were screened of which 10 papers were included. Lower age and higher preinjury activity level were the only 2 predictors identified. Another 13 potential predictors were identi- fied in single studies. All potential predictors were through an iterative process categorized into 4 groups; patient demographics, knee function, patient-reported outcome measures and anatomical structures.

CONCLUSION

This review found few predictors for delayed ACLR, while there were several potential predictors. The evidence for recommending patients delayed ACL reconstruction seems scarce and more studies are needed to evaluate and identify predictors for patients regarding delayed ACLR.

KEYWORDS

ACL, ACL reconstruction, rehabilitation, surgical predictors

REFERENCES

none

EXPLORING EXERCISE INTOLERANCE IN MILD TBI PATIENTS WITH PERSISTENT POST-CONCUSSION SYMPTOMS: A CROSS-SECTIONAL STUDY

Oral

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ABSTRACT

Introduction: Persistent post-concussion symptoms (PPCS) are common after mild traumatic brain injury (mTBI). There is a need to explore contributing factors to exacerbation of symptoms during physical activity, exercise intol- erance, in adult population with PPCS to provide effective rehabilitation

Objective: Explore differences in demographic, injury-related, psychological, and physical functioning factors in patients with and without exercise intolerance tested on the Buffalo Concussion Treadmill Test (BCTT). Explore if these factors are associated with PPCS-burden in patients with exercise intolerance.

Study design: Cross-sectional study of the baseline population in a randomized controlled trial: ClinicalTrials.gov:NCT05086419

METHODS

Study population: 103 patients (57% female, mean age 37 years, SD:11) with mTBI and self-reported exercise in- tolerance recruited from the TBI outpatient clinic, Oslo University Hospital.

Type of assessments: Exercise intolerance measured by BCTT (% of HRmax). Dependent variable: Rivermead Post-concussion Symptoms Questionnaire (RPQ). Independent variables: age, sex, days since injury, exercise intolerance, depression (PHQ-9), anxiety (GAD-7), fatigue (FSS), physical activity level (IPAQ).

Results: Among the 103 patients, 81 (79%) tested exercise intolerant on the BCTT. The exercise intolerant group was younger (35.8 years, sd:10.6 vs. 41.4, sd:10.2, p=.029), had more co-morbidities (proportion: 69% vs 50%, p=0.09) and had shorter time since injury (days: 212 sd:113 vs. 288 sd:123, p=.013). All test parameters for the BCTT were significantly poorer for the exercise intolerant group. Headache (59%) and dizziness (36%) were the most frequently reported symptoms during BCTT. A multiple regression analysis with backward selection showed that female sex (b=3.49), days-since-injury (b=0.015), GAD-7 (b=0.58) and PHQ-9 (b=1.04) were significantly associated (p<.05) with higher PPCS-burden on the RPQ (adjR^2= .46, p<.001), whereas exercise intolerance was not.

Conclusions: Exercise intolerance was confirmed with BCTT for the majority of mTBI patients with self-reported exercise intolerance. Anxiety and depression was the strongest factors explaining PPCS-burden in patients with exercise intolerance after mTBI.

KEYWORDS

#concussion #mTBI #exercise intolerance #post-concussion symptoms #treadmill #incremental_testing\

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EXPLORING THE RELATIONSHIP BETWEEN TRAINING LOAD AND INJURY RISK IN LEINSTER SCHOOLBOY RUGBY: ANALYSIS OF THE SCRUM COHORT STUDY PHASE 2

Oral

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ABSTRACT INTRODUCTION

Management of training load (TL) including contact load, are receiving increased attention in relation to injury risk,

but few studies have explored TL in adolescent rugby players and its link to injury (1).

OBJECTIVES

- Monitor TL in senior schoolboy rugby players in Leinster, Ireland.

- Explore relationship between TL and injury risk.

STUDY DESIGN

Prospective cohort study

METHODS

Leinster senior schoolboy rugby players competing in the 2022-23 season were recruited. Injury recording followed rugby injury surveillance consensus statements (2). Training load was calculated using duration (minutes) multiplied by intensity (rate of perceived exertion) and reported as an arbitrary unit (AU) of load (1). Data were collected in Kitman Lab's Athlete application.

Mean weekly TL categories included <500, 500 to <750, 750 to <1000, 1000 to <1250 and >1250 AUs. Adjusted logistic regression models, accounting for the correlation between players within schools, were used to explore potential relationships between player characteristics, training type, and TL and odds of an injury. Missing RPE data was imputed where possible, from team mean & median RPE or the previous session RPE.

RESULTS

273 participants (mean age 17±2 years, height 181±6 cm, weight 82±13 kg) from eight schools provided data over 24 weeks. 61 players reported an injury during the season. 5614 training sessions were recorded.

Adjusted logistic regression analysis revealed higher odds ratios (OR) for sustaining an injury, with mean weekly TL<500 AUs (OR:1.2, 95%CI:0.14-10.6) or higher than 750 to <1000 (OR:9.1, 95%CI:1.33-61.6), 1000 to <1250 (OR:18.2,

95%CI:1.1-294.3) and >1250 AUs (OR:63.4, 95%CI: 3.1-1288.1); in comparison to 500 to <750 AUs (reference value).

CONCLUSIONS

A quadratic relationship between TL and injury was evident, with lower risk of injury associated with mean weekly 500 to <750 AUs, compared to higher or lower TL.

This research was funded by the Irish Rugby Football Union Charitable Trust.

KEYWORDS

injury risk, training load, rugby, youth athlete

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GENDER DIFFERENCES IN THE RELATIONSHIP BETWEEN INTRINSIC FOOT MUSCLE MORPHOLOGY, TOE GRIP STRENGTH AND POSTURAL CONTROL ABILITY AFTER JUMP LANDING IN ADOLESCENT ATHLETES

Poster

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ABSTRACT INTRODUCTION

Previous research has investigated the relationship between the morphology of intrinsic foot muscles and post-

jump landing posture control ability in adolescent athletes (Arima et al., 2022). However, gender differences in this relationship are still not clearly understood.

OBJECTIVES

This study aimed to investigate the relationship between the intrinsic foot muscles morphology, toe grip strength, and post-jump landing posture control ability in adolescent athletes, considering gender differences.

Study design: This study is cross-sectional design.

METHODS

A total of 171 adolescent athletes (104 males and 67 females) were included. The cross-sectional area (CSA) and thickness of the abductor hallucis, flexor hallucis brevis (FHB), and flexor digitorum brevis (FDB) were measured by an ultrasound system. Toe grip strength was assessed with a digital grip strength meter. The single-leg forward jump landing stability was evaluated using the Dynamic Postural Stability Index (DPSI), calculated from the combined medial-lateral, vertical, anterior-posterior stability index (APSI). Correlations between each variable were calculated for gender, and the relationships were examined using multiple regression analysis.

RESULTS

In males, there was a significant correlation between the CSA and thickness of FHB, toe grip strength, and DPSI (p

< 0.05). For females, significant correlations were observed between the CSA of FHB and DPSI, as well as the CSA of FDB and thickness with APSI ($p < 0.05$). Multiple regression analysis indicated that in males, the CSA of FHB and toe grip strength, while in females, the CSA of FHB and FDB were significantly associated with DPSI ($p < 0.05$).

CONCLUSIONS

The findings suggest that overall toe grip strength contributes to post-jump landing stability in males, while in females, the FDB, which is widely attached to the sole and contributes to foot stiffness, generates stability. Support for adolescent athletes needs to consider the gender differences between toe grasp and FDB function.

KEYWORDS

adolescent athlete, intrinsic foot muscle, ultrasound system, dynamic postural stability index

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GENDER-SPECIFIC SOCIOCULTURAL FACTORS AND THEIR ASSOCIATION WITH LOWER LIMB KINEMATICS DURING HIGH AND LOW-IMPACT TASKS.

Poster

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ABSTRACT

INTRODUCTION

Sex and gender are often used interchangeably in sports medicine research, despite their distinct meanings (1). Women experience a disproportionately higher risk of non-contact ACL injuries compared to men (2). Gender-specific sociocultural factors (GSSFs) may influence movement patterns and injury risk.

OBJECTIVES

1. To examine the association between GSSFs and 3D hip and knee kinematics during high- and low-impact tasks (HITs and LITs).
2. To explore the correlation between 3D hip and knee kinematics during LITs and HITs.

STUDY DESIGN

- Cross-sectional correlational design

METHODS

Participants: 18 cis-gender, healthy, active women aged 18-30 years Assessments:

- Three trials of HITs (drop vertical jump, single-leg drop vertical jump on dominant and non-dominant sides)
- Three trials of LITs (stand-to-sit, single-leg stand-to-sit on dominant and non-dominant sides) Outcome measures:
- 3D hip and knee kinematics measured using motion capture
- GSSFs assessed using Trait Self-Objectification Scale (TSOS) and Gender Role Socialization Scale (GRSS)

Statistical analysis: Spearman and Pearson correlations

RESULTS

TSOS correlations:

Moderate positive correlation with non-dominant frontal plane hip kinematics during single-leg stand-to-sit on the non-dominant side ($\rho = 0.48$, $p = .043$)

Moderate negative correlations with:

- Dominant hip frontal plane kinematics during drop vertical jump ($\rho = -0.52$, $p = .027$*)
- Non-dominant knee transverse plane kinematics during stand-to-sit transition ($\rho = -0.52$, $p = .024$*)

No significant correlations found with GRSS.

Strong positive correlations ($r = 0.77$-0.86, $p < .05$) between dominant-side hip/knee kinematics in frontal/transverse planes during bilateral and single-leg HITs and LITs.

CONCLUSIONS

- LITs may be valuable tools for early ACL injury identification in female athletes.
- Higher self-objectification may be associated with altered hip and knee movement patterns, potentially in- fluencing injury risk.
- Further research is needed to explore the implications of these findings and the broader role of GSSFs in shaping movement patterns.

KEYWORDS

ACL injury, Gender, Sociocultural factors.

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HAMSTRING MUSCLE VOLUME CONTRIBUTION TO HAMSTRING ECCENTRIC STRENGTH IN COLLEGIATE FOOTBALL ATHLETES

Oral

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ABSTRACT

Introduction: The Nordic hamstring exercise is known to increase hamstring muscle volume (MV),(1,2) and greater MV is known to be associated with greater strength across a variety of muscles. However, the relative influence of individual hamstring MV on Nordic hamstring eccentric strength (NHES) in high-level athletes has not been described.

Objective: Investigate the association between individual hamstring MV and peak NHES in collegiate American football athletes.

Study design: Cross-sectional.

Methods: 125 uninjured high-level collegiate football athletes completed preseason NHES testing and magnetic resonance imaging to quantify MV, bilaterally. Each athlete completed 3 NHES trials, and maximum force values

(N) were analyzed. MV (mL) was calculated for each hamstring muscle by automatic muscle segmentation(3). A linear mixed effect model assessed the relationship between each individual HMV and peak NHES, controlling for hamstring strain injuries within 12 months before testing and repeated observations across limbs.

Results: Biceps femoris long head (BFLH, p<0.001), semitendinosus (ST, p=0.001) and semimembranosus (SM, p=0.03) MV were significantly associated with peak NHES, while biceps femoris short head (BFSH) volume was not (p=0.24). A 10 ml increase in BFLH, ST, and SM MV was associated with 3.4N (95%CI: 1.6 – 5.2N), 3.1N (95%CI: 1.2 – 5.0N), and 1.9N (95%CI: 0.2 – 3.6N) increase in peak NHES, respectively. Average (± standard deviation) values for each metric were: peak NHE force: 445.4 ± 82.6N; BFLH: 319.6 ± 68.6mL; BFSH: 164.8 ± 34.9mL; ST: 370.2 ± 61.4mL and SM: 396.7 ± 70.4mL.

Conclusion: A change in BFLH volume was associated with the greatest change in peak NHES, followed by ST and SM. Therefore, targeting the BFLH, ST, and SM in hypertrophy training may potentially enhance NHES. These findings provide insights into optimizing training strategies to improve hamstring eccentric strength in athletes.

KEYWORDS

Athletes; Hamstring muscles; Muscle mass; Nordic hamstring eccentric exercise; Muscle strength.

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HIP CREPITUS IS HIGHLY PREVALENT AND ASSOCIATED WITH PSYCHOLOGICAL FEATURES AND PAIN IN FOOTBALL PLAYERS WITH HIP/GROIN PAIN.

Oral

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ABSTRACT

Introduction: Mechanical hip symptoms (crepitus) are poorly understood in athletes with hip/groin pain[1]. In the knee joint, crepitus relates to negative emotions and beliefs[2]. However, the psychological implications of hip crepitus are unknown.

Objectives: To explore (i) the prevalence and severity of hip crepitus in football players with and without hip/groin pain; and (ii) association between hip crepitus severity and psychological features and pain in football players with hip/groin pain.

Study design: Cross-sectional.

Methods: We recruited football players with and without hip/groin pain (⩾2 weekly football sessions)[3]. The prevalence and severity of crepitus were assessed using a single item of the HAGOS, and the iHOT-33, respectively. Psychological features were assessed using Tampa Scale of Kinesiophobia, Arthritis Self-Efficacy Scale and Pain Catastrophizing Scale. Pain severity was assessed by a Numeric Pain Rating Scale (0-10) describing average pain playing football and average pain in the last week. Log-binomial and linear regressions were used to explore the prevalence and the association of hip crepitus severity with pain/psychological features.

Results: 184 hip/groin pain participants and 60 controls were included. Football players with hip/groin pain had a higher crepitus prevalence (prevalence ratio=5.0 [2.5 to 10.2]) and severity (mean difference [95%CI]=7.5 [0.89 to 15.9]) than controls. Hip crepitus severity was associated with kinesiophobia (r^2=0.07), pain catastrophising (r^2=0.16), self-efficacy (pain subscale: r^2=0.07; other subscale: r^2=0.09), average pain playing football (r^2=0.10) and average pain in the last week (r^2=0.10). Significant interaction effects between hip crepitus and sex were observed for pain catastrophising (p=0.022) and average pain playing football (p=0.030). Women had a higher association between hip crepitus and pain catastrophising, and average pain than men.

Conclusions: Football players with hip/groin pain had greater prevalence and severity of hip crepitus than controls. In footballers with hip/groin pain, hip crepitus is associated with psychological features and pain.

KEYWORDS

Hip; Hip-related pain; Patient-reported outcome measure; Rehabilitation.

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IMMEDIATE EFFECTS OF LOWER LEG TISSUE FLOSSING ON ANKLE MUSCLE STRENGTH AND DORSIFLEXION RANGE OF MOTION IN HEALTHY INDIVIDUALS: A RANDOMIZED CROSS-OVER CONTROLLED TRIAL

Poster

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ABSTRACT

Introduction: The lower leg tissue flossing technique involves wrapping a rubber band around a muscle group for a few minutes while performing joint motion, enhancing ankle muscle strength output and dorsiflexion (DF) joint range of motion (ROM) [1-2)]. However, there is currently no consensus regarding the effectiveness of this technique due to insufficient evidence-based research and inconsistencies in band pressure 3).

