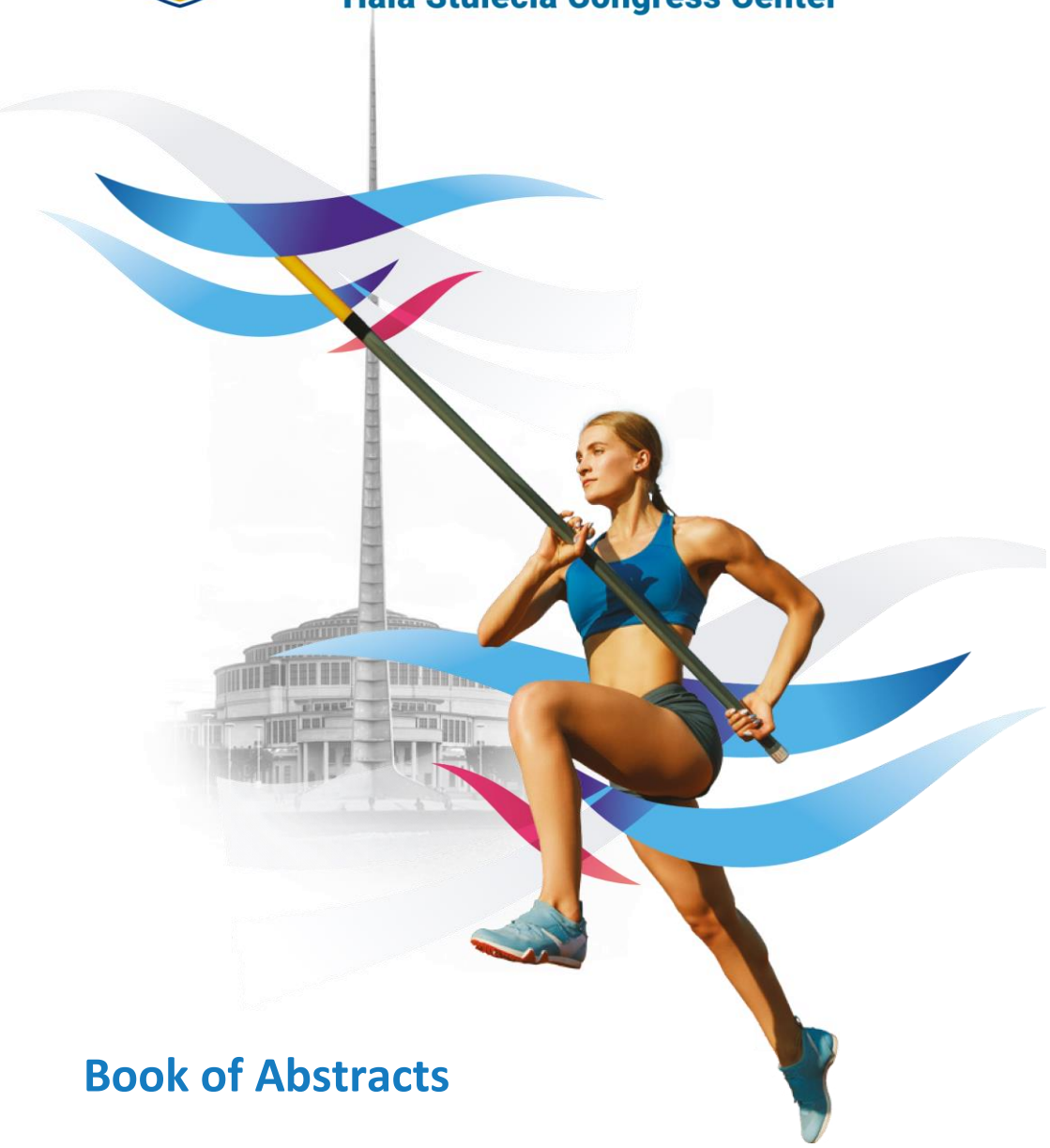
12TH EFSMA CONGRESS OF SPORTS MEDICINE

19-21 October 2023, Wrocław, Poland

Hala Stulecia Congress Center



Book of Abstracts

Invitation letter from the Congress Presidents

We cordially invite you to participate in the 12th European Federation of Sports Medicine Associations Congress of Sports Medicine "Sporty Life — Healthy Life", Centennial Hall, Wroclaw, Poland, 19-21 October 2023.

For the first time, the EFSMA Congress will take place in Poland. Wroclaw is a beautiful, big city in the south-western Poland, with unique history and architecture. Over 700 guests are expected to participate from more than 40 countries.

The main topics of the Congress will include: exercise for health, aging and sport, drugs, doping and antidoping, sudden cardiac death in sports athletes' heart, injuries, sports in children and adolescents, relative energy deficiency in sport (RED-S), digital wearables in sports medicine and sports, altitude training; rehabilitation to Paralympics, exercise and immune health, clinical and legal problems of Sports Medicine in Europe, and other topics.

We hope that the Congress will be a unique occasion to share current knowledge and ideas of modern Sports Medicine.

See you in the wonderful Wrocław!

Maurizio Casasco,
President
of the European Federation of Sports Medicine Associations

Tomasz Kostka
President
of the Polish Society of Sports Medicine

Secretariat of the Congress:
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CONGRESS SCIENTIFIC PROGRAMME

19 OCTOBER 2023 (THURSDAY)

8.30 - 20.00		Registration of participants in the EFSMA Congress
9.00 - 10.00	Room A-B	Workshop: Practical application of medical examination qualifying children and adolescents for sports. Maciej Hess (Poland).
	Room C-D	Workshop: Overload and injuries prevention in children and adolescents practicing sports. Andrzej Czamara (Poland), Łukasz Dalecki (Poland).
10.10 - 11.10	Room A-B	Workshop: Interpretation of imaging results in sports medicine.
	Room C-D	Workshop: Criteria for returning to sport after Achilles tenden injuries. Andrzej Czamara (Poland), Łukasz Sikorski (Poland).
11.20 - 12.50	Room A-B	Workshop: Assessment of exercise capacity and diagnostic tests. Robert Pietruszyński (Poland), Marta Bozańska-Janas (Poland)
12.00 - 13.45		Meetings of the Main Board of the Polish Society of Sports Medicine (PTMS)
14.00		Executive Committee Meeting of the European Federation of Sports Medicine Associations (EFSMA)
14.15 - 15.45	Auditorium	Bed rest and detraining (90 min)
	Room A-B	From rehabilitation to Paralympics - challenges and threats in the sport of people with disabilities (90 min)
	Room C-D	Diagnosis and monitoring of treatment of selected musculoskeletal injuries (90 min)

16.00 - 17.30	Auditorium	Drugs, doping and antidoping in sports (90 min)
	Room A-B	Sudden Cardiac Death in Sports (90 min)
	Room C-D	Digital wearables in sports medicine and sports (90 min)
17.45 - 19.30	Auditorium	Opening Ceremony
20 OCTOBER 2023 (FRIDAY)		
8.00 - 18.00		Registration of participants in the EFSMA Congress
9.00 - 10.30	Auditorium	Relative energy deficiency in sport (RED-S) as a challenge for modern sports medicine (90 min)
	Room A-B	Physical activity for people with chronic diseases (90 min)
	Room C-D	Infodemic-COVID-19 - Sport. Scientific Session of The Polish Chamber of Physiotherapists (90 min.)
10.45 - 12.15	Auditorium	Exercise at 50 years old and beyond (90 min)
	Room A-B	Athlete's heart (90 min)
	Room C-D	Rehabilitation in selected sports injuries (90 min)
13:10 - 14:10	Pergola	Workshop: Pergola in Front of Congress Center: Recreational exercises recommended for health – Zumba performed by seniors from Wroclaw Space the Third Age.
13.30 - 15.00	Auditorium	Clinical and legal problems of Sports Medicine in Europe. A synthesis, summary and analysis (90 min)
	Room A-B	Exercise and immune health (90 min)
	Room C-D	Power of Exercise. Health benefits and their monitoring in project "Exercise Prescription for Health" (90 min)

15.30 - 17.00	Auditorium	Selected problems of the knee injury in children and adolescents (90 min)
	Room A-B	Aging and Sport (90 min)
	Room C	Oral presentation session I (90 min.)
16.00 - 20.00	Room D	EFSMA Council of Delegates
17.15 - 18.45	Auditorium	Biological therapies in musculoskeletal sport injuries (90 min)
	Room C	Oral presentation session II (90 min)
17.15 - 18.00	Room A-B	Altitude training (45 min)
18.00 - 19.00	Room A-B	Global Alliance for the Promotion of Physical Activity: the Hamburg Declaration - Roundtable discussion (60 min)
21TH OCTOBER 2023 (SATURDAY)		
7.30 - 9.00		Registration of participants in the EFSMA Congress
8.30 - 10.00	Auditorium	Physical activity in the preconception, pregnancy and postpartum period (90 min) - in English
	Room A-B	Oral presentation session III
	Room C-D	Moderated e-poster session I
10.20 - 11.50	Auditorium	Sports and Medical Certification on Sports Medicine in Poland (90 min) - In Polish
	Room A-B	E-poster session
	Room C-D	Moderated e-poster session II

12.00 - 13.30	Auditorium	Recommendations of the Polish Society of Sports Medicine (90 min) - in Polish
	Room A-B	Health benefits of probiotics in sports and exercise (90 min) - In Polish
	Room C-D	E-poster session
14.30 - 15.30	Auditorium	Summary and Official Closing Ceremony of the 12th EFSMA Congress of Sports Medicine
15.45 - 17.30	Auditorium	Recommendations of Polish Society of Sports Medicine for health-promoting physical activity of Seniors (100 min) - in Polish (joint session of PTMS and the City of Wroclaw)

INVITED SPEAKERS

SARCOPENIA AND SARCOPENIC OBESITY: A NEEDLESS HEALTH THREAT

NORBERT BACHL

EFSMA, Europ. Fed. Sports Med Associations, Lausanne, Switzerland. Em. Chair of Institute for Sports Science and Sportsmedicine, Vienna, Austria

Sarcopenia is characterised by progressive and generalised loss of skeletal muscle mass and strength with a risk of adverse outcomes such as high risks for falls, fractures, poor physical performance due to muscle insufficiency and premature death. A combination with obesity causes a double- to threefold risk leading to premature immobilisation, reduced life quality and high treatment and care costs. As a global aging demographics show a preeminent increase of those older than 70 years of age, outpacing those younger than 70 years of age, the prevalence of sarcopenia will increase up to 15-17% in men and up to 32-45% in women over 80 years of age. Main causes to develop a sarcopenic obesity are a reduction of mechanical stimuli due to a long-lasting sedentary lifestyle, a disbalance between protein anabolism and catabolism due to malnutrition, a dysbiosis of the gut microbiome, change in hormone levels, insulin resistance and visceral obesity, a chronic disease related inflammation boosted by an immunosenescence and damage associated molecular patterns due to oxidative stress. As a general recommendation prevention must be of highest priority against all risk factors to develop sarcopenic obesity. That means regular exercise/training regarding resistance/power, endurance, balance and coordination, a diet with proteins with essential amino acids, limitation of alcohol and smoking, regular vit. D supplementation and also creatine and testosterone if indicated. Neuromuscular electrical stimulation, body vibration training and low load resistance training with blood flow restriction can support prevention and therapy. Summarising- as in many other NCD‘s- „one gram of prevention is worth more than one kilo of therapy

PHYSICAL EXERCISE FOR PEOPLE WITH ASTHMA BRONCHIALE AND CHRONIC OBSTRUCTIVE PULMONARY DISEASES

ADAM BIAŁAS

Department of Pneumology, Medical University of Lodz, Lodz, Poland, Department of Pulmonary Rehabilitation, Regional Medical Center for Lung Diseases and Rehabilitation, Blessed Rafal Chylinski Memorial Hospital for Lung Diseases, Lodz, Poland

Asthma is a heterogeneous disease, typically characterized by chronic inflammation of the airways. Clinical manifestations include respiratory symptoms such as wheezing, breathlessness, chest tightness, as well as cough with variable frequency and severity, and variable airflow obstruction. This disease is a significant public health problem worldwide. In 2019, its prevalence was estimated at 262 (95% UI: 224–309) million cases, and it accounted for 21.6 (95% UI: 17.1–27.0) million disability-adjusted life-years. In the same year, the mortality rate due to asthma for both genders was recorded at 504.3 (95% UI: 400.6 – 633.3) per 100,000. Therapeutic management of asthma includes both pharmacological and non-pharmacological treatments, with physical activity being one of its key components. Chronic obstructive pulmonary disease (COPD), according to the current definition in line with the GOLD report, is a heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction. Despite being a common disease amenable to prevention and treatment, COPD remains a major public health challenge. Physical activity and, more broadly, pulmonary rehabilitation are crucial elements of its management. Furthermore, both COPD and asthma often coexist with comorbidities. The most common comorbidities in COPD are related to the cardiovascular system. Also, this group of diseases is one of the most common non-respiratory comorbidities of asthma. In both of these conditions, these comorbidities negatively impact the natural history, while physical activity plays a significant role in both primary and secondary prevention of most of these comorbidities. The lecture serves as a summary of knowledge, as well as present current guidelines from scientific societies and expert groups, regarding physical activity and, more broadly, pulmonary rehabilitation, in these patient populations.

PREVENTION AND PHYSIOTHERAPY OF SHOULDER IMPINGEMENT IN RESISTANCE TRAINING AND WEIGHTLIFTING

EWA BRĘBOROWICZ

Traumatology, Orthopedic and Hand Surgery Department, Poznan University of Medical Sciences, Poland

Weight lifting and resistance training is common form of activity. It is popular among both recreational athletes and professionals. Improper unsupervised training can lead to musculoskeletal injury. More than 35% of all disorders in weightlifters involve the shoulder. One of the most common reasons of shoulder pain in weightlifters is impingement. The cause is the imbalance between large muscles called “mirror muscles” and small shoulder muscle groups. This imbalance occurs in strength and power of the muscles. It was proven in many biomechanics and isokinetic assessments. Differences between muscle groups are result of specific strengthening exercises. Deltoid and internal rotators usually are over trained while external rotators and lower trapezius are neglected. Many research suggests that exercises like upward row or deltoid rise are strongly related to development of shoulder impingement. In those exercises shoulder is placed in internal rotation and abduction. Knowledge about shoulder biomechanics and mutual muscle work is necessary to plan safe and effective weightlifting training program.

ROLE OF ECHOCARDIOGRAPHIC SCREENING IN THE CONTEXT OF PRE-PARTICIPATION SCREENING TO PREVENT SPORT RELATED SUDDEN CARDIAC DEATH

ELENA CAVARRETTA

Department of Medical-Surgical Sciences and Biotechnologies, Sapienza University of Rome, Corso della Repubblica 79, 04100 Latina, Italy

The morphological, functional, and regulatory adaptations of the cardiovascular (CV) system, induced by the practice of systematic and long-tem, intense exercise, are generally named under the term of "athlete's heart". This physiological remodeling is characterized by an electrical remodeling, typically represented by the presence of sinus bradicardia and other features and morphological adaptations, with an increased in the volumes of the 4 heart chambers, in the absolute mass and wall thickness, but maintaining a normal systolic and diastolic function. The degree and some specific features of this remodeling are related to the individual's characteristics: as genetic factors, gender, ethnicity; as well as the specific training: the age of starting, the type, intensity and duration of the sport practiced and other environmental factors. Nevertheless, in some cases it may be particularly difficult to discriminate between a physiological adaptation to exercise and a pathological remodeling underlying the presence of a CV disease, possibly related to exercise-related sudden cardiac death. The use of the international criteria for the ECG screening in athletes have further enhanced the sensibility and specificity of the ECG screening during pre-participation screening (PPS), but in cases still doubtful and falling in the grey zone among those two entities, it is mandatory to perform at least an echocardiogram and other exams if needed. Echocardiography stands as a pivotal exam in PPS for its availability, cost-effectiveness and the qualitative and quantitative data obtainable. Some specific features of the athlete's heart must be taken into account when interpreting an echocardiographic exam, as well referring to the reference values for the specific population analyzed.

RECOGNITION OF SPORTS MEDICINE AS A PRIMARY SPECIALTY IN EU: EFFORTS OF THE UEMS MULTIDISCIPLINARY JOINT COMMITTEE ON SPORTS MEDICINE

NICOLAS CHRISTODOULOU

MOVEMED Limassol Centre, European University Cyprus

Sports Medicine is not recognized yet as a primary specialty in Europe. Nevertheless, its significance today is recognised worldwide. For this reason, the Council of UEMS has decided in 2005 in Munich to create a Multidisciplinary Joint Committee (MJC), to deal with the competences and the sphere of Sports Medicine activities. The MJC on Sports Medicine which is open to all the UEMS Sections wishing to participate, as well as to the European Federation of Sports Medicine Associations (EFSMA), started its operation on February 2006. The first interest was to promote the process of the recognition of sports medicine in EU as a primary specialty. A lot of years were spent to convince several EU States having sports medicine as a primary one, to upload their official documents to the IMI module of EU. This year we manage to have the necessary number of eleven (11) EU States, with their documents uploaded. The effort continues for convincing the European Commission to announce by a "delegated act" that sports medicine is officially recognized in EU and include it to Annex V of the relevant Directive for the Free Movement of Professional in EU. In the meantime, our MJC on Sports Medicine has produced a lot of important work, such as the definition of the European training requirements for Sports Medicine. The UEMS Council validated the defined requirements at its meeting in London on October 2019. At this presentation they are explained the several training requirements having to do with: the general rules on monitoring, accreditation and quality of postgraduate training, the general aspects of training in Sports Medicine and its minimum curriculum. Also, the rest of the activities of the UEMS MJC on Sports Medicine are presented in brief.

METABOLIC ASPECTS OF PROBIOTICS

KAZIMIERZ CIECHANOWSKI

Department of Nephrology, Transplantology and Internal Medicine Pomeranian Medical University Szczecin

The intestinal microbiota is a set of microorganisms that colonize the gastrointestinal tract particulary in about 10 times greater number than cells of the human body (and 100 times more genes!). Microbiota have contributed to human evolution and continue to influence our diversity including our susceptibility to developing the metabolic syndrome (MetS). According to the International Scientific Association for Probiotics and Prebiotics the proper use of the term probiotic – „live microorganisms that, when administered in adequate amounts, confer a health benefit on the host". The modulation of the intestinal microbiota through probiotics and/or prebiotics („food" for microbiota) consumption associated to improvements in the parameters that characterize the MetS (obesity, high blood pressure, high blood triglycerides, low levels of HDL cholesterol and insulin resistance). In metabolic syndrome, an excess of bacteria of a species: Bacterioides fragillis, Lactobacillus reuteri a Staphylococcus aureus is found and simultaneous deficiency of Akkermansia municiniphilia, Bacteroides vulgatus, Bifidobacterium bifidum, Bifidobacterium longum, Lactobacillus plantarum. Restoring the proper compositon of intestinal bacteria improves the gut-brain axis. This happens through increased production of propionate (microbiota), release of GLP-1 by colonocyes (via propionate) and decreased appetite („Ozempic-like effect"). It is physiological, cheap and without yo-yo effect.

PROBLEMS IN PLANNING PHYSIOTHERAPY AFTER KNEE INJURIES IN YOUNG ATHLETES

ANDRZEJ CZAMARA

The College of Physiotherapy in Wroclaw, Poland

Hypothesis: Prevention is better than cure. Question: Can we always prevent knee injuries in children and adolescents practicing dynamic and extreme sports? We are not always able to prevent possible knee injuries, especially when the problem concerns dynamic jumps, pivots, fouls, falls, slides, the condition of the ground surface, weather conditions and others. In addition, we should consider the emotional state of young athletes, the processes occurring before and during their maturation. There are also situations such as excessive fatigue, mental problems developmental, anxiety, fear of exclusion and others. On the other hand, we have many cases of young athletes who want to return to practicing dynamic sports, requiring jumps, turns, falls, which are associated with high-risk re-trauma of the knee joint after surgical treatment. It is also difficult to reach a consensus of physiotherapeutic management and standards of subjective and clinical assessment, motor and psychophysical readiness of young athletes who have undergone knee injuries and they want to return to sport. Therefore, the lecture aims to: Explain the role of preventing knee injuries and when it comes to damage to structures. The author reviewed the literature on physiotherapy protocols and criteria return to training, successively return to sports competition in young players based on a literature review and the author's own experience.

THE USE OF PLATELET-RICH PLASMA (PRP) INJECTIONS IN THE MANAGEMENT OF SPORTS INJURIES. FACTS AND MYTHS?

SZYMON DRAGON

Faculty of Medicine, Wroclaw University of Science and Technology, Polska

Platelet Rich Plasma preparations (PRP) are a frequently used therapeutic tool in recent years. Their influence on tissue remodeling and regenerative processes is used, among others, in orthopedics, neurosurgery and sports medicine. As preparations of autologous origin, they do not cause significant side effects. They generate relatively low costs, are easy to prepare, and the method itself is minimally invasive. Despite the popularity of the method and a significant number of publications on this topic, the quality of the preparations remains problematic. The lack of standardization of separation in clinical practice translates into differences in the number of platelets in the preparation, which determines its quality and significantly affects the final therapeutic effect. The preparation process, including the centrifugation and concentration protocol and separation devices, differ significantly. A particularly important problem is the frequent lack of analysis of the prepared preparation, and therefore its lack of standardization. The lack of initial analysis of platelet levels in whole blood before preparing platelet-rich plasma preparations is also extremely important. The injection technique poses another problem. There are only isolated reports relating to schemes and techniques and the selection of appropriate materials and equipment for injection. Platelet-rich plasma is an important therapeutic tool. However, it is important to remember about the correct qualification of the patient, appropriate preparation and method of administering the preparation.

CARTILAGE AND MENISCUS INJURIES. WHY IS IT WORTH SAVING THEM?