Objectives: To clarify the immediate effects of lower leg tissue flossing using several compression bands focused on enhancing ankle muscle strength and DF-ROM.

Study Design: Randomized cross-over controlled trial.

Methods: Nineteen healthy adult males underwent the intervention: two bands (low and high pressure) and underwrap (control) were wrapped for 2 min on the non-dominant lower leg, with 5–10 day intervals. A pressure monitor sensor inserted into the center of the posterior lower leg monitored wrapping compression force. The intervention exercise comprised six ankle joint plantar flexion (PF) and DF voluntary isometric contractions at three angles (PF 20°, neutral 0°, and DF 10°) for 3 seconds using a dynamometer. The maximum isometric muscle strength in DF and PF and ankle DF-ROM were evaluated pre- and post-intervention.

Results: The ankle PF muscle strength showed a significant interaction at 10° DF (p<0.01) but none at 0° and 20° PF. The low- and high-pressure bands significantly enhanced the ankle PF muscle strength by 4.3 (p=0.02) and 4.9 Nm (p<0.05), respectively, compared to the control. The ankle DF-ROM showed significant interaction (p<0.01), and the low- and high-pressure bands significantly enhanced the ankle DF-ROM by 1.7° (p<0.01) and 1.3° (p=0.02), respectively, compared to the control. The low- and high-pressure band groups had comparable muscle strength and DF-ROM.

Conclusions: The two-minute lower-leg tissue flossing intervention significantly enhanced ankle PF strength and DF-ROM.

KEYWORDS

Ankle dorsiflexion range of motion, Ankle muscle strength, Injury prevention, Tissue flossing

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IMPROVEMENTS IN FORWARD BENDING ARE RELATED TO

Improvements in Pain and Activity Limitation during Cognitive Functional Therapy for people with Chronic Low Back Pain

Oral

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ABSTRACT

Introduction:

Treatments for low back pain (LBP) often focus on restoring movement to reduce pain and disability. Longitudinal studies examining the relationships between changes in the way a person with LBP moves and changes in their pain/disability are required to clarify associations.

Objectives:

To investigate whether improvements in spinal movement during forward bending are related to improvements in pain/disability in people with LBP undergoing Cognitive Functional Therapy (CFT).

Study design:

Longitudinal Observational Study. Methods:

Participants with chronic, disabling non-specific LBP allocated to CFT or CFT with biofeedback in the RESTORE trial[1](n=261) performed forward bending at each treatment session over a 13-week treatment period (average of

4.3 timepoints/participant (range 1-8)). Spinal kinematics were recorded using inertial measurement units. Participants reported i) average pain intensity (0-10 scale) (Pain), and ii) pain-related activity limitation (Disability), (Roland Morris Disability Questionnaire (RMDQ)) via online questionnaires at 0,3,6 and 13 weeks. Multivariate multilevel models were used to evaluate associations between individual rates of change over time between three spinal movement measures (trunk velocity, trunk range of movement (ROM) or intersensor ROM) and Pain/Disability. Results:

Strong correlations were observed between increased trunk velocity and reduced Pain (-0.81, 95%CI -0.98, -0.05), and reduced Disability (-0.77, 95%CI -0.95, -0.22). Moderate correlations were observed between increased trunk ROM and reduced Pain (-0.37, 95%CI -0.67, 0.04), and reduced Disability (-0.32, 95%CI -0.6, 0.03). It was not possible to establish temporal precedence as changes occurred concomitantly.

Conclusions:

Targeting forward bending may lead to reductions in chronic low back pain and disability. Alternatively, reducing pain or disability via other treatment targets may improve forward bending. It is likely that Pain/Disability and movement outcomes may improve together due to reciprocity of effects which reinforces the importance of a person-centred focus for clinicians.

KEYWORDS

Bending, Disability, Low Back Pain

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versus usual care for chronic, disabling low back pain (RESTORE): a randomised, controlled, three-arm, parallel group, phase 3, clinical trial. *Lancet*. 2023;doi:10.1016/S0140-6736(23)00441-5

INJURY INCIDENCE IN LEINSTER SCHOOLBOY RUGBY PLAYERS IN 2022-23 SEASON; THE SCRUM COHORT STUDY PHASE 2.

Oral

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ABSTRACT

INTRODUCTION

Injury surveillance studies in adolescent rugby show varied injury incidence and injury risk factors, supporting further exploration in this cohort (1). Focus on the tackle as the

mechanism of injury has grown, with an introduction of lower tackle height in community games (2).

OBJECTIVES

- Describe injury incidence, site, mechanism, and severity in senior schoolboy rugby players in Leinster, Ire- land.

STUDY DESIGN

Prospective cohort study

METHODS

Leinster senior schoolboy rugby players competing in the 2022-23 season were recruited. Injury recording included site, mechanism and severity following rugby injury surveillance consensus statements (3). Match frequency and training duration were recorded to calculate exposure (3). Data were collected in Kitman Lab's Athlete application.

RESULTS

297 participants (median age 17 years (IQR:16-17), mean height 181±6 cm, median weight 80.2kg (IQR:73.1-90.1)) in nine schools provided data over 24 weeks.

73 injuries (51 match, 22 training) were reported. Match injury incidence (per 1000 player hours) was 25.8 (95% confidence interval (CI):19.2-33.9), and training injury incidence was 1.2 (95% CI:0.5-1.1). Match injury severity was a median time-loss of 27 days (95% CI:22.4-33), and a median of 18 days (95% CI:12-33) for training injuries. Most common reported match injury sites included head (n=15, 29%) and shoulder (n=11, 22%), and training injury sites were shoulder (n=6, 27%) and ankle (n=5, 23%). The tackle was the most common mechanism of injury (tackling n=19, 26%; tackled n=17, 23%).

CONCLUSIONS

Match injury incidence was lower in Leinster schoolboys than a recent meta-analysis (39.76; 95% CI:10.18-69.33), but similar to a previous season (2019-2020) in Leinster (SCRUm phase 1). Most common regions injured were similar across both phases and to other youth rugby studies (1). Similar to other studies, the tackle is the most common mechanism of injury (1).

This research was funded by the Irish Rugby Football Union Charitable Trust.

KEYWORDS

rugby, youth athletes, injury, epidemiology,

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INJURY OCCURRENCE AND PROFILES ACROSS FOUR PARA SPORT MODALITIES: A ONE-YEAR PROSPECTIVE STUDY

Oral

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ABSTRACT

Introduction: Better understanding of unique injury profiles and occurrence across para sport modalities can aid the development of tailored monitoring and prevention strategies[1].

Objectives: To compare the prevalence of injuries between para athletes from athletics, swimming, powerlifting, and taekwondo throughout a season.

Study design: Prospective longitudinal comparison study.

Methods: Data collection occurred from January to December of 2022 at two Paralympic Reference Centers in Brazil, including para athletes from athletics (N=41), swimming (N=37), powerlifting (N=14), and taekwondo (N=10). Injuries were recorded for 50 weeks, on a weekly basis, via the Oslo Sports Trauma Research Center Questionnaire. Weekly injury prevalence was determined by the ratio of injured athletes to respondents per week2. One-way ANOVAs compared gradual onset and sudden onset injuries prevalence among the four modalities with a = 0.05. **Results:** The mean weekly prevalence of injuries was 51.2% (95%CI 47.8-54.5) for athletics, 31.0% (95%CI 26.3- 835.7) for swimming, 49.0% (95%CI 38.4-59.6) for powerlifting, and 65.6% (95%CI 53.6-77.5) for taekwondo. The following body regions were the most affected by injuries in each modality: athletics - ankle (25.4%) and knee (21.1%); swimming – shoulder (47.2%); powerlifting – wrist (42.7%) and shoulder (29.9%); and taekwondo – ankle (40.7%), knee (28.0%) and foot/toes (20.0%). Swimming had the lowest prevalence of gradual onset injuries while taekwondo had the highest

prevalence between the four modalities (F=14.94; η^2=0.186;p<0.001). There were no differences between modalities regarding the prevalence of sudden onset injuries (F=1.27; η^2=0.019;p=0.286).

Conclusions: The lower prevalence of gradual onset injuries in swimming may be explained by its low impact nature, whereas taekwondo's higher prevalence may be attributed to its combat sport nature. Practitioners working with para athletes should be aware of the body regions most affected by injuries in each modality reported in this study, especially in taekwondo.

KEYWORDS

Injury, Para athletics, Para swimming, Para powerlifting, Para taekwondo

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INTERACTION BETWEEN GENDER AND INJURED LIMB ON H/Q ISOKINETIC RATIO OF BOTH SIDES IN PATIENTS WITH ACL RUPTURE

Poster

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ABSTRACT

Introduction: Anterior cruciate ligament (ACL) rupture is one of the most common sport injuries, particularly in women.

Objectives: The aim of this study was investigating the interaction between gender and injured limb on the isokinetic ratio of H/Q on both healthy and affected sides in patients with ACL rupture.

Study design: This original study was semi-experimental, retrospective, and single blind.

Methods: In this study, eighteen athletes (7 women and 11 men) in the ages of 20 to 35 years participated voluntarily. All the participants had the experience of ACL partial tearing more than 6 months, which were symptom-free at the time of our study and they return to full activity by the help of conservative treatment. After warming up, they performed an isokinetic test for knee flexion and extension at a constant speed of 60◈ per second. Each movement was performed 10 times with three repetitions and the average ratio of hamstrings to quadriceps (H/Q) calculated by the device software was transferred to spss23 software and it was investigated through the statistical test of two-way analysis of variance (α=0.05).

Results: In the results of the present study, the H/Q ratio was significantly higher in the affected leg of women and there was a significant difference between the healthy and affected sides in women (P=0.044). However, comparing the healthy and affected legs in men and also the comparison of the healthy leg of men and women and the affected leg of men and women were not significantly different (P>0.05).

Conclusion: Perhaps this can be attributed to the feeling of greater instability in the affected knee of women after ACL injury and their greater dependence on ACL. So, women show greater hamstring/quadriceps activity in their affected side to support their injured knee, and also compensate dynamic instability due to ACL deficiency.

KEYWORDS

gender, knee isokinetic, ACL rupture, H/Q ratio

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INTRA-RATER RELIABILITY AND ERROR OF MEASUREMENT OF KNEE ISOKINETIC ECCENTRIC MUSCLE PERFORMANCE ASSESSMENT

Procedures in Anterior Cruciate Ligament Injury Prevention Screening for Adult Agility-Sport Athletes

Poster

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ABSTRACT

INTRODUCTION

Noncontact anterior cruciate ligament (ACL) injuries occur frequently during change-of-direction/landing tasks when eccentric muscle performance is required to decelerate momentum and shock-absorb forces away from non- contractile tissues. Therefore, assessment of knee eccentric muscle performance is prudent in noncontact ACL injury prevention screening, but reliable measurement procedures are scarce in the literature.

OBJECTIVE

To assess critical psychometric properties of a new knee isokinetic eccentric muscle performance as- sessment procedure linked closely to noncontact ACL injury mechanisms and using a specific knee range-of-motion and velocity-of-motion (specificity of testing (1,2)). It was hypothesised that procedures would demonstrate good intra-rater reliability (intraclass correlation coefficient [ICC] ⩾0.75).

STUDY DESIGN

Between-day (D1/D2) repeated measures.

METHODS

Setting: biomechanics laboratory.

Study population: 12 agility-sport athletes volunteered (male n=7, female n=5, age 23.5±4.6yr; height 170.0±10.1cm; mass 75.7±12.3kg).

Assessment: athletes were seated on an isokinetic dynamometer set to eccentric mode. For specificity of testing, dynamometer configuration was knee flexion/extension range-of-motion 0-60° and velocity-of-motion 240°/sec- ond. Five maximal-effort knee flexion (eccentric quadriceps) and extension (eccentric hamstrings) trials were per- formed. Peak torque (PT; Newton-metres [Nm]) and time-to-peak torque (TTPT; milliseconds [ms]) were measured. Limb order was randomised for D1, the order repeated for D2.

Main outcome measurements: relative reliability (ICC 2,1), absolute reliability (standard error of measurement [SEM]).

RESULTS

For eccentric quadriceps PT ICC/SEM: right 0.76/22.8Nm, left 0.78/19.0Nm. For eccentric quadriceps TTPT ICC/SEM: right 0.07/213.0ms, left 0.13/316.3ms. For eccentric hamstrings PT ICC/SEM: right 0.92/13.7Nm, left 0.96/8.0Nm. For eccentric hamstrings TTPT ICC/SEM: right 0.74/12.5ms, left 0.41/16.6ms.

CONCLUSION

For both eccentric quadriceps and hamstrings, PT consistently demonstrated good relative reliability (ICC>0.75) but TTPT did not (ICC<0.75). Interestingly, right and left eccentric hamstring TTPT absolute reliability (SEM) were <17.0ms. These new knee isokinetic eccentric PT assessment procedures possess critical psychometric properties that qualify them for use in ACL injury prevention screening systems with adult agility-sport athletes.

KEYWORDS

Anterior cruciate ligament; eccentric muscle performance; isokinetic testing

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INTRINSIC GRAFT LAXITY VARIATION WITH OPEN KINETIC CHAIN EXERCISE AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Poster

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ABSTRACT

Introduction: After anterior cruciate ligament reconstruction (ACLR), studies have demonstrated early use of OKC did not seem to affect the graft healing process and laxity.

Objective: The main objective was to determine whether quadriceps and hamstring strengthening in a rehabilitation program involving early open kinetic chain (OKC) and/or closed kinetic chain (CKC) knee joint exercises had an influence on graft laxity at 1, 3 and 6 after ACLR. The secondary objective was to assess whether the early use of OKC exercise affects intrinsic graft laxity between 1 and 6 months postoperatively.

Design : Non randomized, single blinded, prospective case control study

Methods: This study included 53 patients following a ACLR with hamstring graft. Participants were retrieved from 2 rehabilitation centers that followed different ACLR rehabilitation programs with regards the use of OKC exer-

cises; the intervention group (n= 25) that performed OKC and CKC exercises in combination and the control group (n=28) that performed only CKC exercises. (1;2) Anterior knee laxity was measured using the GNRB device on the operated limb, and compared to the contralateral control limb. Three evaluations were performed at 1, 3 and 6 months after the ACLR. The difference between both limbs was calculated and used to determine the variation in anterior laxity throughout the first 6 months after surgery. (1;3)

Results: No differences were observed in knee laxity at 1 ($p = 0.263$), 3 ($p = 0.263$) and 6 months ($p = 0.256$) follow up between intervention group and control group. No differences were observed in within-group graft laxity between 1 and 6 months after ACLR in intervention group ($p = 0.155$) and control group ($p = 0.690$).