MATEJ DROBNIČ

1 Department of orthopedic surgery, University Medical Centre Ljubljana, Slovenia, 2 Faculty of Medicine, University of Ljubljana, Slovenia

Cartilage lesions (incidence 8-15/100.000) and meniscal tears (incidence 3-5/100.000), along with anterior cruciate tears, remain increasing soft tissue knee injuries that commonly require surgical intervention in pediatric patients. If neglected, such injuries may induce prolonged knee dysfunctions and progress toward an early osteoarthritis. Cartilage lesions are typically presented as osteochondritis dissecans (OCD) involving the entire osteochondral unit. Treatment approach is conservative in isolated and stable lesions with open physis, whereas in unstable OCDs with closed physis and concomitant cruciate or patellofemoral instability a surgical intervention is warranted. In cases of a preserved OCD fragment, the one can be drilled or re-fixated, while various strategies of osteochondral cartilage repair (multilayered scaffolds, OATS, allografts) are necessary, if OCD fragment is shattered. Meniscus tears in pediatric population may have an embryogenic background for early failure (e. g. discoid meniscus variety), or they may emerge de-novo after a knee injury with hyper-flexion/extension or rotational/valgus stress. Older and higher male kids enrolled in pivoting sports represent the majority of traumatic meniscus patients; up to 60% of traumatic meniscus cases in adolescents are ACL related. The most common tears are horizontal or vertical ones located in the red-red or red-white zones of the posterior horns in both menisci (medial > lateral). Meniscus ramp lesions (i. e. menisco-capsular separation at the posterior horn) require special clinical attention after pediatric sports trauma, as they are frequently missed during MRI knee evaluation. While the peripheral tears in stable knees may well heal conservatively, a surgical intervention is needed for the rest. Centrally located flap tears can be simply resected; however, every attempt for the repair and meniscus preservation of the peripheral tears is encouraged.

POLISH EXPERIENCES IN PROMOTING PHYSICAL ACTIVITY: SUCCESSES AND FAILURES

WOJCIECH DRYGAS

Department of Social and Preventive Medicine, Medical University, Lodz, Poland

World Institute of Family Health, Calisia University, Kalisz. Poland Lazarski University, Warsaw, Poland

In Poland based on recent data only about 1/3 of adult population and ca 50% of children and youths are physically active according to WHO recommendations. The author presents long-term history of successes and failures of PA promotion in Poland. In last decade of XX century Poland with only 10 % of physically active adults was among least active European countries. In XXI century, some spectacular successes were achieved. Innovative PA campaign “Postaw Serce na Nogi” (Put the Heart on its Feet) under honorary patronage of Polish president Mr Aleksander Kwasniewski with support of Polish Olympic Committee and many elite Polish athletes has got great popularity. The authors of the Campaign organized a special contest with attractive prizes for all men and women who declare regular physical activity. Strong interest and support by media (TV, radio, newspapers, internet) was of crucial importance for the success of the Campaign. This innovative Campaign (2002-2005) was probably the first one in Europe with participation of several countries like Czech Republic, Slovakia and Romania. Among another successes one should enumerate “Mind Your Heart Campaign“ (2003-2009), Polish part of the “Healthy Stadia “ EU Program (2009 -) and of course “My ORLIK Pitch 2012”. In the period of 2008-2012 more than 2700 ORLIK sports pitches were built in small, middle-size and greater Polish cities. About 3.000 of sports animators were dedicated to work with children and youths using ORLIK pitches. Unfortunately, nowadays, in spite to many other countries, we do not observe in Poland consequent intersectoral collaboration of leading ministries, institutions and organizations in promoting PA. In my opinion PA promotion is not taking as priority by the Ministry of Health, and the Ministry of Sport is mostly engaged in supporting of competitive sports.

DOES COMPETITVE SPORT HAVE A POSITIVE EFFECT ON LONGEVITY?

WOJCIECH DRYGAS 1,2,3 AND WITOLD SMIGIELSKI 1

1 National Institute of Cardiology, Warsaw, Poland

2 Department of Social and Preventive Medicine, Medical University, Lodz, Poland

3 Calisia University, World Institute of Family Health, Kalisz, Poland

Since first scientific paper published by Morgan in 1873, plenty of papers discussed very important public health question: Does competitive sport have a positive effect on longevity?

Unfortunately, many papers are based on selective and not representative studies, moreover many important factors influencing longevity are not taken into analyses. Certainly, genetic factors and selection of most fit, ambitious and well-motivated individuals is of great importance. Moreover, social and economic situation of former athletes, their life habits during and following sports career as well as accessibility and quality of medical care are also very important.

The authors present new and intriguing results of their own analyses related to longevity of top-class football (soccer) players and elite Polish amateur boxers. Based on our recently published studies we concluded that elite Polish football players live about 3 years longer than general male population however they died more frequently due to cardiovascular disease (OR=1.31). For the first time based on a study in 723 top-class international players born before 1923 we demonstrated that goalkeepers live significantly longer than field players and this difference is surprisingly large (83.0 vs. 78.0). Results of our own still unpublished study in elite Polish amateur boxers, including Olympic champions and medalists of European and World championships demonstrate that in spite to few other studies performed in professional boxers, the average lifespan of Polish boxers is longer as compared to Polish men population (74.0 vs. 70.3). However, we observed more deaths due to suicides and due to traffic accidents. Concluding, more profound international studies are necessary to answer the question about relationship between competitive sports and longevity. Genetic factors, type, duration and potential risks of competitive training, economic and political conditions, lifestyle and medical care during and after sports career and also illegal pharmacological support should be considered.

TECHNOLOGY IN PARALYMPIC SPORT - INNOVATION CONTROVERSY

OSNAT FLIESS DOUER

Osnat Fliess Douer holds a PhD in rehabilitation sciences and physiotherapy from KU Leuven, Belgium. She is the director of Science, Technology, and Innovation of the Israeli Paralympic Committee.

Since 2018, Dr. Fliess Douer is an international member of the ACSM Olympic & Paralympic Sports Medicine & Sports Science committee. Her main research focuses on the development of Para athletes, combining innovative technologies to maximize athletic performance, injury prevention and overall athletes' well being.

Technological innovations are dramatically transforming Paralympic sports. Primarily, these innovations aim to enable participation, enhance training methods, reduce injury risks, and uphold the integrity of the sport through accurate classification process. Athletes, driven by the desire to push limits and secure medal, have identified that standard equipment sometimes hampers performance. To cater to these needs, groundbreaking equipment designs have emerged. Examples include advanced prosthetics for running and jumping, and ultra-light, high-speed racing wheelchairs. These innovations have a singular focus: enhancing sport performance. However, these advancements present a two-fold impact. While they undoubtedly improve daily functional devices for the wider differently-abled community, as seen in enhanced wheelchairs and prosthetics, they also pose challenges in preserving the sport's essence. The principle of ensuring safety and fairness in Paralympic competition becomes even more critical. The term "technology doping" has surfaced, defined by the World Anti-Doping Agency (WADA) as using equipment that either enhances performance or goes against the spirit of sport. This definition, however, leaves room for debate. This presentation aims to shed light on the existing controversy within the Paralympic movement regarding the integration of technologies and innovation. Through real case studies, we'll explore the ambiguous zones - areas where the absence of clear regulations lets controversial technologies make their way into competitions.

THE POWER OF EXERCISE TO PREVENT OR REVERSE FRAILTY OF THE ELDERLY

CHIARA FOSSATI

Department of Movement, Human and Health Sciences, "Foro Italico" University of Rome, Rome, Italy

Population all over the world is aging because of declining fertility rates and rising of life expectancy. People are living longer and actually most persons can expect to live over their sixties. Every country in the world is growing both in size and proportion of elderly segments of the population. By 2030, 1 in 6 people in the world will be aged 60 years or over. This leads to a greater burden of chronic aging-related diseases, with the consequent increase in the costs for welfare and sustainability of the entire social and health system. For these reasons, the aim of geriatric medicine is nowadays not only to "add years to life" but also to ensure a good quality of life to the older individuals. Frailty of the elderly, a concept that has fully been described by Linda Fried, is a state of increased vulnerability and difficulty in restoring homoeostasis after a stressor event, which increases the risk of adverse outcomes, like falls, disability, hospitalization, and death. A frailty phenotype has been described by five variables: unintentional weight loss, self-reported exhaustion, low energy expenditure, slow gait speed, and weak grip strength. Individual switch three or more of these factors can be defined as frail, those with one or two factors as pre-frail. Sarcopenia is the major cause of frailty. It can be defined as a loss of muscle mass and function due to atrophy, loss of muscle fibres, and the remodelling of their architecture. Physical activity is one of the most important lifestyle measures for primary prevention of frailty and sarcopenia. Moreover, exercise-based interventions are widely recognized as highly effective treatments against frailty and sarcopenia. They have been proven to improve frailty related physical impairment (low body mass, strength, mobility, physical activity level, energy) and have the potential to reverse this condition. The type, intensity, frequency, and duration of physical activity programs that are able to achieve these effects have still to be fully determined. New research projects in this area are desirable to provide answers to this challenge of today's society.

References

CleggA, YoungJ, Iliff S, et al. Frailty in elderly people. Lancet 2013; 381: 752–62
Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol Biol Sci Med Sci 2001; 56: M146–56.
Sieber CC. Frailty-From concept to clinical practice. Exp. Gerontol. 2017, 87, 160–167.
SymonsBand SwankPAM.Exercise Testing and Training Strategies for Healthy and Frail Elderl.American College of Sports Medicine: Clinical Applications, 2015

DIAGNOSTIC IMAGING AND FAST RECOVERY IN ATHLETES WITH POSTERIOR MICRO INSTABILITY OF THE HIP

SILVANA GIANNINI

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Microinstability continues to gain recognition as a potential cause of pain and functional limitation of the hip in young patients and athletes. Imaging is a very important diagnostic step in the work-up of athletes with suspected microinstability of the hip. In the past we used dynamic ultrasound exam to evoke the pain and to recreate the specific movements to induce the symptoms, discomfort and to stretch the muscles. Recently, weight-bearing magnetic resonance imaging (WB-MRI) has been proposed as an innovative dynamic approach to improve the clinical utility of static conventional musculoskeletal MRI. Microinstability of the hip is generally defined as a painful extra-physiological mobility of the hip, including both architectural and functional abnormalities, impairing hip stability. The etiology of microinstability of the hip is multifactorial, with contributing factors including abnormal osseous morphology, generalized hyperlaxity, capsular laxity and traumatic and iatrogenic injury. Repeated microtrauma may cause instability in athletes, particularly in sports which involve repetitive hip loading with axial rotation such as ballet, football, gymnastics, figure skating, martial arts, tennis and golf. Therefore, a conservative rehabilitation program emphasizing stretching, stabilization and balance exercises of hip stabilizers muscles led to full resolution of the symptoms and return to professional athletic activity. Symptoms related to this pathology are not uniform since they could be caused by a multitude of intra and extraarticular hip structures or can coexist conditions affecting or affected by micro- instability, like femoro-acetabular (FAI) and femoro-ischiatic (IFI) impingement, thus leading to different therapeutic pathways. We achieved a correct diagnostic result by using dynamic ultrasound and innovative real-time magnetic resonance imaging (WB-MRI) to identify lesions caused by gravity-related changes in muscle tension. Dynamic real-time and load imaging methods help to identify the extent of the pathology the athlete is suffering from. The correct diagnosis accelerates fast recovery of the athletes.

PREPARTICIPATION MEDICAL EVALUATION AND SPORTS ELIGIBILITY - EFSMA RECOMMENDATIONS.

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Sports medicine professionals need to ensure the safe participation of athletes in sports activities achieved through a periodical medical Pre-Participation Evaluation (PPE) and regular medical monitoring of the athletes' health. To harmonise these national variations in the content and application of the PPE, the EFSMA Scientific and Educational Commission proposes a "gold standard" for elite athletes across Europe.

The evaluation includes assessing the health status of athletes, conducting anthropometric measurements and evaluating functional and exercise capacity. Special emphasis is placed on the significance of cardiopulmonary exercise testing (CPET) as a tool to detect early signs of cardiovascular or pulmonary impairments and establish baseline performance assessments. The goals of the PPE also include fitness assessment, prescription of recovery and nutritional strategies, injuries prevention and safe return to play.