Conclusion: The initiation of OKC exercises doesn't seem to increase the ACLR graft laxity as compared to the rehabilitation program with only CKC exercises.

KEYWORDS

intrinsic graft laxity, open kinetic chain, anterior cruciate ligament, rehabilitation program

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IS DECELERATION THE KEY ELEMENT IN VERTICAL JUMP PERFORMANCE TO RETURN TO SPORT AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION ?

Oral

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ABSTRACT

Introduction : After anterior cruciate ligament reconstruction (ACLR), jump tests allow to help return to sport decision making.

Objective : The main objective was to examine countermovement jump (CMJ) measures to identify which parameters can best distinguish between ACLR and control participants. The secondary objective was to determine whether performance alterations between operated and non-operated limb exist during vertical two-legged activities after ACLR

Design : Non randomized, single blinded, prospective case control study

Methods: This study included 67 patients with hamstring graft and no contact injury at 6 postoperative months (203.5 days ± 32.2) and 47 healthy athletes (25,2 ± 6,6 years old) with no knee injury history. Two groups were formed, an ACLR group (n=67) and a control group (n=47). The evaluation of CMJ by force plate was performed to calculate vertical ground reaction force (vGRF), maximal power (MP) and eccentric rate force development (RFDe) during landing and limb symmetry index (LSI). (1-3) First analysis compared LSI vGRF, LSI MP and LSI RFDe between both groups during CMJ. Secondary analysis compared vGRF, MP and RFDe between operated/non-operated limb in the ACLR group and dominant/non-dominant limb in the control group.

Results: At 6 months after ACLR, CMJ measures in the ACLR group were significantly reduced compared to the control group for LSI vGRF (- 8.7% ; $p < 0,001$), LSI MP (- 10.8% ; $p < 0,001$) and LSI RFDe (- 8.7% ; $p < 0,001$). Secondary analysis showed no significant result in control group between dominant/non-dominant limb. ACLR group showed significant results between operated / non-operated limb for vGRF (+1.4 $N.kg^{-1}$; $p < 0,001$), MP (+2.6 $W.kg^{-1}$; $p < 0,001$) and RFDe (+ 375.3 $N.s^{-1}$; $p < 0,01$).

Conclusion: Landing performance and deceleration should be better considered at time to return to sport after ACLR.

KEYWORDS

Deceleration, Anterior Cruciate Ligament Reconstruction, Vertical Jump, performance, return to sport

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IS QUADRICEPS STRENGTH THE KEY FACTOR FOR RTR AFTER ACLR?

Poster

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ABSTRACT

Background: Return to run (RTR) after anterior cruciate ligament reconstruction (ACLR) is an important step in the return to previous performance. Generally, postoperative time (12-weeks) help clinicians in RTR decision making but it seems important to recover strength, mobility, functional and psychological qualities to optimize the RTR. **Objectives:** The aim of this study was to analyze the RTR self-perceived quality with physical, functional and psy- chological parameters at 6 months after ACLR.

Design: Cross-sectional study

Methods: This study included 130 patients at 6 months after ACLR. The patients performed the international knee documentation committee (IKDC) subjective knee form, the anterior cruciate ligament - return to sport after injury (ACL-RSI) scale, strength and functional assessment. Limb symmetry index (LSI) and peak torque to body weight ratio (PT/BW) were assessed with isokinetic dynamometer for quadriceps (Q) and hamstring (H) in concentric mode at 60°. s^{-1}, 240°. s^{-1}, and eccentric mode at 30°. s^{-1}. Functional assessment was performed with MyJump app and included knee range of motion (ROM), hop tests (single, triple and triple cross over for distance) and single leg vertical drop jump. All participants were assigned in 2 groups : RTR with pain (G1, 33.6%) and pain-free RTR (G2). **Results :** G2 showed significantly higher quadriceps PT/BW than G1 (1.8 ± 0.4 $N.kg^{-1}$ vs. 2.3 ± 0.5, p = 0.05), but similar LSI Q (81.1% ± 14.8; 80.2% ± 15.1 ; p = 0.008). ACL-RSI (p = 0.22) and IKDC (p = 0.43) scores were lower in G1 compared to G2. No significant results were found for ROM and hop tests in both groups.

Conclusion: These findings indicate that quadriceps strength seems to be a key performance discriminator to allow for safe RTR. Besides, IKDC and ACL-RSI may help athletes and clinicians in RTR decision making.

KEYWORDS

ACL reconstruction, Return to run, criteria

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ISOKINETIC ECCENTRIC QUADRICEPS MUSCLE PERFORMANCE

Assessment in Patellofemoral Joint Primary and Secondary Injury Prevention: An Intra-Rater Reliability and Standard Error of Measurement Pilot Study

Poster

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ABSTRACT

INTRODUCTION

Quadriceps muscle weakness is implicated in the onset and persistence of patellofemoral joint (PFJ) pain, which

commonly manifests during the early stance-phase of gait when eccentric quadriceps muscle performance (eccQMP) is required to decelerate momentum and shock-absorb forces away from articular tissues. Therefore, assessment of eccQMP is prudent in PFJ primary and secondary injury prevention, but reliable measurement procedures are scarce in the literature.

OBJECTIVE

To assess critical psychometric properties of a new isokinetic eccQMP assessment procedure linked closely to the biomechanics of gait during stair and hill descent, using a specific knee range-of-motion and velocity-of-motion (specificity of testing (1)). It was hypothesised that procedures would demonstrate good intra-rater reliability (intraclass correlation coefficient [ICC] ⩾0.75).

STUDY DESIGN

Between-day (D1/D2) repeated measures.

METHODS

Setting: biomechanics laboratory.

Study population: eight athletes volunteered (male n=6, female n=2, age 23.0±3.6yr; height 157.0±35.8cm; mass 86.0±36.4kg).

Assessment: athletes were seated on an isokinetic dynamometer set to eccentric mode. For specificity of testing, dynamometer configuration was knee flexion/extension range-of-motion 10-80° and velocity-of-motion 60°/s then 120°/s. Three maximal-effort knee flexion (eccQMP) trials were performed for both velocities. Peak torque (PT; Newton-metres [Nm]) and time-to-peak torque (TTPT; milliseconds [ms]) were measured. Limb order was ran- domised for D1 then repeated D2.

Main outcome measurements: relative reliability (ICC 2,1) and absolute reliability (standard error of measurement (SEM)).

RESULTS

For 60°/s: PT ICC/SEM, right 0.95/13.5Nm, left 0.98/10.2Nm; TTPT ICC/SEM, right 0.12/1121.0ms, left 0.12/666.3ms. For 120°/s: PT ICC/SEM, right 0.85/23.8Nm, left 0.96/15.1Nm; TTPT ICC/SEM, right 0.76/174.4ms, left 0.05/694.7ms.

CONCLUSION

For both 60°/s and 120°/s, eccentric PT consistently demonstrated good relative reliability (ICC>0.75) but TTPT did not (ICC<0.75). The SEM was consistently lowest when the highest ICCs were evident. The new isokinetic eccentric quadriceps PT assessment procedures demonstrate psychometric properties that qualify them for potential use in PFJ primary and secondary injury prevention.

KEYWORDS

Patellofemoral joint; eccentric muscle performance; isokinetic testing

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MUSCLE ACTIVATION ALTERATIONS ON SINGLE LEGGED JUMPS AFTER ANTERIOR CRUCIATE LIGAMENT SURGERY

Oral

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ABSTRACT

Introduction: Motor control deficits persist after anterior cruciate ligament reconstruction (ACLR), and are more than often responsible for bad return to play ability and reinjuries.Current information still lacks on the potential deficits in specific lower limb muscle activation during sport's specific tasks, or even basic tasks such as jumping Objective: The aim of this study was to measure muscular activity of the lower limb in patients performing single leg tasks during their rehabilitation process after ACLR.

Design: Non randomized, Prospective, Case control study

Methods: This study included 59 participants divided into two groups, a test group (n=31) which included patients after ACLR (5.6 ± 2.1 months) with a hamstring graft and a control group (n=28) including healthy subjects. Partici- pants were asked to perform four tries of both a Single Leg Counter Movement Jump (SLCMJ) and a Single Leg Drop Landing (SLDL), on each leg in a randomized order. (1,2) The muscular activity of Vastus Medialis, Gluteus Medius, Soleus and of the Lateral et Medial Gastrocnemii was recorded. Raw EMG data was treated via Root Mean Square and maximum normalized value were used for the analysis and compared between groups.

Results: Significant results showed a lower Soleus activity (-26.1%, p-value = 0.01), as well as a higher Vastus Medialis (+17.2, p-value = 0.03) and lower Gluteus Medius (-7.50%, p-value = 0.01) in the test group for the SLCMJ. Similar results were found in the SLDL, adding a lower Medial Gastrocnemius activity (-41.0%, p < 0.01). Other muscle showed non-significant differences between both groups.

Conclusion: Neuromotor deficits are present after ACLR and can be linked to specific neuromuscular patterns, which may also help our current strength and function-based return to sport decision making, allowing athletes to return to their practice in better condition and decreased risks of injury.

KEYWORDS

Electromyography, Anterior Cruciate Ligament Reconstruction, Motor pattern,Return to sport, Neuromuscular assessment

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PATIENT CHARACTERISTICS ASSOCIATED WITH SUCCESSFUL RESPONSE TO PATIENT ADVICE AND COMBINED TREATMENTS FOR PATIENTS WITH *PLANTAR FASCIOPATHY*

Oral

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ABSTRACT

Introduction: A recent randomised controlled trial compared three combined treatments for plantar fasciopathy (PF) and found no clinically relevant between-group differences. Understanding which patient characteristics can predict response to treatment may help clinicians choose the most suitable treatment for their patients.

Objectives: This study aims to explore patient characteristics associated with a successful outcome of different combined treatments for patients with PF.

Study design: An ancillary analysis of a three-armed randomized controlled trial (the FIX-Heel Trial) comparing three combined treatment approaches to PF.

Methods: The association between patient characteristics collected at baseline and the outcome of one of the three treatment approaches: 1) advice plus insoles (PA), 2) PA and exercises (PAX), and 3) PAX and corticosteroid injection (PAXI) were explored. 180 patients with PF were included in the trial. The primary analysis is a logistic regression to analyse a possible association of sex, age, BMI, symptom duration, pain during the past week on a 0-100 mm VAS, number of PF episodes, and sedentary behaviour with a successful outcome of treatment after 12 weeks. A success- ful outcome is defined as a minimal clinically important change (14.1 points) in the Foot Health Status Questionnaire pain domain.

Results: Preliminary results from univariate complete-case analyses indicate that pain during the past week is negatively associated with a successful outcome with odds ratios of 0.95 (95%CI: 0.91;0.99], P=0.014) and 0.91 (95%CI: 0.86;0.97, P= 0.005) in PA and PAX, respectively. Symptom duration seems negatively associated with a successful outcome with an odds ratio of 0.9 (95%CI: 0.83;0.97 P= 0.006) in PAXI. Final results, including secondary analyses, will be presented at the conference.

Conclusion: Less pain during the past week in PA and PAX and shorter symptom duration in PAXI may be associated with a successful outcome of treatment after 12 weeks.

KEYWORDS

Key words: combined treatment, logistic regression, plantar fasciopathy, predictors.

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PELVIC FLOOR MUSCLE TRAINING IN FEMALE FUNCTIONAL FITNESS EXERCISERS – AN ASSESSOR-BLINDED RANDOMIZED CONTROLLED TRIAL

Competition abstract

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ABSTRACT

INTRODUCTION

Stress urinary incontinence (SUI) is common among females during functional fitness training, such as CrossFit© (1). Pelvic floor muscle training (PFMT) has been proven effective in treating SUI in the general female population, but there is limited knowledge of the effect of PFMT among female strenuous exercisers and athletes (2, 3).

OBJECTIVE

The aim of the study was to assess the effect of PFMT on SUI in female functional fitness exercisers.

METHODS

This was an assessor-blinded randomized controlled trial with two arms: a PFMT group (n=22) and a control group (n=25). The PFMT group followed a 16-week home-training program including 3 sets of 8-12 maximum pelvic floor muscle (PFM) contractions daily and with weekly follow-up by phone. Primary outcome was change in the total score of the International Consultation on Incontinence Questionnaire Urinary Incontinence – Short Form (ICIQ-UI- SF). Secondary outcomes were perceived change of symptoms of SUI, change of PFM strength (measured by vaginal manometry), and symptoms of anal incontinence (AI) and pelvic organ prolapse (POP).

RESULTS

Forty-seven women, mean age 33.5 (SD: 8.1), participated in the study. At 16 weeks, there was a mean difference between groups of -1.4 (95% CI: -2.6 to -0.2) in change of the ICIQ-UI-SF score in favor of the PFMT group. The PFMT group completed in mean 70% (SD: 23) of the prescribed protocol. Sixty-four percent in the PFMT group vs. 8% in the control group reported improved symptoms of SUI ($p < 0.001$, Relative Risk: 7.96, 95% CI 2.03 to 31.19). There were

no group differences in change of PFM strength or AI/POP symptoms.

CONCLUSION

A 16-week home-training program of the PFM led to improvements of SUI among female functional fitness exercisers. However, PFM strength, AI and POP symptoms did not improve significantly in the PFMT group compared to the control group.

Keywords Women's health Female athlete Pelvic floor Incontinence Rehabilitation

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PERIODIC HEALTH EVALUATION IN PARA ATHLETES: A POSITION STATEMENT BASED ON EXPERT CONSENSUS

Oral

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ABSTRACT

Introduction: Para athletes diverse impairments and their specialized equipment used in competitions require individualized approaches to comprehend their overall health[1]. They frequently encountering barriers when ac- cessing healthcare services[2]. The Periodic Health Evaluation (PHE) is a valuable tool for continuously monitoring athletes' health, screening for health conditions, and identifying barriers to athlete's performance[3]. Additionally, the PHE assists in the surveillance of health problems by establishing baseline information for each athlete and pro- viding crucial information in case of emergencies. **Objective:** To guide sports healthcare providers in the PHE for para athletes across key impairment categories: intellectual, musculoskeletal, neurological and vision. **Study de- sign:** position statement. **Methods:** A panel of sixteen international experts, including epidemiologists, physiother- apists, optometrists, and physicians with expertise in para athlete health, convened via videoconferences to discuss the position statement's purpose, methods, and themes. They formed working groups to address underlying med- ical condition, cardiorespiratory, neuromusculoskeletal, nutritional status, mental and sleep health, concussion, and female para athlete health assessment considerations. **Results:** Health history review can provide insights into factors impacting para athlete health, inform physical assessments, and help healthcare providers understand each athlete's needs. During the PHE, considerations should encompass the specific requirements of the sport modality and the impairment itself. These evaluations can help mitigate the common tendency of para athletes to underreport health issues. They also enable early interventions tailored to the athlete's health history. Moreover, the PHE serves as an opportunity to educate para athletes on preventive strategies that can be integrated into their training routines, enhancing their performance and overall health. **Conclusion:** This position statement can potentially enhance clinical practice and improve the healthcare quality for para athletes, ultimately contributing to their overall health and well-being.

KEYWORDS

Health; Assessment; Paralympic; Sport

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PHYSIOTHERAPIST-LED TREATMENT FOR FEMOROACETABULAR IMPINGEMENT SYNDROME (THE PHYSIOFIRST STUDY): A PARTICIPANT AND ASSESSOR-BLINDED RANDOMISED CONTROLLED TRIAL

Competition abstract

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ABSTRACT

Introduction: There have been no full-scale randomised controlled trials (RCTs) comparing physiotherapist-led interventions for FAI syndrome(1).

Objectives: Evaluate the effect of physiotherapist-led targeted-strengthening (STRENGTH) compared to physiotherapist-led standardised-stretching (STRETCH) on hip-related quality of life (QOL) and perceived improve- ment at six-months in people with femoroacetabular impingement (FAI) syndrome.

Study design: Double-blind, parallel, superiority RCT(2).

Methods: Participants aged 18-50 years, pain ⩾3/10 for ⩾6 weeks, cam morphology (alpha angle ⩾60°), positive flexion–adduction–internal rotation test were included. People were excluded for physiotherapy treatment or hip joint injection in the past three months, previous or planned hip, back lower limb surgery, radiographic hip osteoarthritis.

Both groups received 6-months of one-on-one treatment with a physiotherapist. STRENGTH undertook a supervised, targeted, individualised exercise therapy and education programme. STRETCH undertook a supervised standardised stretching and education program. Primary outcomes were change in hip-related QOL (International Hip Outcome Tool-33 (iHOT-33, 0-100 points)); and patient-perceived global improvement (7-point Likert scale) at six-months. Secondary outcomes were hip muscle strength, functional task performance, and kinesiophobia. Statistical analyses compared between-group differences by intention-to-treat.

Results: We recruited 154 participants (STRENGTH n=79 (53% women, 35(9) years); STRETCH n=75 (45% women, 36(9) years)). There was no difference between groups for change in hip-related QOL (mean difference (95% confidence interval) 1.6 (-4.9 to 8.1) p=0.63) or patient-perceived global improvement (0.3 (-0.1 to 0.7) p=0.11) at six-months. Both groups improved in iHOT-33 over six-months of 21.9 points. STRENGTH had greater improvements in hip abduction (21.6(7.6 to 35.5) Newtons; p=0.002) and adduction (16.9(3.9 to 29.9) Newtons; p=0.011) strength than STRETCH.

Conclusions: We found no difference between a targeted, individualised strengthening program and a standardised stretching program on hip-related QOL or perceived improvement at six-months in people with FAI syndrome. Both groups showed improvements much larger than the minimal clinically important change in hip-related QOL at six- months.

KEYWORDS

Keywords: Exercise-therapy, Femoroacetabular Impingement Syndrome, Hip pain, Physiotherapist-led treatment, Randomised controlled trial

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RECOVERY AFTER A SPORTS-RELATED CONCUSSION: A LONGITUDINAL STUDY OF ADOLESCENT RUGBY UNION PLAYERS IN NORTHERN IRELAND

Oral

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ABSTRACT

Introduction: Adolescent athletes who sustain a sports-related concussion may experience a prolonged recovery period [1]. Evidence suggests female athletes and those with a history of previous concussion may have an extended recovery period, spanning multiple weeks to months [2].

Objectives: To track recovery from a concussion across patient-reported measures and determine the time taken to return to pre-injury levels in adolescent rugby union players.

Study design: A longitudinal study was utilised across a single rugby union playing season (2022-23). Ethical approval was granted from Ulster University Research Ethics Committee

Methods: Male and female rugby union players were recruited from nine school and club rugby teams across Northern Ireland. To be eligible, participants had 16-18years of age, injury free and currently playing at First XV level. Participants completed demographic and established questionnaires including Post-Concussion Symptom Scale (PCSS), Concussion Clinical Profiling (CP), Paediatric Fear Avoidance Behaviour after Traumatic Brain Injury (PFAB-TBI), General Anxiety Disorder (GAD) and Patient Health Questionnaire (PHQ). Those who sustained a concussion were re-assessed at 3, 7, 14, 23, 90 and 180days post-event. Recovery was defined as questionnaire score at pre-injury level. Primary outcome measure with Post-Concussion Symptom Scale.

Results: Of the 149 participants (113M (76%); 36F (24%)), 11 (7%) sustained a concussion during the season (9M: 2F), of which four had a previous history of concussion (2M: 2F). PCSS and PFAB-TBI took the longest time to return to baseline scores. Statistically significant differences in survival distribution (Chi-square 9.27 (df=4) $p<0.05$) across self-reported outcomes; pairwise comparisons show the largest differences in survival distribution were seen be- tween PCSS and GAD ($p=0.02$) and PCSS and PHQ ($p<0.04$).

Conclusions: Adolescent male and female rugby union players experienced prolonged post-concussive symptoms based on self-reported measures. Further research on male and female adolescent athletes is needed to track re- covery across various clinical measures.

KEYWORDS

Female, Male, Prolonged

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RECOVERY OF SENSORIMOTOR OUTCOMES AFTER ACUTE ANKLE SPRAIN: PRELIMINARY RESULTS OF A PROSPECTIVE COHORT STUDY

Oral

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ABSTRACT

INTRODUCTION

Chronic ankle instability (CAI) develops after 30-40% of ankle sprains.[1] Etiological models suggest CAI is underpinned by pathomechanical and sensorimotor deficits, but this is largely informed by cross sectional data.[2]

OBJECTIVES

To prospectively record key clinical outcomes and evaluate their individual recovery at 6 and 12 weeks post ankle sprain

STUDY DESIGN

Prospective cohort study

METHODS

Athletes (>18y) presenting with an acute lateral ankle sprain (LAS) (<14 days) were recruited from hospital ED's, social media and physiotherapy clinics. The following outcomes were recorded at 6 and 12 weeks post injury: perceived instability (CAIT), self-reported ankle function (Q-FAAM), range of motion (ROM), strength, joint positional sense (JPS) , balance and jump performance. For each outcome, recovery was considered as the point at which scores for the affected ankle were ⩾ to the contralateral side (± minimal detectable change - MDC). We also recorded re-injury (%), and time to return to sport.

RESULTS

We have recruited N=33 patients (61% male; mean age 29y (range 18-60)), with 28 completing 6 and 12 week follow ups. At weeks 6 and 12, many participants had comparable side to side scores for ROM (61%; 89%) and balance (82%; 86%). Fewer participants reported normal scores for CAIT (23%) and Q-FAAM (13%) at week 6, with some increases at week 12 (50% and 46%). Muscle strength, JPS and jump performance were inconclusive. At 6 weeks, 50% had return to sport, increasing to 95% at 12 weeks. By week 12, 12 participants (36%) had incurred a re-sprain. Conclusions:

Recurrence rates are high and align with previous reports. Our initial results suggest that sensorimotor outcomes seem to recover up to 12 weeks post LAS, but time to recovery varies considerably across these outcomes. Recruit- ment is ongoing; future analysis will examine key predictors of CAI.[3]

KEYWORDS

Ankle Sprain, Chronic Ankle Instability, rehabilitation

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RELATIONSHIP BETWEEN MUSCLE SWELLING AND MUSCLE HYPERTROPHY OF PERONEUS MUSCLES BY RESISTANCE TRAINING

Poster

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ABSTRACT

Introduction: The peroneus longus (PL) and peroneus brevis (PB) have different functions for ankle stability. Although resistance training (RT) is effective in improving the muscle function, since it takes a long time to obtain muscle hypertrophy, a simple measure to confirm the effects of RT would be useful. A previous study has shown a positive correlation between muscle swelling and muscle hypertrophy[1)]. However, it is unclear about PL and PB. **Objectives:** To examine whether the muscle swelling of PL and PB was associated with muscle hypertrophy.

Study design: Intervention study

Methods: Participants were divided into PL (n=10, push the TheraBand out form the ball of the foot by ankle eversion) and PB (n=9, pull the TheraBand through the base of the fifth metatarsal by ankle external rotation) groups[2)]. RT of 2 sets of 100 times was performed 3 times a week for 8-weeks. Cross-sectional area (CSA) of muscles was measured using ultrasound before and after 8-weeks. To examine the acute morphological changes after RT, each CSA was measured before RT, immediately after (post), 10, and 20 minutes after the RT. Paired t-test was used to compare CSA before and after 8-weeks. A one-way repeated ANOVA with post-hoc test was performed to confirm acute changes. The correlation between the changes in CSA at each time point after RT and the changes by 8-weeks intervention was calculated with Pearson's correlation analysis.

Results: Each CSA increased after 8-weeks ($p<0.05$). Post-hoc test revealed that each CSA at post was greater com- pared with others ($p<0.05$). We found a correlation between the amount of muscle swelling at post and the amount of muscle hypertrophy in each CSA (PL: $r=0.682$, $p<0.05$; PB: $r=0.680$, $p<0.05$).

Conclusions: We reaffirmed selective RT for peroneus muscles is possible. Furthermore, this report is useful in efficiently performing RT to obtain muscle hypertrophy.

KEYWORDS

muscle swelling, muscle hypertrophy, peroneus muscles, resistance training, ultrasound

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RETURN TO SPORT AMONG 1928 PATIENTS WITH HIP DYSPLASIA AFTER UNDERGOING PERIACETABULAR OSTEOTOMY

Competition abstract

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ABSTRACT

Introduction: Symptomatic hip dysplasia is often treated with the periacetabular osteotomy (PAO). Studies investigating the effect of PAO have primarily focused on radiographic measurements, pain-related outcomes, and hip survival while evidence related to sport participation is limited.

Objective: The primary aim of this study was to report the rate of participation in sports among patients with hip dysplasia before undergoing PAO compared to up to 20 years after surgery.

Study Design: Cohort study with both retrospective and prospectively collected data.

Methods: All patients who had undergone PAO and had answered at least one question related to sport registered in our institutional database were deemed eligible. Patients were asked if they were playing sport preoperatively, 6 months after PAO as well as 2, 5, 10, 15 and 20 years after. In addition, patients were asked if they were able to play their preferred sport, at what level they were playing sport, what type of sport and if surgery had improved their sport performance.

Results: Among 2404 patients surveyed, 1928 (80%) were included and 56% were playing sport 6months after PAO. This number was 61% two years after PAO, and remained around that for the following years, before dropping

15 years after PAO. Between 56% and 71% of patients felt that their sporting performance improved following PAO at the different time points. Between 39% (6 months after PAO) and 63% (15 years after PAO) were able to participate in their preferred sport.

Conclusion: Patients undergoing PAO due to hip dysplasia have a good chance of returning to, and maintaining, sport after PAO. And more than half of patients undergoing PAO believe that the surgery improved their sports per- formance, and long after the surgery more than half of patients undergoing PAO can participate in their preferred sport.

KEYWORDS

Hip Dysplasia, Periacetabular Osteotomy, Return to Sport

REFERENCES

NA

REVIEW OF THE PHYSIOTHERAPY SERVICE FOR ATHLETES IN OLYMPIC WINTER GAMES

POSTER

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ABSTRACT

Introduction Given that the Olympic Summer and Winter Games take place in differing environments, they comprise different sporting categories as well. These differences bring about various injuries and illnesses (International Olympic Committee, 2009). Soligard et al. reported 14.0% and 9.8% injury rates in the Sochi Olympic Winter Games and the Rio Olympic Summer Games, respectively (Soligard et al., 2015, 2017). We believe not only injury and illness have differences, but also in physiotherapy service for athletes are receiving during the Olympic Games are also an important factor to protect athletes' health (International Olympic Committee, 2009).

Objective This study will provide to better understand the needs for physiotherapy services during the 2018 PyeongChang Olympic Winter Games (POG) from two polyclinics. It is necessary to understand the needs and what physiotherapists do during the Olympic Winter games for first time.

Design An observational study.

Setting 2018 PyeongChang Olympic Winter Games.

Participants Athletes who visited the physiotherapy department of polyclinics.

Results During 25 the days of the POG, a total of 125 athletes (n = 125, 83 males, 42 females) visited the two polyclin- ics. Of all visits, 69.6% were from the mountain polyclinic and 30.4% from the city. There were three reasons for visit, most of the reason for visit was injury and injury with recovery or injury prevention. Overall, the injury rate (per 1000 athletes) was 42.8 across 13 sports visited the physiotherapy department during the POG. Total numbers of treatments sessions were 823 provided and electrophysical modalities (36.2%) was the most utilized service in POG. And also there were significant differences in the physiotherapy services provided at the two polyclinics.

Conclusion As each polyclinic differed in location, they addressed different populations of athletes; hence, the study provides insights into the injury trends and different physiotherapy treatments.

KEYWORDS

Injury, Winter sports, Olympics, Physiotherapy service

REFERENCES

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Sports injury and illness incidence in the Rio de Janeiro 2016 olympic summer games: A prospective study of 11274 athletes from 207 countriesBritish Journal of Sports Medicine, 51 (17) (2017), pp. 1265-1271,

SCAPULAR POSITION IN NON-PROFESSIONAL RACQUET PLAYERS: A CROSS-SECONDARY STUDY

Oral

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ABSTRACT

Introduction. Racquet sports are characterized by repeated movements above the level of the head, implying that the dominant shoulder must develop strategies that allow it to acquire sufficient laxity to ensure the necessary articular ranges and stability to avoid possible articular dislocations, predisposing the area to possible shoulder postural alterations.

Objective. To examine if there is asymmetry in the scapular position between the dominant and non-dominant shoulders in non-professional racquet players.

Methods. Cross-sectional, descriptive, and analytical study in 83 tennis and/or paddle tennis players. Scapulotho- racic angle, normalized lateral scapular displacement, scapular height index and distance from the acromion to a reference vertical were evaluated through photographs, later processed and analyzed with SAPo software. Descrip- tive statistics and repeated measures linear regression models were used for data analysis, adjusting the models for sex, age, BMI, and profession. The effect size was calculated using the partial eta-squared (h^2), with values $p>0.14$ being considered large. Values of $p<0.05$ were established as statistical significance.

Results. On the dominant side, the players presented smaller scapulothoracic angle [MD: -2.0; P=0.011]; smaller normalized lateral scapular displacement [MD: -0.08; P=0.007]; greater scapular height index [MD:0.48; P=0.000]; and greater distance from the acromion to a reference vertical [MD:1.29; P=0.007]. However, only the scapular height index and the distance of the acromion to a reference vertical were considered high ($h^2>0.30$). When subjects were analyzed by sport subgroup, tennis players presented fewer asymmetries as compared to the paddle or mixed group.