The pre-participation examination (PPE) plays a crucial role in athlete selection by assessing athletes' overall health, identifying any risk factors. By combining the findings from the PPE with the selection criteria, such as talent, effort capacity, body composition, and psychological skills, sports medicine professionals can make informed decisions about athlete selection, training regimens, and performance optimization strategies. The multidisciplinary nature of sports medicine ensures a comprehensive approach to athlete selection, incorporating medical expertise, physiological assessments, and psychological support to identify and nurture elite athletes. The conclusion emphasizes the importance of implementing standardized pre-participation screening protocols to ensure the safety and well-being of athletes, facilitate appropriate training interventions, and enhance overall performance outcomes. Once it is established as a European, comprehensive and standardised tool for assessing athletes readiness to play, it could also be used for conducting research and creating policies for athletes.

Keywords: pre-participation screening, athletes, health evaluations, injury prevention, performance enhancement, standardized protocols, selection

EXERCISE RECOMMENDATIONS IN INDIVIDUALS WITH CARDIOVASCULAR DISEASES

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Moderate physical activity should be promoted in all people with cardiovascular diseases (CVD). Appropriate risk stratification and optimal therapy are essential to formulate professional exercise recommendations for CVD patients. The current exercise recommendations in individuals with CVD in Europe were published 3 years ago by a group of experts from the European Society of Cardiology (ESC) Pelliccia A. et al. 2020. They are recommendations on physical exercise in individuals with: cardiovascular risk factors (obesity, hypertension, dyslipidemia, diabetes), chronic coronary syndrome, chronic heart failure, valvular heart disease, aortopathy, cardiomyopathies, myocarditis and pericarditis, arrhythmias and channelopathies, adult congenital heart disease. After 2020, further ESC Clinical Practice Guidelines have been prepared, which recommend regular physical activity (PhA) as a support for treatment and an element of patients' lifestyle: in 2021 CVD Prevention, Valvular Heart Disease, in 2022 Ventricular arrhythmias and the prevention of sudden cardiac death (SCD) and in 2023 Acute coronary syndromes (ACS) and Cardiomyopathies.

In the presentation, the ESC recommendations from 2020 will be supplemented with the latest research results. The aim of the PhA recommendations is to ensure the health safety of exercisers, eliminate or reduce exercise- related SCDs, and support the treatment of these diseases.

A very important element of the examination performed by a sports medicine doctor is the pre-participation examination. The proposal of EFSMA recommendations on a unified form for the assessment of elite athletes in European countries was published by Ionescu A.M. et al. in BMJ Open Sport & Exercise Medicine in 2021

The presentation will discuss how to formulate recommendations regarding PhA for patients with selected CVDs, in accordance with the acronym FITT, with particular emphasis on how to assess the intensity of physical exercise. Recommendations for risk stratification and prevention of SCD according to age will be considered: in young athletes and athletes over 35 years of age. A personalized exercise prescription is absolutely required for every person with CVD.

ELECTRICAL STIMULATION FOR MUSCLE WEAKENING.

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Loss of muscle mass and strength with age (sarcopenia) is a significant cause of functional decline with age. It also has a number of negative consequences for the health and functioning of seniors. The recommended way to prevent and treat sarcopenia is physical activity (mainly resistance training) in combination with dietary interventions. Unfortunately, the implementation of recommendations for resistance exercise among the elderly is very poor. In addition, some pathological conditions affecting the elderly, e.g. musculoskeletal diseases and limited physical abilities are a real barrier to undertaking and implementing resistance training. An alternative to resistance training may be electromyostimulation (EMS). Electromyostimulation is defined as the application of a series of electric impulses to the superficial skeletal muscles to produce visible muscle contractions by activating intramuscular nerves. There are many protocols for the use of EMS. EMS is used locally, on individual muscle groups and as whole-body electromyostimulation (WB-EMS), in combination with exercise/isometric tension or as a single intervention. Various EMS application parameters are also proposed (frequency, intensity, pulse duration, contraction time and rest periods, session duration). Review studies suggest that EMS is an effective intervention used to prevent sarcopenia and improve muscle mass and strength in the elderly. In addition, they can result in improved gait and balance, especially in less active older people. It seems that even a 4-week EMS program used 3 times a week can bring positive effects. EMS is considered less time-consuming than conventional resistance training. It is generally a safe intervention, but due to the reported isolated cases of rhabdomyolysis after the use of WB-EMS, caution should be exercised when dosing the current, especially during the first training sessions, and follow the training safety recommendations.

EXERCISE OVER 50 YEARS OLD: RISKS AND BENEFIS

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In the developed countries the number of older people is on the increase, likewise the knowledge on the benefits of regular physical activity. Therefore, the number of physically active older people is gradually increasing. Older individuals generally undertake lower-intensity activities (gardening, walking, golf, low intensity exercises) than their younger peers. Nevertheless, growing number of seniors participate in physical activity at a very high level of intensity like marathon running or competitive weightlifting. On the list of world masters athletics records there are many people at a very advanced age (even over 90-100 years old) in disciplines such as long jump, high jump, hurdles, triple jump, pole vault, decathlon or steeplechase. There are no specific guidelines restricting participation in even the most intense forms of exercise for older subjects. The American College of Sports Medicine/American Heart Association (ACSM/AHA) in physical activity recommendations for older adults include vigorous-intensity activities and recommend only: “Any modality that does not impose excessive orthopedic stress“. Moreover, the Department of Health and Human Services (DHHS) in Physical Activity Guidelines for Americans note that additional health benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration. In older people the risk of injury is greater due to age-related changes and concomitant conditions. Consequences are also usually mor serious than in younger age. The number of sports-related injuries increases among older people practicing sports. An appropriate identification of risk factors for injury and education of older people can reduce the incidence of injuries. Methods of preventing injuries include using helmets, protective equipment, warming up and properly designed training programme. Therefore, while participation in regular physical activity should be promoted, attention should also be focused on another health goal: to decrease the incidence of injuries associated with sport and recreational activities.

THE ROLE OF PHYSICAL ACTIVITY IN THE TREATMENT OF INFERTILITY

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In this lecture, I will discuss three topics. The first is the role of physical activity in the treatment of obesity-related fertility disorders in both men and women. Obesity among people of reproductive age is significant and concerns almost 1/3 of this population. Physical activity as part of a broadly understood lifestyle can facilitate procreation. The second group in which abdominal obesity, insulin resistance is a factor that aggravates the disease and infertility among women is polycystic ovary syndrome. I will discuss the mechanism of this disease and the role of physical activity in the course of this disease. The third group is a disorder of gonadal function among women practicing sports, called functional hypothalamic amenorrhea (FHA), which means amenorrhea due to inhibition of the hypothalamic-pituitary-ovarian axis without accompanying anatomical abnormalities or organic disease. This type of disorder is part of the so-called "Triad of female athletes". Originally, the term was characterized by eating disorders, amenorrhea, and osteoporosis among female athletes. Currently, this disorder has a broader definition and affects both women and men. Since there are other disorders that may result from the triad of female athletes, the IOC (International Olympic Committee) has proposed the term Relative Energy Deficiency in Sport (RED-S) to expand the issue. The RED-S syndrome includes disturbances in the functioning of the body, observed both among physically active women and men, resulting from the supply of energy in an amount insufficient to ensure optimal energy availability. In this part, I will present the scale of the problem, the mechanism of infertility in women and men in the course of RED-S syndrome and how to treat this disease.

LIFE EXPECTANCY, LONGEVITY AND SPORT

HERBERT LÖLLGEN

Germany, Remscheid, Cardiology Practice and University of Maisz

Dieter Leyk, Head, Sports Epidemiology Section, Sports University, Cologne, Germany

Most people want to live a long life with health and fitness. Longevity requires a healthy lifestyle with regular physical activity (PA) at least 10-30 years especially before aging. Top athletes, but also leisure time athletes with regular sports activity are examples of how regular PA not only prolongs life, but also gives a better quality of life and self-determination for seniors beyond age of 70 years. A narrative review with many meta-analyses and single studies resulted in convincing data with athletes living longer and fitter than the general population. Longevity is especially to be observed in endurance trained athletes. Epidemiological studies show, that people starting with regular activity between 50-60 years will have the best chance to live longer and with better fitness from 70 years onwards. Thus, the analysis of active elderly athletes when being 70 ys or older have a better quality of life and longer life expectancy. According to numerous epidemiological studies, it clearly shows, that even regular walking or low intensity activity will enable such a healthy aging. Nonetheless, some activity is better than nothing, but more will give better fitness and health. Starting between 50 to 60 years with regular physical activity means a healthy and self-determined life beyond 70 years.

SIMULATION OF WEIGHT LESSNESS (ZERO GRAVITY) VIA BEDREST (HEAD DOWN TILTING)

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Simulation of weightlessness or microgravity is a basic procedure for training of astronauts. Microgravity can be performed by parabolic flight with short term weightlessness (20 sec), by head out water immersion, by bedrest or head down tilting. Simulated microgravity is a prerequisite for all subjects before staying and working on space station such as ISS or flights at great heights. With regard to epidemiological studies, microgravity is comparable to long-term – inactivity or sedentary lifestyle. As a consequence, longer lasting sedentary lifestyle as simulation or part of real life for many people (e.g. >4 hours per day) leads to sarcopenia, such as osteoporosis or muscle atrophy. Normally, this observed in astronauts when staying longer (> 2 months) on the ISS. As countermeasure, astronauts are recommended to perform regular physical activity such as ergometry or treadmill exercise between 2 to 4 hours per day. This then is an effective procedure to prevent sarcopenia during weightlessness and staying fit. As such, this procedure is also an example from which we can from astronauts how to stay fit even from young to older age. Unfavourable results of sedentary lifestyle or physical inactivity can be overcome by regular movement and moderate or vigorous regular physical activity.

CORONARY CALCIUM AND ENDURANCE ATHLETES: A NARRATIVE REVIEW

HERBERT LÖLLGEN, NORBERT BACHL

Herbert Löllgen Germany, Cardiology Practice, Remscheid, and University of Mainz, and EFSMA Lausanne, Switzerland

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Over many years, there has been a controversial discussion whether vigorous or highly intensive endurance training can lead to heart damage in athletes. The landmark study by Saltin (1964) rejected this presumption many years ago. With the application of coronary calcium determination in endurance athletes, again the question arose whether intensive training may favour atherosclerosis. In contrast, several studies show a significantly longer life expectancy and no cardiac events in highly trained athletes. Cardiological journals (ACC, AHA, ESC), sports cardiology, radiology and epidemiology publications were reviewed in addition to research (PubMed, BISP-Surf, Google scholar). With the advent of routine coronary artery calcium (CAC) determination, some authors reported positive findings for CAC in a smaller group of athletes (10-20%) with low, moderate or especially high fitness with elevated Agatston scores. When performing analysis of coronary plaque, especially by coronary computer angiography (CAT),there were different features of coronary plaques in normal subjects or even in patients compared to endurance athletes. Athletes have, if at all, different plaque composition as calcified or no risk plaques. Plaques in athletes' arteries, which are wide, are more dens, firmer, more stable, have a firm "cap", thus reducing or preventing risk of plaque rupture. The fitter the athlete, the more atherosclerotic plaques were stable. Remarkably, two current papers reported very different findings of plaques in a small group of top endurance athletes, namely mixed or non-calcified plaqes. However, no or very rare acute cardiovascular events were observed in all athletes even in these studies. There are some explanations for the origins of plaque in athletes, which will be discussed together with several open questions such as longevity or lack of mayor cardiovascular events. Different approaches analysing harm to the heart by intensive endurance sports convincingly show that cardiac endangerment of athletes from this point is not proven or at least questionable for a minority (10-20%) of highly trained endurance athletes.