Conclusions. Non-professional racquetball players presented asymmetries in scapular position between the dominant and non-dominant shoulders, differing in frequency and magnitude according to the type of sport practiced.

KEYWORDS

Racquet Players, Scapular Position, Shoulder postural Alterations

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SECONDARY PREVENTION FOR ATHLETES AFTER AN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION – AN EVIDENCE SUMMARY

Poster

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ABSTRACT

Introduction: A rupture of the anterior cruciate ligament (ACL) is a common knee injury in athletes, often followed by surgical reconstruction. A high percentage returns to high-impact sports, however, up to 25% of those athletes sustain an ACL reinjury [1].

Objectives: To summarize evidence-based training modalities as secondary prevention measures after ACL recon- struction

Study design: Evidence summary based on a systematic literature review.

Methods: Systematic literature search in the databases PubMED and Web of Science with the keywords «ACL, anterior cruciate ligament, reconstruction, reinjury, second injury, rerupture, secondary, prevention, sports» from 2013 to May 2023. Two authors screened the hits independently for title and abstract, followed by full-text reading. Predefined inclusion (adults, professional and amateur athletes after ACL reconstruction), and exclusion criteria (conservative treatment, ACL suture, concomitant or secondary injuries, cadaver or animal study) were used. In- jury of the contralateral side, rerupture of the reconstructed ACL and modification of risk factors for ACL reinjury were chosen as outcomes. The final study selection was made by consensus. Included studies were assessed for risk of bias by using the Critical Appraisal Skills Programme checklist [2].

Results: From 923 hits, seven studies with a total of 560 athletes, one systematic literature review, three randomized controlled trials and three cohort studies were included for qualitative analysis. The included literature showed moderate to high quality. Secondary prevention programs with neuromuscular training, eccentric training and plyometric exercises and core strenghtening showed a positive impact on spine, knee and hip joint biomechanics, functional and clinical outcomes in patients after ACL reconstruction.

Conclusions: The interventions in the included literature were shown to reduce various risk factors for ACL rein- jury. However, the included studies were heterogeneous regarding interventions and outcomes. As ACL reinjury is multifactorial, it is recommended not to focus on one specific risk factor or outcome.

KEYWORDS

ACL, anterior cruciate ligament, reconstruction, reinjury, secondary prevention

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SEGMENTAL SPINAL CURVATURE, INCLINATION, AND MOBILITY CHANGES OF MALE SOCCER PLAYERS WITHIN 4-YEAR FOLLOW-UP

Poster

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ABSTRACT

Introduction: It has been observed that the segmental curvature changes, inclination, and mobility of the spine may change depending on age, sport, and the duration of training load (sports age) (1,2).

Objectives: This study aimed to compare the spinal curvature, inclination, and mobility changes of soccer players within a 4-year duration.

Study design: The study was a longitudinal study comparing data from the same participants within a 4-year duration.

Methods: Sixteen male soccer players from Team A were included in the study at the age of 16.38±1.10 years, with a sport age of 6.43±1.63 years. Four years later, at the age of 19.94±1.00 years, their sports age was 10.00±1.79 years. Spine evaluation was conducted using the Valedo®Shape device (Idiag, Fehraltorf, Switzerland). Thoracic kypho- sis, lumbar lordosis, and sacral kyphosis curvatures, mobility, and inclination angles (angle of body displacement relative to the gravity line) were recorded in the sagittal and frontal planes. After marking the spinous processes as reference points, the Valedo®Shape device was moved downward from C7 to approximately S3 (3). A paired samples t-test was used to compare the before and after data of the two different intervals in 4 years.

Results: There was a difference between angular inclination values in the sagittal plane in favor of the second measurements (first: 4.63±2.39°, second: 0.81±2.40°, p<0.001). In the frontal plane, thoracic (first: 6.13±5.06°, second: 10.81±7.46°, p=0.014) and lumbar curvatures (first: 5.75±4.30°; second: 12.69±7.59°, p<0.001), and thoracic mobility (first: 52.31±9.09°, second: 71.75±13.56°, p<0.001) were increased in favour of current measurements.

Conclusions: The second measurement revealed a decrease in the angle of inclination, indicating a decrease in spinal curvature. Increased curvatures in the anterior plane can potentially bring risks related to asymmetry. There was an observable increase in thoracic mobility.

KEYWORDS

Soccer players, spine, angle, mobility, inclination.

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SHOULDER LAXITY AND ROTATOR CUFF MUSCLE STRENGTH IN HEALTHY OVERHEAD ATHLETES: AN ULTRASOUND STUDY

POSTER

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ABSTRACT

INTRODUCTION

Shoulder instability may exist in healty overhead (OH) athletes, as high ligament and bursa flexibility contributes to performance exertion in OH athletes[1]. Previous study reported that methods for measuring shoulder laxity using ultrasonography was reliable[2]. However, no studies have examined differences in shoulder laxity between non-OH and OH athletes using ultrasound imaging devices.

OBJECTIVES

To compare shoulder laxity and rotator cuff muscle strength between OH and non-OH athletes and to examine the characteristics of shoulder joint stability in OH athletes.

STUDY DESIGN

Cross-sectional study

METHODS

The dominant shoulder of 7 healthy men who play OH sports (OH group) and 7 healthy men who did not play OH sports (non-OH group) were included. Shoulder laxity were measured according to the method of Sangeeta et al[2]. The shoulder joint was fixed in 90-degree abduction and external rotation in the sitting position, the posterior labrum and posterior humeral border were delineated by an ultrasonography (KONICA MINOLTA, Japan). The humeral head was pulled back and forth up to 30 N with a tensiometer (TAKEI, Japan), and the anterior and posterior laxity were measured. Internal and external rotation muscle torque were measured by a dynamometer (ANIMA, Japan). For statistical analysis, group comparisons were performed by unpaired t-test ($p<0.05$).

RESULTS

The OH group had significantly higher anterior laxity (0.9 ± 0.6 mm; 1.9 ± 0.8 mm), internal rotation muscle torque (31.1 ± 7.1 Nm; 42.4 ± 8.9 Nm), and external rotation muscle torque (29.2 ± 6.5 Nm; 35.9 ± 4.3 Nm) than the non-OH group ($p<0.05$, respectively).

CONCLUSIONS

The OH group had higher anterior laxity than the non-OH group, suggesting the presence of structural instability of the shoulder joint in healthy OH athletes. Internal and external rotation muscle torques was higher in the OH group and may be antagonistic to increased structural instability.

KEYWORDS

overhead sport, shoulder laxity, ultrasonography

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STABILOMETRIC AND BAROPODOMETRIC EVALUATION AFTER OSTEOPATHIC SCAPHOID TUG MANIPULATION

Poster

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ABSTRACT

Introduction. Stabilometry and baropodometry are currently the object of study in different health fields both at a preventive, diagnostic level, and as a method of treatment of different pathologies or imbalances. Osteopathic manipulative techniques applied to the foot sensor could modify the postural registers.

Objectives. To analyze the modification of the stabilometric and baropodometric registers in the bipedal standing posture in healthy subjects after the application of the osteopathic manipulative technique of TUG of the scaphoid. Method. A randomized experimental study was performed with a sample of 36 subjects (intervention group n=17; control group n=19). The intervention group underwent an osteopathic scaphoid TUG intervention, while the con- trol group was given a placebo. Before and after the intervention, both groups underwent a stabilometric and baropodometric analysis by means of a pressure platform using the standards of the Association Français de Pos- turologie. Statistical analysis was carried out with IBM SPSS

Statistics, version 19.0 (Shapiro-Wilks test, analysis of Q-Q and Q-Q normality graphs without trend, Levene's test, ANOVA, Bonferroni correction and Cohen's d).

Results. The inter- and intra-group post-intervention comparative analysis showed that there were no significant differences in the stabilometric and baropodometric variables studied, except for the support surface variable which showed significant intra-group results both in the control group (differences in the right foot p=0.02) and in the intervention group (left foot p=0.032), which suggests an anomaly or influence of some parameter not con- trolled in the study or in the measurement process.

Conclusions. Osteopathic TUG manipulation of the scaphoid does not modify the stabilometric or baropodometric recordings in the bipedal standing posture in healthy subjects.

KEYWORDS

osteopathic manipulation, stabilometry, baropodometry

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STATIC STRETCHING IMPROVES FLEXIBILITY. BUT HOW OFTEN, HOW HARD, AND HOW LONG DO WE NEED TO STRETCH FOR? A SYSTEMATIC

Review, Meta-Analysis, and Multivariate Meta-Regression.

ORAL

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ABSTRACT

Introduction: Static stretching is widely used to increase flexibility. However, there is no consensus regarding the optimal dosage parameters for increasing flexibility.

Objectives: To identify the optimal frequency, intensity, and volume to maximise flexibility through static stretching, and to investigate whether this is moderated by muscle group, health status, or baseline flexibility.

Study design: Systematic review and meta-analysis.

Methods: Seven databases (CINAHL Complete, Cochrane CENTRAL, Embase, Emcare, MEDLINE, Scopus, and SPORTDiscus) were systematically searched up to March 2023. Randomised and non-randomised controlled trials investigating the effects of a single session (acute) or multiple sessions (chronic) of static stretching on flexibility- specific outcomes (compared to non-stretching passive controls) among adults (⩾18 years) were included. Multilevel meta-analysis examined the effect of acute and chronic static stretching on flexibility outcomes, while multi- variate meta-regression determined the volume at which increases in flexibility were maximised.

Results: Data from 188 studies representing 8095 adults (63% female; mean [SD] age: 29±13 years) were included. We found a moderate positive effect of acute static stretching on flexibility (g = 0.60, 95%CI: 0.49-0.72, p<0.001) and a large positive effect of chronic static stretching on flexibility (g = 0.94, 95%CI: 0.80-1.10, p<0.001). While neither effect was moderated by stretching frequency, intensity, muscle group stretched, or health status, those who were less flexible had greater improvements following acute static stretching (g = -0.46, 95%CI: -0.70, -0.23, p<0.001). Improvements in flexibility were maximised by a cumulative stretching volume of three minutes per session (acute) and eight minutes per week (chronic).

Conclusion: Static stretching improves flexibility in adults, with no additional benefit observed beyond three min- utes per session or eight minutes per week. Intensity, frequency, muscle group, and health status do not influence improvements in flexibility. These guidelines for static stretching can be used by coaches and therapists to improve flexibility.

KEYWORDS

Joint Flexibility; Joint Range of Motion; Muscle stretching exercises; Static Stretching

REFERENCES

N/A

THE APPLICATION OF THE ROAST - GUIDELINE IN ANKLE SPRAIN REHABILITATION – A CASE STUDY

POSTER

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ABSTRACT

INTRODUCTION

Ankle sprains are associated with increased re-injury rates and frequent development of chronic ankle instability [1]. The Rehabilitation Oriented Assessment (ROAST) tool should help to identify mechanical and sensorimotor impair- ments and guide the rehabilitation decision making [2]. Recently, a systematic review evaluated the measurement properties of tests recommended in the ROAST guideline which is used to underpin the decision making for our case [3].

OBJECTIVES

Monitoring the rehabilitation process using impairment-based testing.

STUDY DESIGN

Case study

METHODS

We assessed overall ankle function, pain, swelling, range of motion (ROM), sensorimotor function, and muscle strength according to ROAST. In addition, we evaluated brain activity using electroencephalography and time to stabilization (TTS) after jump landing. The measurements were performed at baseline (T0), 6 weeks (T1), three (T2) and six months (T3) after injury.

RESULTS

A middle-distance triathlete (31 years) twisted his right ankle during running. Medical examination revealed no fracture but positive anterior drawer test. Self-reported ankle function increased significantly at T1 or T2 according to the minimal clinical important difference (MCID) for the Foot and Ankle Ability Measure (mean difference (MD):
10.4 - MCID: 9) and Cumberland Ankle Instability Tool (right MD: 9 - MCID: 3). ROM improved over timepoints without fulfilling the cut-off of ⩾ 10cm for dorsiflexion (9.9cm at T3). Ankle pain, swelling and calf muscle strength were inconspicuous. Composite Y-balance scores failed to meet the criteria of 94% (left: 82.16%, right: 85.66%) at T3. The injured limb demonstrated higher cognitive activity during balance exercises on T1. No clear patterns were observed for balance exercises (T2, T3) and TTS after jump landings.

CONCLUSIONS

Self-reported ankle function normalized over time but measured ankle function did not reach standardized thresh- old values. Brain activity might indicate increased cognitive resources to maintain balance on the injured limb six weeks post injury.

KEYWORDS

Ankle injury, chronic ankle instability, impairment-based assessment, case study

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THE EFFECT OF BLOOD FLOW RESTRICTION TRAINING ON QUADRICEPS STRENGTH AND PHYSIOLOGICAL CROSS-SECTIONAL AREA AFTER ANTERIOR

Cruciate Ligament Reconstruction: A Double-Blind, Randomized, Placebo-Controlled Clinical Trial

COMPETITION ABSTRACT

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ABSTRACT

Introduction: Blood flow restriction training (BFRT) is a popular form of training for athletes after anterior cruciate ligament reconstruction (ACLR); however, there is a lack of research establishing the efficacy of using BFRT during rehabilitation.

Objective: To test the efficacy of BFRT to improve quadriceps strength (QS), rate of torque development (RTD), and physiological cross-sectional area (PCSA) after ACLR.

Study Design: Double-blind, randomized, placebo-controlled clinical trial

Methods: 48 athletes were randomly assigned to either low-load strength training with BFRT (BFRT group) or high-load strength training with sham BFRT (control group). Treatment occurred for one month pre-surgery and four months post-surgery. Both groups followed the same standard rehabilitation program and performed the same ex- ercises (leg press, knee extension, squat, step up/down) 3x per week. Outcome variables were measured at baseline and 4 months post-surgery. Isometric QS and RTD were measured on an isokinetic dynamometer and normalized to body mass. PCSA of the vastus lateralis was determined using diffusion tensor magnetic resonance imaging. A two-sample t-test was used to assess between group differences (change from baseline to 4-months post-surgery) for each outcome.

Results: Both groups were equally balanced by sex (BFRT: 11F, 15M, Control: 11F, 15M) and age (BFRT: 20.8 ± 6.0 yrs, Control: 21.23 ± 5.3 yrs). There were no significant differences between groups for QS (p=0.49, BFRT: -0.22 ± 0.6 Nm/kg, Control: -0.11 ± 0.5 Nm/kg), RTD (p=0.92, BFRT: -1.59 ± 3.4 Nm/kg/s, Control: -1.67 ± 2.4 Nm/kg/s) or PCSA of the vastus lateralis (p=0.46, BFRT: 387.25 ± 1351.8 mm^2, Control: 95.67 ± 958.4 mm^2).

Conclusion: The use of BFRT as part of a rehabilitation program for athletes pre- and post-ACLR was no more effective than standard rehabilitation for improving QS, RTD, and PCSA. Clinicians should consider the value of BFRT relative to the cost, time, and discomfort for patients.

KEYWORDS

ACL, BFRT, quadriceps, strength training

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THE EFFECTS OF ICING ON MUSCLE TEMPERATURE AND CONTRACTILE PROPERTIES.

Oral

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ABSTRACT

Introduction: Cold exposures impair neuromuscular function[1]. Tensiomyography (TMG) non-invasively assesses muscle contractile properties with electrical stimulation[2]. Until present, there are no reports to clarify icing effects on muscle contractile properties with TMG.

Objective: To investigate the effects of icing on muscle temperature and contractile properties.

Methods: Eight healthy males (age: 22.9 ± 2.2 years) participated in this study. Each participant completed two con- ditions (icing and control) each for 15 minutes on separate days in a random order. Icing was applied on the right gastrocnemius muscles. Muscle temperature was measured at gastrocnemius lateralis. Muscle contractile proper- ties of the gastrocnemius medialis were measured using Tensiomyography (TMG−100). The stimulation intensity was increased gradually to 20 mA, reaching a plateau in the twitch response curve. TMG parameters, including maximal radial displacement (Dm), delay time (Td), contraction time (Tc), and velocity of contraction (Vc), were then measured from the maximal twitch response. Two-way repeated-measures ANOVA was performed, and the Bonferroni test was used for post-hoc comparisons.

Results: In the icing condition, muscle temperature were significantly decreased (Pre: 34.2 ± 0.9 °C; Post: 28.6 ± 2.7 °C, $p < 0.001$). Neuromuscular properties were shown with Td (Pre: 20.2 ± 1.1 ms; Post: 23.9 ± 1.4 ms, $p < 0.001$), Tc (Pre: 20.9 ± 2.1 ms; Post: 23.2 ± 2.6 ms, $p = 0.021$) and Vc (Pre: 0.087 ± 0.024 mm/ms; Post: 0.076 ± 0.021 mm /ms, $p < 0.001$) were significantly impaired after icing. However, no significant changes with Dm in icing condition ($p = 0.206$) and muscle temperature and TMG parameters in control condition ($p = 0.092–0.994$).

Conclusion: Icing temporally impairs muscle contractile properties, but the maximal radial displacement remains unchanged. The present results suggest that icing may negatively affect neuromuscular properties without altering mechanical properties with the muscle contraction.

KEYWORDS

icing, muscle contractile properties, tensiomyography

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THE EFFECTS OF MOTOR IMAGERY ON BALANCE AND ON THE FEAR OF RE-INJURY IN PROFESSIONAL FOOTBALL PLAYERS WITH ANKLE SPRAIN

Oral

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ABSTRACT

Acute lateral ankle sprain is one of the most common musculoskeletal injury in football causing deficits in balance. Motor Imagery (MI) has been progressively included in sports rehabilitation as an adjunct therapeutic modality either for injury management or sports performance (e.g. fear of re-injury). The aim of the present study was to investigate the effects of MI on balance and on the fear of re-injury in professional football players with ankle sprain Grade II. Fifty-eight professional football players participated in the study. Athletes were in the return to play period, and they were randomly divided into 2 groups: 1st MI group (n = 29) and 2nd – Placebo group (n = 29). Both groups received the same balance training program. Athletes in the 1st – MI group received a standardized recorded content of MI instructions in addition to the balance training program, while athletes in the 2nd – Placebo group received only relaxation instructions. Static balance was evaluated with the Single Leg Stance Test (SLST) by the portable KForce Plates, dynamic balance was evaluated with the Y Balance Test (YBT), the fear of re-injury was assessed using the Causes of Re-injury Worry Questionnaire (CR-IWQ), the ability of MI with the use of the Greek version of the Vividness of Movement Imagery Qusetionnaire-2 (VMIQ-2-GR) and the responses of the Autonomic Nervous System through the Oxygen saturation (SPO_2) and the heart rate. Results indicated a statistically significant improvement for the YBT (p < 0.001) between the 2 groups while there were no statistically significant differences on the other variables. Despite the MI group did not show statistically significant results, there was an improvement in all main outcome measures post intervention. Further research is recommended in order to explore the MI interventions in combination with psychophysiological factors associated with sports rehabilitation and performance.

KEYWORDS

motor imagery; football; ankle sprain; balance; fear of re-injury

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THE EFFECTS OF REPETITIVE PITCHING ON ELBOW VALGUS STABILITY IN BASEBALL PITCHERS

Poster

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ABSTRACT

INTRODUCTION

Repetitive baseball pitching causes valgus stress on elbow joints and consequently increases ulnar collateral ligament (UCL) injury risk[1]. The medial elbow joint space was found to increase after 60 pitches in a previous study[2,3]. However, the pitching task in the previous study was performed on "straight" pitches only in a controlled setting.

OBJECTIVES

To investigate the repetitive pitching effects in a baseball game on the medial joint space at elbow joint.

DESIGN

A cross-sectional study

METHODS

Twenty-six young male collegiate baseball pitchers were enrolled. The medial elbow joint space was measured using ultrasonography in the following conditions: resting with forearm on bed (unloaded), valgus load with forearm weight (loaded), and valgus load with forearm weight and maximal grip (loaded-contracted). The medial elbow joint space was measured before and after pitching in a game. Subgroup analysis was conducted considering the throwing frequency (⩾ 60 pitches and < 60 pitches). The minimum detectable change (MDC) was also calculated. Two-way repeated-measures analysis of variance was used to assess the effects of the game and condition on the medial elbow joint space.

RESULTS

In the analysis of all participants, the medial elbow joint space significantly increased (0.14 mm) after pitching in the loaded condition (p = 0.01). In the subgroup analysis, the medial elbow joint space in the ⩾ 60 pitches significantly increased (0.13 mm) after pitching in the loaded contraction (p = 0.02). However, none of these results exceeded the MDC (0.28 mm). There were no significant changes in the < 60 pitches.

CONCLUSIONS

Repetitive pitching with various types of throwing in an actual game was indicated to decrease elbow valgus stability. However, the effect may be considered small due to less than the MDC.

KEYWORDS

baseball, elbow, ulnar collateral ligament, ultrasonography

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THE EFFECTS OF RHYTHM JUMP TRAINING ON AGILITY AND JUMPING ABILITY IN PREADOLESCENT JAPANESE SOCCER PLAYERS: A NON-RANDOMIZED CONTROLLED TRIAL

Poster

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ABSTRACT

Introduction: Although the World Health Organization recommends 60 minutes of physical activity per day for children, approximately 80% do not meet this recommendation [1) 2)]. Rhythm jump training (RJT), involving rhythmic jumping exercises, is aimed at increasing physical activity and improving motor skills; however, its effectiveness remains unclear.

Objectives: This study was aimed to elucidating the effects of RJT on motor skills.

Study design: We conducted a non-randomized comparative trial.

Methods: Overall, 101 preadolescent soccer players attending soccer school once a week were included, with 79 individuals (age: 8.5 ± 1.6 years) ultimately participating after exclusions. The participants were divided into two groups, RJT group (n = 44, age: 8.3 ± 1.8 years) and CON group (n = 35, age: 8.7 ± 1.4 years). The RJT group performed six different RJT exercises synchronized to music at a tempo of 115-120 BPM for the initial 10 minutes of each 60-minute practice session once a week, totalling eight sessions. The CON group performed regular warm-up exercises. Motor skill performance measurements included the reactive strength index (RSI), which measures jump height per ground contact time, and the pro-agility test (PAT), a 20-meter sprint including two changes of direction.

Results: Following the intervention, PAT scores significantly improved in RJT group compared with CON group (p < 0.01).

Conclusions: This study showed that RJT positively affected the agility of preadolescent soccer players. RJT is an effective training method that is easy to sustain and can increase physical activity. Because the difficulty of the exercises can be adjusted by altering the types of jumps and the music, RJT is considered feasible for a wide range of age groups. Future research endeavours will require elucidating the improvement in various motor skills through RJT and determining the impact of long-term RJT interventions on injury incidence.

KEYWORDS

Motor skill, physical activity, rhythm jump training

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THE HEALTH AND PERFORMANCE PROMOTION IN YOUTH SPORT (HAPPY) STUDY: A QUALITATIVE EVALUATION OF THE IMPLEMENTATION OF INJURY PREVENTION EXERCISE PROGRAMS IN COMMUNITY HANDBALL

Competition abstract

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ABSTRACT

Introduction: Although evidence-based injury prevention programs are available in youth handball, their implementation in practice remains insufficient. This gap emphasizes the need for a better understanding of the behavioral determinants, facilitators, and barriers among youth handball coaches.

Objectives: To gain a profound understanding of youth handball coaches´ behavioural determinants and adherence to an injury prevention exercise programme in youth community handball.

Methods: We used a qualitative study-design. Data were collected from 18 semi-structured interviews with handball coaches who participated in a randomized controlled trial, comparing the effectiveness of an online and on- site implementation strategy (11 coaches) versus an online-only strategy (7 coaches) in enhancing adherence to an injury prevention exercise program. The interview guide was based on The Health Action Process Approach (HAPA) behaviour change model, addressing barriers, facilitators, and behavioural determinants influencing the implementation process. Interviews were transcribed verbatim and data were analyzed using reflexive thematic analysis.

Results: All participants recognized the importance of injury prevention, however they had different levels of adherence implementing the HAPPY-program. 6 overall themes were identified influencing the implementation process positively or negatively; 1) coaches' knowledge, skills and preferences, 2) player skills and motivation 3) practical setting, 4) injury prevention club culture, 5) onsite expert support from health professionals and 6) social support among coaches. We found no major differences in coach responses between the two randomized implementation strategy groups. Instead, adherence to the implementation was strongly influenced by personal autonomy, as well as environmental factors such as the availability of resources/facilities, social support and culture.

Conclusion: Adherence to an injury prevention program was largely dependent on pre-existing factors, such as the coaches' personal beliefs, skills, resources, and the environmental factors surrounding them.

KEYWORDS

Health and Performance, Implementation, Injury prevention, youth handball

REFERENCES

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THE INFLUENCE OF GROWTH AND MATURATION ON INJURY AND ILLNESS IN NORWEGIAN YOUTH ATHLETES – A PROSPECTIVE OBSERVATION STUDY

Oral

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ABSTRACT

Introduction: Youth athletes rely on full participation in their sport to be able to achieve their athletic potential. However, health problems related to growth and maturation can negatively impact their athletic development through a significant loss in training and competition. Moreover, injuries in adolescence can proceed a reason for drop-out.

Objectives: The main objective was to investigate the relationships between growth, maturation, and health problems among Norwegian youth athletes.

Study design: This is a prospective observation study.

Methods: In total, 299 youth athletes between 12 and 16 years were prospectively monitored for growth, maturation, and self-reported health problems for a period of 13 weeks. Health problem variables were collected through weekly distribution of the Oslo Sports Trauma Research Questionnaire on Health Problems, and generalised Poisson regression models were used to model growth rate and maturation with health problem variables.

Results: Both the relationship between maturity status and severity score, and the relationships with severity score of substantial health problems was non-linear in both genders ($p<0.001$). Peak estimated severity scores, duration of health problems and full time-loss were observed between

86.8 and 92.1% predicted adult height in boys, and above 97.8% in girls. The relationships with maturity status and duration of health problems were non-linear in boys (p=0.003) and in girls (p<0.001). The relationships with growth rate and severity score in boys was linear and positive (p<0.001), and non-linear in girls (p<0.001).

Conclusion: Severity and burden of health problems follow a non-linear association with maturity status in male youth athletes, with peak values approximating peak height velocity. In females, the association was more linear, although the sample was more mature compared to the boys and largely post-PHV. Growth rate had a positive linear association with severity of health problems in male youth athletes, while the association was non-linear among the females.

KEYWORDS

Growth, maturation, injury

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THE MULTICENTRE ACL SCREENING COHORT STUDY – VALIDATION OF A SCREENING TOOL – THE MASCOT STUDY PROTOCOL

POSTER

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ABSTRACT BACKGROUND

Anterior cruciate ligament (ACL) rupture can be treated surgically or non-surgically. An existing screening tool has been used to identify patients who require ACL reconstruction (ACLR) and who do not. However, previous research assessed the tool's utility shortly ACL injury.

OBJECTIVE

The primary objective of the MASCOT study is to evaluate the sensitivity and specificity of an existing screening tool to identify patients who needs ACLR following 3 months rehabilitation.

STUDY DESIGN

Protocol for a prospective cohort study

METHODS

In the MASCOT study, three Danish hospitals will enroll 356 patients (aged 18-49) within six months of a primary unilateral ACL injury. Patients will be evaluated at baseline (when initial acute impairments are resolved), at follow- up after 3 months rehabilitation and after 12 months from follow-up. Evaluation at baseline and follow-up include the existing screening tool (number of episodes of giving way, Global Rating Scale [GRS] of knee function, a func- tional performance test [6-meter timed hop] and a patient reported outcome measure [PROM], [Knee Outcome Sur- vey]) and additionally assessment of muscle strength of knee extensors and knee flexors, a battery of single-legged hop-tests, patient reported outcomes and treatment preference. At 12 months after follow-up assessment includes patient reported outcomes and questionnaire regarding satisfactory of completed treatment. The primary outcome is patients scheduled for ACLR after the follow up assessment. The sensitivity, specificity, positive and negative predictive values of the screening tool will be calculated and additionally a receiver operating characteristics (ROC) analysis will be performed.

DISCUSSION

This study may have important clinical implications in the identification of patients who will receive ACLR after 3 months rehabilitation and who do not.

KEYWORDS

ACL, rehabilitation, ACL reconstruction, screening, copers and noncopers

REFERENCES

none

THE RELATIONSHIP BETWEEN TRUNK FLEXOR ENDURANCE TEST AT DIFFERENT ANGLES AND TRUNK PERFORMANCE TESTS IN PHYSICAL EDUCATION STUDENTS

Poster

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ABSTRACT

[Introduction] The trunk flexor endurance test (TFET) has been used with variations in the inclination angle from 45 to 60 degrees. Specifically, an inclination angle of 60 degrees is deemed suitable for older adults, yet may be overly simplistic for athletes. The clinical relevance of TFET could differ based on the inclination angle and populations. [Objectives] This study aims to investigate the association between different TFET angles and trunk performance. [Study Design] A correlational analysis approach.