CLASSIFICATION CHALLENGES IN PARALYMPIC SPORTS

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Introduction. Classification is an important part of the Paralympic Sport Movement sports procedures which is existed since 1960, when the 1st Paralympic Games were. The classification process is conducted on the national or international level before the competition. In parasports, athletes are grouped by the degree of activity limitation resulting from the impairment. The main aim of the classification is to minimize the impact of impairment on sport performance. The new athletes (N) must present the permanent underlying health condition (UHC), stable or fluent, which provide at least one of ten types of impairments (the first part of the classification process) and is established as eligible or not eligible (NE). Next, the athletes are checked and verified in terms of minimum impairment criteria (MIC), which are very specific for each sport by classifiers, who use medical and functional tests. If the players meet MIC, they will allocate to the specific class based on the results of medical and functional assessment. In the end, the athletes receive the class and the status (confirmed - C, review - R, fix review date - FRD, or is not eligible – NE) for the specific sport. If the UHC is stable, nearly all athletes participate in the classification process once. If the UHC is fluent, this athlete has to be classified again in the future. The most challenge for classification is evidence-based classification (EBC) that deliver proper evidence to each part of the classification process (specific medical documentation and assessment, medical and functional factors to access, observation factors during a real game competition. Conclusion. The valid and reliable assessment methods are seeking in the literature and research. The specific determinants are looking for to observe and measure in a specific sport. The search for new and specific methods in classification is highly desirable.

Keywords. Classification, parasport, athletes

IPC. (2015). IPC Classification Code. Rules and Regulations, Policies and Procedures for Athlete Classification. http://www.paralympic.org/sites/default/files/document/150423144118595_2015_Code+version2+for+website.pdf

IPC (2020). Explanatory guide to paralympic classification. Paralympic summer sports. https://www.paralympic.org/sites/default/files/2020-10/2020_06%20Explanatory%20Guide%20to%20Classification_Summer%20Sports.pdf

Tweedy, S. M., Mann, D., & Vanlandewijck, Y. C. (2017). Research needs for the development of evidence-based systems of classification for physical, vision, and intellectual impairments. In Y. C. Vanlandewijck & W. R. Thompson (Eds.), Training and Coaching the Paralympic Athlete (pp. 122-149). John Wiley & Sons, Inc.

Tweedy, S. M., & Vanlandewijck, Y. C. (2011). International Paralympic Committee position stand--background and scientific principles of classification in Paralympic sport. British Journal of Sports Medicine, 45(4), 259-269. https://doi.org/10.1136/bjsm.2009.065060

PHYSIOLOGY OF THE AUTUMN OF THE ATHLETIC CAREER

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Physical activity can positively affect the ageing process, unfortunately only partially. The choice of the moment for the end of the professional sport career depends on many factors and questions. What afterwards, are there any guidelines? These questions will be addressed according to the physiology of ageing and extended to the following: Do elite athletes live longer? Is it influenced by the sport discipline? Finally, several examples of 'master' performance will be presented and the discussion on the recommendations for training and competition in ageing humans will be risen.

ALTITUDE TRAINING IN PRACTICE - LIVE-HIGH TRAIN-LOW IN ELITE ATHLETE

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Most athletes use a natural model of living and training at altitude, but many other strategies have developed, including artificial manipulations of air composition. The most promising strategy for the sea-level elite performance is living high-training low (LH-TL). The introduction of LH-TL method into the practice in the middle-distance runners of the Polish track and field National Team will be presented. During the season the methods, duration and altitude were modified according to the athletes' status and competition schedule. Basic training in the first phase was performed naturally at moderate altitudes. The main part was LH-TL, with gradually increasing altitude, and in the final phase the short, acute altitude stimulations were introduced. Moreover, several confounding factors always appear in such 'perfect' plans, and adaptation to them will also be briefly discussed.

SPORT PERFORMANCE MONITORING OF ELITE ATHLETES IN PARALYMPIC SPORT

BARTOSZ MOLIK

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Paralympic sport was launched in 1960. Since then, there has been observed a dynamic development of Paralympic sport events. Achieving sports successes in elite sport requires searching for new, effective, innovative and creative solutions. The aim of this study was to review the field based and laboratory test used in different Paralympic sports. Analyzes of different laboratory and non-laboratory (field based) tests were presented in that study. New sport specific tests related to sport paralympic events were prezented. Moreover, main challenges and difficulties of athletes' monitoring i.e. equipment, resistance, realiability and validity, classification and impairment were showed. New research directions were presented.

Keywords: Paralympic sport, sport performance, field based and laboratory tests

Funding: Józef Piłsudski University of Physical Education in Warsaw, Poland

REGENERATIVE ASPECTS OF CARTILAGE TREATMENT

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Regenerative medicine in sports orthopedics includes the application of medical biotechnology to treat and heal defects and functional lesions in the locomotor system. Especially in sports medicine with increasing rates of injuries regenerative modalities are necessary to restore function of the locomotor system after failed repair. Regenerative medicine encompasses tissue engineering by using cells, biomaterials, and regulators to restore tissue defects, as well as blood derived products like PRP, ACP or cell concentrates from bone marrow or fat to regulate und modulate healing response to achieve better out-comes after degenerative and inflammatory processes. In the younger athlete the treatment of the cartilage defect with autologous chondrocyte transplantation shows sufficient evidence, but the logistic, regulations, costs and the delayed back to sport is still an unsolved issue. The use of biomaterials has advanced the progress and newer development want to avoid cell culture and use progenitor cells from fat or bone marrow attached to the scaffolds. Degenerative processes in cartilage and tendon are in the focus of autologous blood products like PRP, which are widely used in sports medicine. The high variability of the products as well in the individual perspective, as on the technology of production aspect is very high and does not allow general assumptions regarding efficacy, effectiveness, and evidence. Although especially in early osteoarthritis many studies prove even long-term effects of those blood derived substances. Recently extracellular vesicles (eVs) as functional messenger between cells have come into the focus of research and might help to stratify and standardize these orthobiologic concepts. However, the field of regenerative medicine is wide and many of those products are not fully understood yet and beyond clinical evidence; so critical analysis of existing studies and scientific background is inevitable. Especially in sports medicine in younger athletes the regenerative potential is very high and should be in the focus research to overcome early impairment of sport activities especially in younger patients.

HEART DAMAGE IN ENDURANCE SPORT. CAN STRENUOUS ENDURANCE EXERCISE DAMAGE A HEALTHY HEART?

GÜNTHER NEUMAYR

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All things are poison and nothing is without poison, only the dose makes a thing not a poison. This well-known quote was coined about 500 years ago by Paracelsus. Regular exercise is very effective in the prevention and treatment of many diseases, and much is known about the minimal “dose” for health benefits. However, there might be dose-dependent “toxic” effects beyond an upper limit of regular training where additional physical activity does not provide any further benefits. The dose-response curve is curvilinear in the best case or U-shaped in the worst-case scenario with toxic effects beyond the limit. So far, no upper limit for potential harm has been defined. In the last two decades some research focused on the adverse long-term effects of regular strenuous endurance. These studies provided evidence suggesting that years of endurance training can lead to negative cardiac effects, including myocardial fibrosis, atrial fibrillation, exercise-induced dilatation of the right heart, ventricular arrhythmias, and premature coronary atherosclerosis. On the other hand, many exercise-induced cardiac adaptations, e.g. the increases in cardiac troponins and natriuretic peptides, as well as left and right ventricular dysfunction and dilatation, are known to be promptly reversible and are often summarized under the term of “cardiac fatigue” expressing complete cardiac recovery. The cut-off between acute and chronic cardiac adaptations is a grey-zone between physiology and potential pathology. The present lecture gives some insights and answers to the issue whether strenuous endurance exercise can damage a healthy heart. However, the crucial question for the perfect dose of physical activity still remains unanswered.

INTERNATIONAL ASPECTS OF ACL (ANTERIOR CRUCIATE LIGAMENT) PREVENTION

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During the last years we see a dramatic rise of knee injuries among mainly young people (aged 8-23 years). In different countries all over our planet studies were performed about the so-called incidence of knee injuries. Especially recent work from Australia and the UK showed clearly, that the health and wellbeing of children and adolescents is at risk. Since the early 2000s lots of research has been done in the US and Scandinavia, showing, that exercises, which can be used as a warming up, can reduce the risk of a knee injury by 50-60%. These exercises include balance / strength / speed and plyometrics (jumping) and a mixture is mandatory in order to reduce the risk of knee injuries and help the athlete to be active instead of injured. ESMA, the sports section of ESSKA has joined forces and composed 3 sets of exercises, based on research and experience from the United States, Norway and The Netherlands from 10-15 years in order to reduce the risk of knee injuries. The different sets of exercises become a bit more difficult for the different levels / age groups. If performed properly and regularly as a standard warming up, this prevention program will improve your performance and reduce the risk for a knee injury at the same time! During the presentation an overview of international approaches reagarding this important topic will be presented as well as the ESMA/ESSKA program.

EARLY SPECIALIZATION IN SPORT

SANDRA ROZENSTOKA

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Physical activity is an important factor and active biological stimulus promoting the growth and physical development of a child. Sports for children should be engaging and motivating as well as regular, comprehensive, and suitable for the health and fitness of the child's body. In paediatric sports medicine, a tendency towards early specialization in specific sport is often observed, even though less than 1 % of children become professional athletes. The main criteria of the early specialization in sports are early children start age (4 - 12 years) with involvement in only one sport and exclusion other sports, early start of high-intensity training program and participation in sports competitions (Popkin, Bayomy and Ahmad, 2019). Children's participation in sports is analysed using data of the scientific systematic reviews, registers of children's participation in sports and parents' interviews. A lot of sports are late specialization sports, except artistic and sports gymnastics, figure skating, acrobatic and artistic sports where specific and complex motor skills must be acquired before the period of physical growth during adolescence. However, sports in many countries are characterized by the children early specialization in sports or even in one position in the field (team sports), which is facilitated both by the motivation of parents for the early achievements of the child, the non-observance of the training methodology of the sports trainer and the organization of national or regional-level sports competitions in young age children's groups. Early specialization and following intense training program in specific sport slows down the functional adaptation of cardiovascular and respiratory systems and decreases a possibility to develop in high level all physical and motor skills of the child. In early specialization the risk factors are: little variety of movements and sport-specific repetitive movements effects on the child's body with two-time increased risk of sports injury, especially overload injuries such as Osgood - Schlatter's disease, stress fractures or others, psychological burnout syndrome, which is promoted by chronic fatigue, little time to socialize and changes in mood, eating disorders and life uncontrol feeling. Early specialization (more often in individual sports) in sports, high training volumes and competitive experience at early age do not provide or increase achievements in sports in adulthood but give a risk for complete inactivity in adulthood if the child does not choose an athlete's carrier.

Key words: Sports medicine, Early Specialization, Children sports

CORRELATION BETWEEN CLINICAL, MRI AND ARTHROSCOPIC FINDINGS IN SPORTS KNEE INJURIES.