[Methods] The participants consisted of 350 physical education students (236 men, 114 women), divided into three groups based on angles (45, 50, and 55 degrees). The TFET commenced by moving the backrest 10 cm backwards at the designated angle while participants maintained the initial posture. The test concluded when participant's back contacted the backrest again. Trunk performance was evaluated through 30-second speed sit-ups, trunk extensor endurance test (TEET), closed kinetic chain upper extremity stability test (CKCUEST), and upper quarter Y balance test (UQYBT).

[Results] Among men, a significant difference was noted between 45 and 55 degrees, whereas no significant dif- ference was observed among women across angles. For men, correlation analysis revealed significant associations between TFET and sit-ups (r=.32 with 45 degrees, r=.37 with 50 degrees, r=.27 with 55 degrees), TEET (r=.54 with 50 degrees), and UQYBT (r=.30 with 55 degrees). For women, significant correlations were observed between TFET and sit-ups (r=.49 with 45 degrees, r=.61 with 55 degrees), TEET (r=.38 with 45 degrees), CKCUEST (r=.35 with 45 degrees, r=.31 with 50 degrees), and UQYBT (r=-.37 with 55 degrees).

[Conclusions] Our findings showed that the angle of TFET influences both the endurance capacity and the outcomes on trunk performance tests. The variation in TFET duration across different angles underscores the importance of selecting appropriate angles to accurately assess the physical fitness levels of diverse populations.

KEYWORDS

endurance test, physical fitness, trunk performance

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THE SIGNIFICANT EFFECT ON CLINICAL CONDITION, STRENGTH ENDURANCE AND STIFFNESS OF THE ACHILLES TENDON FOR BOTH ALFREDSON AND SILBERNAGEL PROTOCOLS IN COMPETITIVE ATHLETES WITH ACHILLES TENDINOPATHY

Oral

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ABSTRACT

Introduction: Treatment protocols for Achilles tendinopathy, such as the Alfredson and Silbernagel, have shown beneficial effects on the clinical condition of patients. However, they have never been directly compared in com- petitive athletes.

Objectives: To compare the effectiveness of both the Alfredson and Silbernagel protocols in competitive athletes. A secondary objective was to explore biomechanical or structural changes in the Achilles tendon (AT) and impact on strength endurance of the plantar flexors.

Study design: Randomized controlled trial.

Methods: A total of 20 competitive athletes with Achilles tendinopathy diagnosed through a combination of questionnaire, ultrasound and clinical assessment were randomly assigned to the Alfredson isolated eccentric loading (AG) or Silbernagel concentric-eccentric loading (SG) group using permuted block randomization stratified by age. Both groups followed the respective protocol for six weeks. The primary outcome was the difference in the clinical condition assessed by the Victorian Institute of Sports Assessment-Achilles (VISA-A) instrument after 6 weeks. Secondary outcomes were plantar flexors strength endurance assessed by heel-rise test (HRT), stiffness of AT assessed by MyotonPRO device (STIF) and cross-section area of AT assessed by ultrasound (CSA). Between-group comparison was performed using an unpaired t-test, and the impact of training was evaluated using a paired t-test.

Results: No significant between-group differences were found for the primary and secondary outcomes. When analyzing both groups combined, there was a significant improvement in:

VISA-A score (from 60.3±17.5 to 77±13.2, $p<0.001$), HRT (from 26±3.72 to 31.8±4.65 reps, $p<0.001$),

STIF (from 869 ± 149 to 942±155 N/m, $p=0.006$), of the tendinopathy leg and there was no significant improvement in CSA of the tendinopathy leg.

Conclusions: No differences were found between AG and SG. Both protocols significantly improved clinical condition (VISA-A), plantar flexor strength endurance (HRT), and stiffness (STIF) of the AT with diagnosed tendinopathy. Registration: NCT05659134 (ClinicalTrials.gov)

KEYWORDS

Achilles tendinopathy, treatments, VISA-A, HRT, stiffness

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THERMAL AND TEXTURAL ANALYSIS IN ATHLETES WITH PATELLAR TENDINOPATHY: A CROSS-SECTIONAL STUDY

Poster

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ABSTRACT

Introduction. Patellar tendinopathy (PT), common in athletes, poses a challenging diagnosis. Thermal assessment by infrared thermography (IRT) and grey-level co-occurrence matrix (GLCM) analysis of infrared images could help in the identification and characterisation of this pathology.

Objectives. To evaluate thermal and textural changes in athletes with unilateral PT versus asymptomatic athletes, and to analyse their correlation with symptomatology and functionality.

Methods. In this cross-sectional study we worked with a group of athletes with unilateral PT (n=27) and a group of asymptomatic athletes (n=27). Infrared images of the patellar tendons of both groups were recorded and the symptomatology and functionality of the knees were quantified using the VISA-P questionnaire. Thermal symmetry between patellar tendons and GLCM of the infrared images was analysed and finally correlated with the results of the VISA-P questionnaire.

Results. As expected, the thermal difference between knees in the PT group was larger than in the control group, with an effect size of 0.79. No correlation was observed between temperature and the VISA-P scale (rxy= -0.162, p= 0.242, R2= 0.03). In relation to GLCM, the PT group showed a higher textural correlation (effect size 0.85) and a lower homogeneity (effect size of 0.47) than the control group. A significant correlation was only observed for the textural correlation in inverse and weak correlation (rho= -0.276, p= 0.013, R2= 0.18).

Conclusions. The analysis of thermal symmetry and GLCM on thermal images of patellar tendons could be used as an aid in the diagnosis and clinical follow-up of patients with TR, despite not having found a correlation with knee pain and functionality measured with VISA-P scale.

KEYWORDS

Patellar tendinopathy, thermography, textural analysis, athletes

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THROWING INJURY PREVENTION STRATEGIES WITH A FUNDAMENTAL MOTOR SKILLS-FOCUSED APPROACH IN THE EARLY STAGES OF LONG-TERM ATHLETIC DEVELOPMENT

Oral

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ABSTRACT

Introduction: Shoulder and elbow throwing injuries are common in young baseball players[1)]. In the early stage of long-term athletic development, it's crucial to focus on the development of fundamental motor skills first, and specific athletic skills second[2)].

Objectives: This study aimed to investigate the effectiveness of a prevention program for the incidence of throwing injuries of the shoulder and elbow using a fundamental motor skills-focused approach.

Study design: Randomized controlled trials.

Methods: Six youth baseball teams consisting of 268 players aged 8–11 years were randomized into an intervention group (three teams, 122 players) and a control group (three teams, 146 players). The intervention program consisted of all-four balance exercise, multiple squat exercises, and skip exercises performed during the warm-up. The primary study outcome measures were shoulder and elbow injuries incidences for 10 months. In addition, ball speed and ball spin ratio during pitching and swing speed during batting were measured as performance-related fac- tors during the pre- and post-intervention periods. Physical function variables (single-leg balance, chest expansion length, and thoracic kyphosis angle) were assessed during the pre- and post-intervention periods.

Results: The incidence of shoulder and elbow injuries in the intervention group (23/122, 18.9%) was significantly lower than that in the control group (55/146, 37.7%) (hazard ratio, 45.6%; P = .02). The factors related to performance, as assessed by swing speed, tended to increase in the intervention group compared to the control group (P = .001). The program also improved single-leg balance (P = .047), chest expansion length (P = .001), and thoracic kyphosis angle (P = .047).

Conclusions: A prevention program with a fundamental motor skills-focused approach decreased throwing injuries and enhanced baseball performance in young baseball players.

KEYWORDS

throwing injury

long-term athletic development prevention

randomized controlled trials

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TISSUE FLOSSING IMPROVES RANGE OF MOTION AT HIP IN ACTIVE PERSON.

POSTER

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ABSTRACT

Introduction:Tissue flossing is the use of elastic bands called floss bands, which are wrapped around joints and/or tissues. Studies have found that flossing in tissues (FT) has beneficial effects such as increased range of motion (ROM), power, prevention and post-exercise recovery1.

Objectives: To compare the acute effects of FT application with physical activity on the variables of local thigh temperature and hip ROM. We hypothesize that FT will generate an increase in local temperature, hip ROM, when compared to the group that will perform only physical activity.

Study design: This study has a cross-sectional design.

Methods: The study included 16 men aged (22.8 ± 1.58 years), (1.80 m ± 0.06 m), (79.5 kg ± 8.43 kg). All of them with a weekly physical activity time of (354.12 ± 71.90 minutes).

The SWATT2 method was used for FT. For the acute physical activity, exercises were performed for about 10 min. Results: For thigh temperature, the group that performed the FT protocol found a difference ($p<0.05$) both pre and post training and in the application of FT. There was a difference post FT and post training (increased in the group that performed FT).

Regarding hip ROM, we found difference between pre FT and post FT ($p<0.05$), also there was difference between pre FT and post training in the FT group.

Conclusions: We conclude that FT compresses the tissue1, producing heat that leads to an improvement in the viscoelasticity of the fascia because it enhances the shear between its layers2. The fascia, therefore, presents more stretching capacity, which benefits joint ROM.

KEYWORDS

Voodoo Flossing, Temperature, Viscosity, Performance, Fascia

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TITLE: PERCEPTION TOWARDS INJURY RISK AND INJURY PREVENTION OF RUGBY PLAYERS IN GERMANY – IS THERE A DIFFERENCE BETWEEN MALE AND FEMALE PLAYERS?

POSTER

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ABSTRACT

Introduction: There is a high injury incidence in Rugby in Germany but only few clubs implement injury preven- tion programs. One barrier could be that players do not perceive injuries as serious and hence do not see the need for it.

Objectives: To gather information on the perceptions of injury and injury prevention of German rugby players.

Study design: cross-sectional survey.

Methods: Male and female players who were older than 16 years were included. They completed a question- naire as described by Barden et al. (2021) which included demographic information followed by rating the agree- ment/disagreement to several statements on a 6-point Likert scale. The answers were described using a median. Differences between male and female players were calculated using a Mann-Whitney Test.

Results: 50 questionnaires were completed (25 female, 25 male). The mean age was 23.7 ± 5.0 years and they had on average 10.5 ± 3.9 years experience playing rugby.

Seriousness of contusions was rated the lowest (median:2) and concussion the highest (median:6). Female play- ers rated concussions statistically significantly more serious (median:6 vs median:5, p< .05; Cohen's d: .47). The agreement with the statements that "injury can shorten the career" or "cause physical problems later in life" was very high (median: 6). The risk of injury while playing rugby was rated high (median: 4). The agreement with the statements about injury prevention (e.g. preventive exercises should be integrated in training) were very high (median 5 to 6). Six players know the program "Activate". Most players (N=47) think, they are responsible for injury prevention, followed by the coach (N=41).

Conclusion: Players see a high risk of injuries and would like prevention exercises integrated in the training. They should also be advised what to do themselves. There is only little difference in perception towards injury and injury prevention between male and female players.

KEYWORDS

activate, athletes, attitude, rugby union

REFERENCES

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TRANSLATION, CROSS-CULTURAL ADAPTATION AND VALIDATION OF THE DANISH VERSION OF THE KNEE OUTCOME SURVEY - ACTIVITIES OF DAILY LIVING SCALE

Poster

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ABSTRACT

INTRODUCTION

The Knee Outcome Survey –Activities of Daily Living Scale (KOS-ADLS) is a patient reported outcome measure (PROM) developed to assess functional abilities in patients with various knee disorders. The original version of KOS-ADLS is widely used in research and clinical practice and is reliable, valid and responsive to changes in pa- tients with various knee disorders.

OBJECTIVES

The purpose of this study was to translate and culturally adapt the KOS-ADLS into Danish and to evaluate the psy-

chometric properties of the Danish version (KOS-ADLS-DK) in patients with anterior cruciate ligament (ACL) injury.

STUDY DESIGN

Cross-sectional study

METHODS

The KOS-ADLS was translated into Danish and culturally adapted in accordance with guidelines from Beaton and colleagues (1). To evaluate the psychometric properties, 117 patients with ACL injury completed KOS-ADLS-DK and other knee-specific PROMs. All patients completed the PROMs at baseline and 14 days later and a sub-population (79 patients) completed the PROMs before and after 3 months of rehabilitation (to evaluate responsiveness). Validity (internal consistency and construct validity), reproducibility (test-retest reliability and agreement), responsiveness and floor/ceiling effects were assessed.

RESULTS

The translation and cross-cultural adaptation process did not reveal major problems. The KOS-ADLS-DK showed a high internal consistency (Cronbach's alpha = 0.90), factor analysis confirmed the unidimensionality of the KOS-ADLS-DK, but the construct validity was not satisfactory as only five of seven hypotheses were confirmed. Bland&Altman plots showed equal distribution in test-retest agreement, good reliability (Intraclass Correlation Co- efficient = 0.88) with a SEM of 4.9% and SDC of 13.6%. Hypotheses testing on change scores revealed the KOS-ADLS- DK to be responsive and without floor/ceiling effects.

CONCLUSION

The Danish version of KOS-ADLS is a valid, reliable and responsive PROM for assessing symptoms and functional limitations in patients with ACL injury, but have some minor limitations in its construct validity.

KEYWORDS

Knee Outcome Survey, translation, validation, psychometric assessment, ACL

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UNVEILING VASCULAR MASQUERADES: A CASE OF ILIAC INTERNAL

Stenosis Mimicking GTPS. Author: Hamso, M., physiotherapist, MsC. Magnus@fysioterapien.no

POSTER

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ABSTRACT

This case study sheds light on a situation where peripheral arterial disease was mistaken for Greater Trochanteric Pain Syndrome (GTPS). The patient, a

woman aged between 55 and 60, had a complex medical history, including a battle with breast cancer, cardiovascular problems, and gastrointestinal complications stemming from previous treatments. Her presenting complaint was 14 months of persistent right hip pain. Despite conservative treatments aimed at GTPS, her symptoms failed to improve.

Upon closer examination, it became evident that her symptoms were not typical of GTPS. She displayed signs such as pain that worsened rapidly with any activity (including cycling) and was completely alleviated by short rest periods (<120 seconds). The symptoms did not typically originate in the calves but in the lateral hip, and did not radiate distally. The rapid alleviation of symptoms with rest prompted further investigation. This led to the discovery of vascular issues, specifically iliac internal stenosis, which had been previously masked by the predominant musculoskeletal symptoms.

The patient underwent surgery to address the underlying vascular pathology, receiving bilateral iliac stents. Postoperatively, her symptoms dramatically improved, and she experienced significant relief from her hip pain. Notably, clinical tests that were initially positive for musculoskeletal dysfunction, such as single-leg standing and specific isometric tests, no longer reproduced her previous pain.

This case underscores the importance of considering vascular etiologies in patients presenting with atypical musculoskeletal symptoms, especially those with underlying cardiovascular risk factors. It highlights the potential pitfalls of relying solely on clinical presentations and the importance of a comprehensive assessment approach. Early recognition of vascular involvement and prompt intervention could have potentially prevented prolonged suffering and unnecessary treatments.

In summary, this case emphasizes the critical role of thorough assessment and clinical reasoning in guiding appropriate management strategies, ultimately leading to improved patient outcomes and quality of life.

KEYWORDS

Greater Trochanteric Pain Syndrome, peripheral arterial disease, iliac stenosis, misdiagnosis, vascular screening

REFERENCES

None cited in abstract.

USING IN-GAME SCENARIOS TO MEASURE DUAL TASK CAPACITY IN FOOTBALL PLAYERS

Poster

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ABSTRACT

Introduction: Current dual-task methods are not enough to challenge football players' dual-task capacity and are not specific to football as they are mostly based on functions like counting backward from a hundred while walking over obstacles[1].

Objectives: We aimed to create a dual-task test based on in-game situations and measure football players' capacity, which would not be correlated to physical performance.

Study design: Our study was designed as a prospective cohort study.

Methods: Thirteen football players (from professional youth teams) were included in our study with a mean age of 17.67±0.41. We excluded players with health-related problem that could affect attending regular training. Besides our Dual-Task test, players performed a juggling (foot), speed dribbling, and long passing tests for performance measurement[2]. For the dual-task test, we used a shorter version of the agility t-test. One meter away from the test area, we placed a projector and a curtain. At first, players performed the agility test while dribbling. In the dual- task version, while the players dribble, we projected in-game scenarios to the curtain and asked players to say the number of the player who is available to receive the ball. The total time and number of errors were recorded.

Results: Our players scored a mean of 23.46±5.55 times in right-foot, 16.85±8.93 times in left-foot, and 40.31±9.13 times in total juggling; 17.92±1.55 seconds in speed dribbling; 8.38±2.36 points in long passing; 9.28±0.92 seconds in modified t-test; 11.77±1.08 seconds in new dual-task test; 27.69±13.6 in dual-task cost. There was no correlation between dual-task cost and performance parameters (all ps'>0.05 and r=0.231, 0.214, 0.339 for juggling right, left, and total; r=-0.311 for speed dribbling; r=-0.147 for long pass test.)

Conclusions: Our test could be used as a new method to measure players' dual-task capacity. The performance parameters did not alter the dual task measurement.

KEYWORDS

Dual-Task, Performance Testing, Soccer.

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VALIDITY AND RELIABILITY OF THE GROIN INJURY SCREENING QUESTIONNAIRE IN JAPANESE

Poster

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ABSTRACT

INTRODUCTION

Groin pain is one of the prevalent injuries in soccer players [1)]. Since groin pain takes time to heal and affects the performance of the players, it is necessary to monitor the groin condition regularly to prevent its onset and reccurence. The Groin Injury Screening Questionnaire (GISQ) was developed in Norway to evaluate the groin condition for soc- cer players [2)]. GISQ has already been translated in several language, but not into Japanese.

OBJECTIVES

To develop the Japanese version of the GISQ (GISQ-J), and to examine its validity and reliability. Moreover, to in- vestigate the relationship between a history of groin pain and GISQ-J scores.

STUDY DESIGN

Cross-sectional study

METHODS

The GISQ-J, translated with permission from the original author, was distributed twice to 114 Japanese high school and university soccer players by Google Forms. The second response was given within 72 hours of the first response, recalling the condition of the groin at the time of the first response. The GISQ-J is a 100-point scale, with a higher score indicating better groin conditions. Cronbach's α was calculated to assess the validity of each GISQ-J scale, and the intraclass correlation coefficient (ICC) was calculated to evaluate the reliability. In addition, an unpaired t-test was used to compare GISQ-J scores by the presence or absence of a history of groin pain.

RESULTS

A total of 60 soccer players (52.6%) responded. Cronbach's α for each scale ranged from 0.71 to 0.97, and the ICC from 0.72 to 0.86. Those with a history of groin pain (n=14) had significantly lower GISQ-J scores than those without (n=46)($p<0.05$).

CONCLUSIONS

The GISQ-J showed good validity and reliability on each scale. The GISQ-J scores were poor with a history of groin pain, suggesting that the GISQ-J may be useful in the evaluation of groin conditions in Japanese soccer players.

KEYWORDS

Groin pain, Questionnaire, Screening tool, soccer player

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VALIDITY, AGREEMENT AND RELIABILITY OF THE FORCEFRAME DYNAMOMETER IN PATIENTS WITH ANTERIOR CRUCIATE LIGAMENT INJURIES

POSTER

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ABSTRACT

INTRODUCTION

Restoring maximal muscle strength of knee extension and knee flexion following anterior cruciate ligament (ACL) injury and reconstruction is of great importance. It is therefore essential for clinicians and healthcare providers to have dynamometers that are easy-to-use, valid and reliable. The ForceFrame is a novel dynamometer that may be a reliable option compared to the gold-standard isokinetic dynamometer.

OBJECTIVE

To assess the reproducibility of the ForceFrame dynamometer and concurrent validity against an isokinetic dynamometer in maximum voluntary isometric contraction (MVIC) during knee extension and flexion.

STUDY DESIGN

Reproducibility study

METHODS

Twenty-seven participants with ACL injury or reconstruction participated in this study. ForceFrame MVIC were tested on two separate days; Day one including gold-standard isokinetic dynamometer and day two inter-tester assessment by a new assessor. Main outcome measures were concurrent validity and agreement (ForceFrame vs. isokinetic dynamometer), day-to-day test-retest reliability and agreement and inter-tester reliability of ForceFrame.

RESULTS

ForceFrame showed a fair concurrent validity compared to the isokinetic dynamometer for extension (r=0.56), poor concurrent validity for flexion (r=0.24), Bland & Altman plots between ForceFrame and the isokinetic dynamometer showed a mean difference of -0.51 Nm/kg for extension and -0.32Nm/kg for flexion. There was a good day-to-day test-retest reliability for MVIC of extension (ICC=0.77, CI95:0.48-0.90) and flexion (ICC=0.83, CI95:0.61-0.92), while there were excellent inter-tester reliability for MVIC of extension (ICC=0.97, CI95:0.94-0.98) and flexion (ICC=0.93, 95CI:0.85-0.97). Standard error of measurement (SEM) was 8% and 9% while the smallest detectable change (SDC) was 22% and 27% for extension and flexion, respectively.

CONCLUSIONS

ForceFrame can be used to obtain valid and reliable results to assess MVIC of knee extension and flexion, but absolute results may be considered an underestimation of actual MVIC. The chosen test position to assess knee flexion in ForceFrame does not appear to be optimal, and different test-positions may be considered.

KEYWORDS

ACL, knee, maximal muscle testing, validation

REFERENCES

none

WHO COUNTED AS AN EXPERT AND WHOSE EXPERTISE COUNTED IN

Consensus Statements on Patellofemoral Pain or Patellofemoral Osteoarthritis?

Oral

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ABSTRACT

Introduction: Consensus recommendations bridge knowledge gaps in patellofemoral pain (PFP) research and/or clinical practice. The prevalence of PFP is 29% in elite, and 23% in amateur, female athletes.[1] Consensus recom- mendations depend on the expertise of panelists who take part in the consensus process. To represent their target population, panels should include persons impacted by their work.[2]

Objectives: To assess who has been invited and whose opinions have counted towards consensus recommendations on PFP or Patellofemoral osteoarthritis (PF-OA).

Study Design: A secondary analysis of data from a scoping review.

Methods: The Joanna Briggs Institute Manual for Evidence Synthesis was used to map consensus statements in PFP and PF-OA. Two reviewers extracted data on the panelists including: number of panelists; definition of expertise; sex; country; country income level; and the reason they were invited to participate.

Population: PFP 'experts'. Inclusion criteria – had to be a panelist in a consensus statement making recommendations on PFP.

Results: Twenty-two consensus statements were included. Thirteen (59%) focused on treatment recommendations. Nine (39%) provided a justification for why panelists were invited. Sixteen (73%) reported panelist numbers (N=365). Eleven (50%) reported panelist sex; 66% of panelists were male (111 of 169). Twelve (55%) reported panelist country; 44% (117 of 263) of panelists represented the USA or Canada. All panels included either a medical doctor or physical therapist. One consensus panel included a patient.

Conclusions: PFP and PF-OA consensus statements have often failed to define who counts as an expert and the panels have lacked diversity. Experience—the metric most often used to identify experts—is not a perfect proxy for expertise.[3] The patient/athlete voice has been missing from consensus panels, meaning that recommendations may not serve the athletic population who are affected by PFP.

KEYWORDS

Patellofemoral Pain; Consensus; Expertise; Diversity.

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"EFFICACY OF A RHYTHMIC GYMNASTICS-SPECIFIC INJURY PREVENTION PROGRAM: A CLUSTER-RANDOMIZED CONTROLLED TRIAL AMONG COMPETITIVE NORWEGIAN RHYTHMIC GYMNASTS"

Competition abstract

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ABSTRACT

Introduction: Overuse injuries are common among competitive Norwegian rhythmic gymnasts with a mean weekly prevalence of 37% and with the knees, lower back and hip/groin as the most common injury locations (Gram, M., Clarsen, B., & Bø, K., 2021). It has been postulated that reduced physical capacity (e.g. strength, flexibility) in these areas contributes to the high prevalence of overuse injuries.

Objectives: To assess if exercises targeting reduced physical capacity in the lower back, knees and hip/groin lower the prevalence of overuse injuries in these areas compared with no targeting exercises among Norwegian rhythmic gymnasts.

Study design: Assessor-blinded cluster-randomized controlled trial.

Methods: Twenty-three Norwegian rhythmic gymnastics clubs were randomized to an intervention group (12 clubs, 119 gymnasts) and a control group (11 clubs, 86 gymnasts). Included gymnasts had to be ⩾12 years of age and training ⩾3 days per week. The intervention group performed a targeted injury prevention exercise program for

lower back, knees and hip/groin during training/warm-up for 8 months (November 2023-June 2024). The control group continued RG training as normal. The prevalence of overuse injuries in the targeted areas were measured monthly in both groups using the Oslo Sports Trauma Research Centre Questionnaire on Health Problems (OSTRC-H2).

Results: The prevalence of overuse injuries in the targeted areas were similar in the two groups: Odds ratio = 0.93 (95% CI 0.40 to 2.15); P=0.87 for intervention vs control.

Conclusions: The results suggest that a targeted injury prevention program alone is not enough to prevent overuse injuries in the knees, lower back and hip/groin among competitive Norwegian rhythmic gymnasts. Other measures to prevent overuse injuries (e.g load management, proper training planning and performing sport specific elements with correct technique) might be just as important as targeted exercises.

Trial registration number: NCT05506579; ClinicalTrials.gov

KEYWORDS

Female athletes; Injury prevention; Overuse injuries; Rhythmic gymnastics

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"QUALITY FIRST": DEVELOPMENT OF A TOOL TO ASSESS MOVEMENT QUALITY IN HOP TESTS

POSTER

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ABSTRACT

INTRODUCTION

Hop tests are used to assess knee function but outcomes often reflect rather performance than movement quality, which is crucial for proper knee function (1).

OBJECTIVES

The movement quality scoring tool "Quality First", focusing on movement related risk factors for knee injury, was developed and quality criteria were assessed. Moreover, movement quality was correlated with performance and a comparison of real-time versus slow-motion analysis was executed.

STUDY DESIGN

Cross-sectional study in a clinical setting.

METHODS

34 participants performed various hop tests and 2D-videos were evaluated using "Quality First". Content validity was assessed from the perspective of professionals, for interpretability, classical test theory was employed. Cron- bach's α was calculated to evaluate internal consistency. Intraclass correlation coefficients (ICC2,3), standard er- ror of measurements (SEM) and minimal detectable changes (MDC) were analyzed to assess reliability. Hop per- formance (Limb-Symmetry-Index, LSI) was correlated with the "Quality First" total score (Spearman) and Bland- Altman analysis was performed for method comparison (slow-motion, real-time).

RESULTS

Content validity resulted in the final inclusion of single-leg hop for distance, vertical hop, and side hop test covering sagittal, vertical, and transversal plane. "Quality First" consists finally of 15 items on a 4-point scale and obtained a sufficient Cronbach's α. The interrater reliability showed ICC2s from 0.45–0.60, with SEMs ranging from 1.46-1.73 and MDCs from 4.06-4.80. Intrarater reliability revealed ICC3s from 0.73–0.85 with SEMs ranging from 0.89-1.09 and MDCs from 2.47-3.01. No correlations between LSIs and "Quality First" were found (r=−0.1–0.02, p=0.65–0.93). Bland-Altman analysis revealed no systematic mean differences between real-time and slow-motion except for the vertical hop (0.8 points).

CONCLUSION

"Quality First" can be a promising and time-efficient tool to assess movement quality showing fair to good interrater- and good to excellent intrarater-reliability. Patient progress of movement quality in hop tests should be monitored in addition to performance.

KEYWORDS

hop test, knee injury, movement quality, quality criteria

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"RELIABILITY OF TWO RECENTLY DEVELOPED PROCEDURES ASSESSING BIOLOGICAL MATURITY BY ULTRASOUND IMAGING- A PILOT-STUDY"

Poster

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ABSTRACT

Substantial differences in the biological maturity of children of the same chronological age during puberty lead to inequalities in talent selection in youth sports, emphasizing the importance of considering the athlete's biological maturity [1,2]. Biological maturity is most commonly assessed on the basis of a radiography of the left hand and wrist, but ultrasound (US) could be advantageous, especially by avoiding ionizing radiation. The aims of this study were to assess the intra- and interrater reliability of two examiners with different expertise levels in an US-based assessment of five anatomical landmarks at the knee joint and the interrater reliability of an US-based calculation of the ossification ratio (OssR) of the distal medial femur. For the purpose of this pilot study, a cross-sectional design with two measurement time points was chosen. Twenty healthy female handball players between 10 and 17 years of age were recruited. Adolescents were excluded if they had any form of growth, musculoskeletal or neurological disorder. Epiphyseal closure at the landmarks was staged (stages 1-3). The reliability of the stages was analyzed using Cohen's kappa (*k*). The OssR was calculated by dividing the diameter of the ossification center by the epiphy- seal diameter. The interrater reliability of the OssR was analyzed using the Bland-Altman method and intraclass correlation coefficients (ICC). Interrater and intrarater reliability for the stages ranged from *k*=0.69 to *k*=0.90 and from *k*=0.70 to *k*=1.0, respectively. For the OssR, an ICC of 0.930 and a minimal detectable change (MDC) of 0.030 were determined. In conclusion, the overall high inter- and intrarater reliability shows that US-based imaging has a high potential for use in youth sports. Due to several limitations, further research with a larger number and higher heterogeneity of subjects is needed for possible implementation of US in the field of sports.

KEYWORDS

biological maturity; bone age; reliability; ultrasound; youth sport

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