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A knee injury in an athlete, especially a professional, requires efficient and effective diagnosis and an optimal treatment strategy, taking into account the competition participation schedule. Planning basically focuses on the decision to undertake immediate or deferred surgical treatment, and in cases of minor intra-articular damage, on estimating the chances of success of conservative treatment. The presentation analyzes cases of the most common sports injuries of the knee, diagnosed by clinical and imaging examination using modern examination techniques with a high-field magnetic resonance scanner, and verified by arthroscopic imaging. Based on many years of experience, the author presents the most important principles of treatment tactics for athletes with injuries to the meniscal cruciate ligaments and damage to the articular surfaces.

REVERSING THE ROAD TO DEMENTIA BY ADDRESSING PREVENTABLE RISKS: THE ROLE OF HEARING LOSS AND PHYSICAL ACTIVITY

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In 2017, The Lancet published a large commissioned study on the preventable risk of dementia. The results of this study showed that in middle age (between 45 and 65 years), hearing loss was the most significant preventable risk (9%). Another preventable risk factor in this age group was obesity (6%), while in the older population (over 65) it was physical inactivity (4%). The results of this study revolutionized research in the field of hearing science and, as a result, expanded the outcome measures for patients treated for hearing loss. This presentation will review the evidence for the impact of auditory rehabilitation with cochlear implants on the cognitive abilities of people with hearing loss. In addition, the relationship between physical activity and hearing ability will be presented and discussed in the context of dementia prevention. Finally, the relationship between a healthy immune system, physical fitness, and hearing ability will be presented.

CAN WE ENHANCE THE EXERCISE-RELATED HEALTH BENEFITS FOR WOMEN AND THEIR OFFSPRING BY INCREASING THE AMOUNT OR INTENSITY OF PHYSICAL ACTIVITY DURING PREGNANCY? – BASED ON CURRENT RECOMMENDATIONS AND RESEARCH ON THE EFFECTIVENESS OF VARIOUS PRENATAL EXERCISE INTERVENTIONS

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Does more mean better? – this is an open question regarding the health benefits of exercise during pregnancy. Undeniably, regular physical activity supports the proper course of pregnancy, childbirth and postpartum period and is associated with clinically meaningful reductions in the odds of developing gestational diabetes mellitus, pre-eclampsia, gestational hypertension and other serious diseases. Moreover, prenatal physical activity reduces the risk of premature delivery and miscarriage, foetal macrosomia, complications in labour or the risk of metabolic disorders in children. It also improves sociopsychological functioning of women in the perinatal period. The World Health Organization recommends at least 150 minutes of moderate-intensity physical activity per week throughout pregnancy. However, there is scientific evidence that accumulating more physical activity over the week is associated with greater health benefits. Recently, researchers have been particularly interested in exercise intensities beyond those typically recommended. Prenatal High Intensity Interval Training (HIIT) is becoming more and more popular, both as a proposed fitness class in sports facilities and as an experimental intervention in clinical trials. The aim of this presentation is to discuss, based on available scientific evidence and current guidelines in the field of gynaecology and obstetrics and sports medicine, including new Polish guidelines: Firstly, whether HIIT during pregnancy, as a stronger exercise stimulus, has a better impact on selected biological and psychological parameters of pregnant women compared to MICT (moderate intensity continuous training)? Secondly, will HIIT and MICT programmes, tailored to the specific needs of pregnancy, differ in their effectiveness in maintaining proper functional parameters in women, including quality of life and prevention of urinary incontinence? The outcomes of HIIT Mama project (NCT05009433) will be presented, showing various exercise programmes as potential method of preventing pregnancy complication and ailments as well as non-communicable diseases in future mothers.

Keywords pregnancy, exercise, physical activity, high intensity interval training, HIIT, recommendations, health

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THE COMPELLING LINK BETWEEN LIFESTYLE EXERCISE AND IMMUNOSENESCENCE

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During aging the immune system undergoes remarkable changes that collectively are known as immunosenescence. Immunosenescence has been considered detrimental because it may lead to a low-grade chronic inflammation called „inflammaging" [Santoro et al. Ageing Res Rev 2021]. Many efforts have been initiated to find biomarkers or constellations thereof for predicting morbidity and mortality and which might be potentially informative for understanding mechanisms of immune ageing [Pawelec 2019]. One of the non-pharmacological activities in the concept of successful aging recommended to older people is the promotion of regular physical activity. It has been proven that regular physical activity has a positive effect on the prevention of coronary heart disease, lowers blood pressure and protects against the development of Alzheimer's disease [Vogel et al Int J Clin Pract 2009]. In our research the older adults with the result of 6-minute walking test >1.3 m/s and VO_2 max >35 mL/kg/min had a significantly higher CD4+CD45RA+ T lymphocyte percentage and also a higher ratio of CD4+CD45RA+/CD4+CD45RO+. Above 50% of physically active participants demonstrated the CD4/CD8 ratio ≥1 or ≤2.5 contrary to the inactive group who showed in 15% of respondents the ratio <1 [Tylutka et al. BMC Geriatrics 2020]. What more elderly people leading an active lifestyle (gait speed >1.3 m/s) had significantly lower values of the pro-inflammatory HMGB-1 protein (20.5 ± 19.2) compared to the inactive older adults (68.2 ± 56.6). HMGB-1 in our study had both high AUC=0.701 and OR=12, 95%Cl 3.254 - 61.614, p<0.001, which implies its potential application in the assessment of the impact that an active lifestyle exerts on inflammation reduction in older adults [Tylutka et al. Aging (Albany) 2023, in press]. According to Morawin et al. [Int J Environ Res Public Health 2021] the 10-month Tai-Chi training has pro-health effects through the loss of fat content and the improvement of physical performance. Practicing Tai-Chi may initiate changes in apoptotic mechanisms, which could improve the skeletal muscle functioning, and in the longer term, health-related quality of life in older adults.

TREATMENT OF ANTERIOR CRUCIATE LIGAMENT INJURIES IN CHILDREN AND ADOLESCENTS

WOJCIECH WIDUCHOWSKI

College Of Physiotherapy In Wroclaw, District Hospital Of Orthopedics And Trauma Surgery, Piekary Slaskie

Children and adolescents constitute the largest demographic group of patients who sustain anterior cruciate ligament (ACL) tears, and the frequency is increasing. ACL injuries in skeletally immature individuals remain a challenge for orthopaedic surgeons and physical therapists. There is the potential risk of recurrent instability, secondary injuries following nonoperative treatment, and also the risk involved with surgical treatment. In ACL-deficient children and adolescents, continued symptoms of instability can result in progressive meniscal and cartilage damage. The paper presents treatment strategies for ACL injuries in children and adolescents.

BIOMATERIALS IN TREATMENT OF JOINT INJURIES

WOJCIECH WIDUCHOWSKI

College Of Physiotherapy In Wroclaw, District Hospital Of Orthopedics And Trauma Surgery, Piekary Slaskie

There is a great interest in biomaterials that can be utilized in repair and regeneration applications of musculoskeletal system caused by sports injuries. The significance of the rise of biomaterial-based approaches and tissue engineering strategies has been observed recently. This paper provides a summary of biomaterials currently used in clinical practice and application of synthetic biomaterials used in the treatment of musculoskeletal conditions.

PHYSICAL EXERCISE AS A STRATEGY TO IMPROVE IMMUNITY HEALTH STATUS

EDYTA WAWRZYNIAK-GRAMACKA, BARBARA MORAWIN, ANNA TYLUTKA AND AGNIESZKA ZEMBRON-LACNY*

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Background. The World Health Organization recently recognized the need for work to improve immunity health status and vaccination process. Physical exercise holds the potential to be beneficial for immune status and vaccine response especially individuals who practice physical activity regularly. During and after physical exercise, pro- and anti-inflammatory cytokines are released, lymphocyte circulation increases, as well as cell recruitment [Tylutka et al. BMC Geriatr 2021, Wawrzyniak-Gramacka et al. Nutrients 2021]. Such practice has an effect on the lower incidence, intensity of symptoms and mortality in viral infections. The effect size of aerobic exercise is reported to be moderate, and larger effect sizes have been reported for isometric and resistance exercise [Lee et al. Hum Vaccin Immunother 2021]. Despite evidence supporting the role of physical activity in reducing the risk of infection diseases, little is known about optimal physical exercise interventions in vaccination process. Methods. PubMed, EBSCO, and Medline SPORTDiscus and Cochrane databases were searched up to July 2023 for physical activity-based intervention studies that assessed physical activity outcomes in adults. Three randomised controlled trials including 373 adults (physically activity and non-activity/control group) without comorbidities were included. An increase in physical activity was reported with a moderate-vigorous intensity aerobic and resistance training intervention before and/or immediately after vaccination. Meta-analyses showed that physical activity interventions had an overall positive effect (standardised mean difference 0.40 95% CI 0.20-0.61, p<0.01, I2=99%) compared to control group. Conclusion. Regular, moderate to vigorous physical activity is associated with reduced risk of infectious diseases, enhances the immune status and increases the potency of vaccination.

Keywords. Exercise, infectious diseases, vaccine

CURRENT RECOMMENDATIONS OF PHYSICAL ACTIVITY IN SUBJECTS WITH ARTERIAL HYPERTENSION

TOMASZ ZDROJEWSKI, IWONA SZADKOWSKA

PART I: Tomasz Zdrojewski

Department of Hypertension and Diabetology, Medical University of Gdansk, Committee of Public Health, Polish Academy of Sciences, Poland

Arterial hypertension remains an important epidemiological problem. European and American recommendations for clinical practice differ in blood pressure classification and definition of hypertension, however, appropriate physical activity remains in both cases one the basic compound of non-pharmacological management. The proportion of subjects implementing physical activity recommendations in the population of adults in Poland is very low and does not exceed 30%. It is estimated that significant improvements in this field could increase life expectancy by 1.5 years for women and 1.7 years for men. Arterial hypertension affects also athletes, among whom the occurrence of hypertension is estimated at about 4%. Yet, research shows slightly higher blood pressure values among strength-trained athletes in comparison to endurance-trained athletes. Appropriate complex intervention in specific groups of hypertensive individuals should include planning of physical activity with proven hypotensive effects.

PART II: Iwona Szadkowska

Department of Sports Medicine, Medical University of Lodz, Poland

The recommendations of physical activity for patients with hypertension include, as for the general population, endurance training, resistance training and balance and coordination training for the elderly. In people with well-controlled hypertension, resistance training 2- 3 per week is recommended, in addition to moderate / vigorous aerobic exercise to lower blood pressure and cardiovascular risk. Additional hypotensive impact can have balance and coordination training. Moreover, studies have shown that implementation of aerobic exercises reduces ambulatory blood pressure also among patients with resistant hypertension. Depending on the static or dynamic components of the exercises, a different reaction of blood pressure and heart rate is observed. Power sport disciplines, especially of high intensity, may be contraindicated in some individuals with hypertension. In hypertensive adults, an excercise test will be helpful to determine training loads. It is especially useful for assessment of physical fitness, verification of clinical symptoms and detection of exercise-induced abnormalities.

ADVERSE OUTCOMES OF PROLONGED BED REST

ANDRZEJ W. ZIEMBA

Clinical and Research Department of Applied Physiology, Mossakowski Medical Research Institute, Polish Academy of Sciences, Pawińskiego Str. 5, 02-106 Warsaw, e-mail: ziemba@cmdik.pan.pl

Prolonged bed-rest is connected with reduced physical activity and hypogravia (reduced hydrostatic pressure) in healthy people. Nearly all body systems are adversely affected by this deconditioning and the most considerable ones include muscle atrophy, decreased blood volume and other changes in cardiovascular system functioning, increased diuresis (loss of calcium), glucose intolerance, as well as decreased bones mass and content. Reduced working capacity results from increased heart rate in submaximal exercise load and decreased maximal oxygen uptake (VO2max). The more elevated VO2max level is before immobilization, the greater the magnitude of working capacity and VO2max reduction. The described changes may be accountable for delayed recovery in hospitalized patients.

THE RISK OF SUDDEN DEATH IN HYPERTROPHIC CARDIOMYOPATHY IN YOUNG ATHLETES

LIDIA ZIÓŁKOWSKA

Department of Pediatric Cardiology, the Children's Memorial Health Institute Warsaw, Poland

I would like to invite you to listen to a lecture in which the aspects of assessing the risk of sudden cardiac death (SCD) in young athletes (<35 years of age) with hypertrophic cardiomyopathy (HCM) will be presented, with particular emphasis on the population of children and adolescents. Hypertrophic cardiomyopathy is a leading cause of SCD in young athletes. Histopathologically, HCM presents an unstable myocardial substrate that is vulnerable to ventricular tachyarrhythmias during exercise. During the lecture, the etiology of SCD depending on the patient's age will be presented. It is worth emphasizing that when considering the most likely cause of SCD in a young athlete, his age should always be taken into account. Cardiomyopathies account for nearly half of SCD cases in college and professional athletes, while coronary artery anomalies play a more prominent role than expected in middle school athletes. Diagnosis of HCM can be difficult in athletes, it is necessary to perform comprehensive cardiological tests and collect a detailed personal and family history in order to differentiate the physiological LV hypertrophy in an athlete from hypertrophic cardiomyopathy. Current methods of SCD risk stratification in HCM will be presented based on individualized and validated models such as HCM Risk-SCD for patients over 16 years of age and HCM Risk-Kids for children and adolescents under 16 years of age. All individuals with HCM should be encouraged to participate in regular physical activity and recreational exercise. Recommendations for exercise and sports participation in athletes with HCM should be based on current guidelines but shared decision making remains very important. I hope that the scientific program of the lecture will allow you to expand your knowledge helpful in everyday clinical practice.

ORAL PRESENTATION SESSION I

20 OCTOBER 2023 (FRIDAY) 15.30-17.00 ROOM C
CHAIRS: BARBARA MORAWIN, ANDRZEJ POKRYWKA

1.

Name: Błażej Przybylik

Title The effects of supplementation protocols on physical capacity and performance in racket sports athletes: a systematic review of randomized controlled trials

Author affiliations Błażej Przybylik 1 , Paulina M. Nowaczyk 1 , Mikołaj Szymocha 1 , Krzysztof Durkalec- Michalski 1* 1 Department of Sports Dietetics, Poznan University of Physical Education, Królowej Jadwigi 27/39, 61-871 Poznań, POLAND

Abstract

Introduction: Racket sports are characterized by intense, acyclic movements that require both aerobic and anaerobic energy systems. The physical and physiological demands of elite racket sports athletes are constantly evolving and growing, what is reflected by increasing number of passes, raises, or meters run during matches. For these reasons proper nutrition and supplementation play a crucial role in optimizing performance, post-exercise adaptation and recovery, or reducing the risk of injuries. The current systematic review aimed at synthesizing and summarizing the up-to-date scientific data on ergogenic supplementation in racket sports athletes, framing disciplines-specific and effective supplementation protocols, as well as indicating directions for further investigations. Methods: The systematic review was conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analyses guidelines. PubMed, Scopus and Web of Science databases were searched for relevant records. Extracted records were subsequently screened according to the inclusion (male/female racket sports athletes; acute/chronic supplementation; cross-over/parallel-group, single-/double-blind, placebo-controlled designs) and exclusion (observational studies, single-arm interventional studies, in vitro or animal studies) criteria. Results: Thirty-one studies with a total number (n) of 485 participants were included. Great majority of studies – 21 of included investigations, were performed in tennis players at different level of training experience (n=303); 8 studies were in badminton athletes (n=157); while remaining 2 studies were in squash practitioners (n=25). The most studied ergogenic aid were carbohydrate (CHO) fluids, which were supplemented within 8 of included studies (n=113); 5 studies employed caffeine supplementation (n=75), 4 protein/amino acids (n=65), 3 creatine (n=53), 2 beetroot juice (n=22), 2 extra-cellular buffering agents (n=19); each single of remaining 7 of included studies implemented supplementation with: co- supplementation of CHO plus amino acids (n=17), co-supplementation of CHO with caffeine (n=12), cinnamon extract (n=30), quercetin (n=26), probiotics (n=30), water enriched with glycerol (n=11) or with various amounts of sodium (n=12). Conclusions: The systematic review revealed a great heterogeneity in the implemented supplementation protocols, regarding supplemented agents and their doses, as well as exercise tests used for evaluation of physical capacity and discipline-specific performance. While targeted and personalized ergogenic support with supplements may contribute to improvement in muscle strength and power, speed, and various indices of discipline-specific performance in racket sports, further research is needed to determine the most effective, and safe supplementation approaches.

Keywords: tennis, badminton, squash, ergogenic aids, exercise performance, physical capacity, supplements

Funding: not applicable

2.

Name: Emilia Wołyniec & Anna Hadamus

Title Influence of a single session of occlusion training with a blood-flow restriction training band or a flossing band on knee muscles strength and endurance

Author affiliations Anna Hadamus 1, Bartłomiej Osuch 2, Tomasz Jankowski 2, Emilia Wołyniec 1, Karolina Wiaderna 1, Aneta Ferenc 1, Dariusz Białoszewski 1. Afiliations: 1 Department of Rehabilitation, Faculty of Dental Medicine, Medical University of Warsaw, Poland, e-mail: anna.hadamus@wum.edu.pl 2 Students Scientific Society for Physiotherapy, Department of Rehabilitation, Faculty of Dental Medicine, Medical University of Warsaw, Poland

Abstract

Introduction Blood-flow restriction training (BFRT) is used for athletes and patients to improve muscle strength and stimulate muscle hypertrophy. Thus, there is no clear evidence of how different types of occlusion influence muscle performance directly after the training and therefore if it can disturb the rest of the training or everyday activity following the exercises. The aim of this study was to evaluate how a single session with occlusion bands or flossing bands influences muscle strength and endurance parameters in isokinetic concentric knee flexion and extension measurements. Material and Methods Ninety-eight healthy, young recreational athletes were qualified for this study. The BFRT group included 32 participants (mean age 21.5 years, BMI 22.6 kg/m2), the Flossing (F) group included 36 participants (mean age 21.0 years, BMI 23.2 kg/m2), while the control group included 30 participants (mean age 21.8 years, BMI 22.6 kg/m2). Each participant performed a warm-up before the 1st isokinetic measurement (without occlusion). The bands (BFRT-band or flossing band) were applied only in the study groups. Then the 2nd isokinetic measurement was performed and after that the band were removed, and the exercises continued for the next 5 minutes. Then the 3rd measurement was performed. The control group maintained the same intervals between all three measurements as the study groups. Muscle strength in the dominant leg only was measured with the Humac Norm system for knee flexion and extension at three speeds: 60, 120, and 180°/s. The following parameters related to body weight were analysed for flexors and extensors separately: peak torque (PT), work (W), and power (P). The endurance index (EI) was calculated from the PT results of the 180°/s trial. Statistical analysis was performed using PQStat 2021 software with Friedmann's ANOVA with post hoc Dunn–Bonferroni test. Results Results obtained in both study groups followed the same pattern, both for knee flexors and extensors. A significant decrease in all strength parameters was observed in all speeds in the 2nd measurement in comparison to the 1st measurement. PT, W and P-values returned to the baseline in the 3rd measurement ($p<0.05$). In the control group, significant changes were observed only in the P of extensors in the 60°/s trial, although the post hoc test did not show the differences. There were no significant changes in the endurance index among all three measurements in all of the groups. Conclusions 1. Analysed types of occlusion training (BFRT and training with tissue flossing) worsened the strength parameters of knee flexors and extensors. Therefore, there is no rationale to include the occlusion training in the warm-up procedure or to perform it at the beginning of a training session due to the following higher risk of injury. 2. This study needs to be continued to analyse also strength and endurance parameters, as well as to compare the results with other groups.

Keywords: blood-flow restriction training, occlusion, knee muscle strength, time parameters, warm-up

3.

Name: Xuyun Liu

Title Exercise alleviates endothelial mitochondrial fragmentation by improving hemodynamics via sheer stress-mediated Piezo1/Mfn2 activation in hyperlipidemia

Author affiliations Xuyun Liu1,†, Xing Zhang2,†, Jing Lou2,†, Yizhen Yan2, Mengya Feng1, Ziang Zhang2, Jiankang Liu1,3*, Feng Gao2* 1Center for Mitochondrial Biology and Medicine, The Key Laboratory of Biomedical Information Engineering of Ministry of Education, School of Life Science and Technology and Frontier Institute of Science and Technology, Xi'an Jiaotong University, Xi'an, 710049, China; 2Key Laboratory of Ministry of Education, School of Aerospace Medicine, Fourth Military Medical University, Xi'an 710032, China; 3School of Life Sciences, University of Health and Rehabilitation Sciences, Qingdao 266071, China †These authors contributed equally to this work. *Corresponding author. Correspondence and requests for materials should be addressed to F.G. (email: fgao@fmmu.edu.cn) or J.L. (email: j.liu@xjtu.edu.cn)

Abstract

Exercise promotes mitochondrial homeostasis of vascular endothelium. Accumulating evidence has elucidated that fluid shear stress is considered as a primary factor in regulating endothelial function during exercise, but its underlying mechanisms remains poorly defined. Here, we identify shear stress-sensing protein PIEZO1 in endothelial cells as an obligatory molecular sensor and transducer of exercise conferring its mitochondrial benefits. Short-term moderate-to-high intensity exercise (18 m/min, 1 h/day, 10 days) immensely promoted shear stress and mitochondrial fusion in thoracic aorta of mice, and the same hemodynamic and morphological effects of exercise were observed in hyperlipidaemia mouse model. The intravenous injection of PIEZO1 agonist Yoda1 showed comparable effects with exercise on promoting mitochondrial fusion by enhancing the expression of MFN2, one of the key regulators for mitochondrial fusion. On the contrary, application of the PIEZO1 antagonist, GsMTx4, effectively repressed this change. In human aorta endothelial cells (HAECs), fluid shear stress (15 dyn/cm2, 8 min) markedly facilitated mitochondrial fusion, and GsMTx4 completely blocked this change. However, mitochondrial benefits of PIEZO1 activation were not fully eliminated by prechelating Ca2+ and the expression of MFN2 was only increased in thoracic aorta during exercise. Simultaneously, RNA sequencing revealed that the expression of MFN2 was sharply decreased in sm22Cre PIEZO1fl/fl (SMC-PIEZO1-KO) mice. The PIEZO1 over-expression dramatically promoted MFN2 expression, mitochondrial fusion and ATP production, while the PIEZO1 knockdown inhibited mitochondrial basic respiration. In addition, MFN2 knockdown partially suppressed Yoda1-promoted ATP production. Mechanistically, PIEZO1, as a sensor and a linker of mitochondrial fusion, is co-localized with MFN2 at PM-ER-Mit junction and activated by exercise-induced shear stress in vivo and Yoda1 in vitro, leading to the influx of mitochondrial Ca2+ to regulate mitochondrial fusion. This study provides a novel biomechanical mechanism of exercise ameliorating vascular disease-associated disruptions of hemodynamics and mitochondrial homeostasis.

Keywords: Exercise, Shear stress, PIEZO1, Mitochondrial fusion, MFN2

4.

Name: Krzysztof Durkalec-Michalski

Title The effect of beta-hydroxy-beta-methylbutyric acid supplementation in regular training and high-intensity functional exercise-enhanced workout stimuli on body composition and muscle morphology in trained males

Author affiliations Krzysztof Durkalec-Michalski1,2*, Paulina M. Nowaczyk1,2, Tereza Jandova2, Tomasz Podgórski2,3, Joanna Kamińska2,3, Vaclav Kvitek2, Michal Steffl2 1. Department of Sports Dietetics, Poznan University of Physical Education, Królowej Jadwigi 27/39, 61-871 Poznań, Poland; 2. Sport Sciences–Biomedical Department, Faculty of Physical Education and Sport, Charles University, José Martího 31, Prague 6, 162 52, Czech Republic; 3. Department of Physiology and Biochemistry, Poznan University of Physical Education, Królowej Jadwigi 27/39, 61-871 Poznań, Poland; *Correspondence to: Krzysztof Durkalec-Michalski; e-mail: durkalec-michalski@awf.poznan.pl

Abstract

Background: Beta-hydroxy-beta-methylbutyrate (HMB) exhibits possible anticatabolic activity and is supposed to facilitate protein synthesis and thus support nutritional status, physical capacity and exercise performance. HMB has been investigated in various population groups, however, the results of up-to-date studies are inconclusive. Therefore, based on the current state of knowledge, the aim of this study was to verify the hypothesis that 3-week supplementation with highly-personalized and innovatively established dose of free liquid form of HMB in relation to individual content of fat-free mass (FFM; 90 mgHMB·kg-1FFM) will result in favorable changes in body composition and muscle morphology, and that magnitude of these changes will be amplified after introducing high-intensity functional training (HIFT) units as an additional adjunctive stimuli. Methods: The randomized double-blind placebo-controlled parallel study was performed in the group of 17 trained male athletes aged 26±8 years (body mass [BM] 85.5±10.5 kg, height 1.83±0.06 m). After the baseline (BAS) visit, participants were randomly allocated into HMB (n=9) or placebo (PLA; n=8) group. The whole study protocol consisted of two 3-week periods, of which 1) the first one was supplementation period (SUP) during which participants were ingesting either HMB or PLA and were performing their usual training cycle, and 2) during the second period as an adjunct to the prescribed supplementation, the additional (in addition to their usual training schedule) exercise stimuli in the form of two Fight Gone Bad (FGB) workouts per each week was introduced (SUP+FGB). Testing visits (in total 3 visits) were performed at BAS, and after completion of SUP and SUP+FGB periods. Body composition (FFM and fat mass [FM] content) was evaluated based on air displacement plethysmography using the BodPod analyzer. The vastus lateralis (VL) ultrasound was performed using a B-mode US (MyLab Gamma, Esaote Biomedica). The following indices of muscle structure and morphology were evaluated: muscle thickness (MT), fiber length (FL) and pennation angle (PA). Results: There were no differences in BM, FFM, FM, MT, FL and PA between HMB and PLA at BAS. Although, BAS PA seemed to be higher in HMB compared to PLA (~17.12 vs ~15.44°) no significant differences were reveal (p=0.06). No changes in BM, FFM and FM occurred during the whole study protocol regardless study group. There were also no changes in MT, FL, PA between BAS and SUP. However, MT, FL, PA were significantly higher at SUP+FGB compared to SUP in HMB and PLA. In comparison to BAS – at SUP+FGB: FL was higher in HMB (~8.36 vs ~8.93 cm), while PA was higher in PLA (~15.44 vs ~16.75°). Conclusions: HIFT-enhanced stimuli seem to be crucial in triggering the biological activity of HMB in trained male athletes. However, it is still complex to discover differences in relation to PLA when maintaining a proper diet and unified structure of physical exercise.

Keywords: athletes, sport, supplements, ergogenic support, high-intensity functional training, body composition, muscle morphology.

Funding This study was funded by the National Science Centre, Poland. K.D.-M has received research grant from the Polish National Science Centre (grant number 2018/31/D/NZ7/00803). Furthermore, K.D.-M. has participated in the Exchange Programmes for Scientists as part of bilateral cooperation (NAWA: BPN/BIL/2021/1/00108/U/00001 and PPN/WYM/2019/1/00267/U/01), and in the PROM Programme financed by The Polish National Agency for Academic Exchange (NAWA: PPI/PRO/2019/1/00045/U/00001).

5.

Name: Arindam Banerjee

Title Current medical notekeeping standards in English football and rugby league: the good, the bad and the athlete passport

Author affiliations Dr Arindam Banerjee MBChB MRCGP MFSEM(UK) FFSEM(Ir) BSc(Hons) MSc MSoMM PGCertMSKUS Hull City FC, Leeds Rhinos RFL, GB Taekwondo (UK), Founder of AB3 Medical.

Abstract

OBJECTIVE: A groundbreaking legal case involving non-disclosure of crucial information at a player medical led me to evaluate medical notekeeping standards across English football and rugby league. I reviewed current guidelines and if there is appropriate handover of data. DESIGN:In 2021 a comparative study looked at current electronic medical record (EMR) systems in use. An anonymous questionnaire (figure 1) using the Delphi method was completed by doctors in the English Premier League (EPL), English Football League (EFL) and Rugby Football League (RFL). Selection was based on being the named team doctor online and on EPL, EFL and RFL chat groups. RESULTS:77 respondents from 92 football clubs participated, with 80% being the head first team doctor (figure 2). There were 28 RFL respondents (46.4% Super League, 28.6% Championship, 10.7% League 1 and 14.3% multiple teams). -Between clubs: In football 38.5% use the same system, but there are 14 systems in use. 49% do not pass on information on player exit compared to 90% in RFL. When passed on, 39% get information through a phone call alone. -Across sectors: 50% football and 25% RFL respondents did not know if a player was GP registered. Third party clinicians are on different systems, so rely on the athlete's history or phone/email referral. -Within clubs:In football 18% use paper records and 2.6% use verbal only, compared to 28.6% and 14.3% in RFL respectively. In football 32.1% v 50% in RFL document medications on paper, whilst 21% in both admit no documentation. Vaccination history is generally unknown. CONCLUSION: Data is fragmented across different silos. Poor transferability between teams and healthcare sectors leaves a poorly summarised record over a career in to retirement. As players move here or abroad, the outcome is duplication, increased cost, and delays in diagnosis and treatment. There are no standardised UK guidelines apart from follow General Medical Council (GMC) recommendations, which is not occurring. RECOMMENDATIONS 'A to E' A) Standardise: all private screenings, scans and letters are in one place. B) Interoperable: Matchday doctors, NHS and care internationally need instant access to all relevant data. A standardised medical handover checklist between club and national teams was suggested (1). C) Better accessibility and portability: the patient's right under the Data Protection Act 2018. D) A template for medicals: removes non-medical disclosure disputes, quicker risk stratification, and reduces cost. E) Easier transition into retirement: The exit health examination was previously suggested (2). SOLUTION: An integrated athlete passport benefits all stakeholders. The ‘A to E’ approach inspired the AB3 Medical app, empowering the athlete with 24/7 access (figure 3). A clinician dashboard populates the app. AB3's features allow any clinician globally with consent to see and add immediate data. This allows instant handover, whatever the club, country or healthcare sector.

Keywords notekeeping, handover, medical records, athlete passport app

6.

Name: Mikołaj Szymocha

Title The effects of beetroot juice/nitrates supplementation on physical capacity and performance in team sports athletes: a systematic review of randomized controlled trials

Author affiliations

Mikołaj Szymocha1, Paulina M. Nowaczyk1, Krzysztof Durkalec-Michalski1* 1.Department of Sports Dietetics, Poznan University of Physical Education, Królowej Jadwigi 27/39, 61-871 Poznań, POLAND *Correspondence to: Krzysztof Durkalec- Michalski; e-mail: durkalec-michalski@awf.pozanan.pl

Abstract

Background: Nitrates are widely used especially in the form of concentrated beetroot juice, which is safe and in fact one of a few scientifically-proven ergogenic support for athletes. Nitrates via various biochemical pathways contribute to the enhancement in the availability of nitric oxide (NO) in the body, and as a result may play a pivotal role in the regulation of blood pressure, blood flow or muscle contractions. They may also exert ergogenic potential in certain sport disciplines such as team sports which are among the most popular sports disciplines in the world. The exercise efforts in team sports practice are characterized by 'active-passive' actions in which short-term bursts of high-intensity activities, like sprints, jumps, or shoots, are interspaced by low- to medium-intensity activities, e.g. jogging. The current systematic review aimed at synthesizing and summarizing the up-to-date scientific data on nitrates supplementation in team sports, framing disciplines-specific and effective supplementation protocols, as well as and indicating directions of further investigations. Methods: The systematic review was conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analyses guidelines. PubMed, Scopus and Web of Science databases were searched for relevant records. Extracted records were subsequently screened according to the inclusion (male and female team sports athletes; acute [<1 day] or repeated/chronic [>1 day] nitrates supplementation; cross-over or parallel-group, single- or double-blind, placebo-controlled designs) and exclusion criteria. The latest Cochrane Risk of Bias (RoB) tools were also implemented. Results: 18 studies with a total number (n) of 302 participants were included. 11 of included studies were performed without specification of sport discipline (n=193), while 3 in football (n=61), 2 in hockey (n=25), one in basketball (n=9) and one in water polo (n=14) players. 15 studies were performed in male (n=257) and 3 in female (n=45) athletes. 9 studies tested the effects of acute single-dose supplementation (n=135) and the next 9 studies of 2–7 days lasting supplementation protocols (n=167). 2 studies tested co-supplementation with other ergogenic agents. The systematic review revealed a great diversity in the implemented supplementation protocols regarding supplemented doses, timing of pre-exercise ingestion, and exercise tests used for evaluation of physical capacity and discipline-specific performance. Conclusions: Supplementation with beetroot juice/nitrates is effective in enhancing concentrations of nitrates, nitrites and nitric oxide in plasma or saliva. However, the outcomes related to physical capacity and discipline-specific performance are inconclusive. Therefore, individualization in responses to nitrates supplementation must be further investigated.

Keywords: ergogenic support, team sports, supplements, physical capacity, discipline-specific performance

7.

Name: Henrique Gerspacher-Lara

Title Is melatonin as an ergogenic hormone a myth? A systematic review and meta-analysis

Author affiliations

Henrique Fernandes Gerspacher Lara | Filipe Rios Drummond; Lucas Rios Drummond; Helton Oliveira Campos; João Guilhermo Rios Pimenta Fernandes; Mateus da Costa Monteiro; Tito Cardoso de Almeida Mafra; Victor Neiva Lavorato; André Bahia Pereira; Laura Hora Rios Leite; Maristela de Oliveira Poletini; Cândido Celso Coimbra

Abstract

Purpose: Melatonin supplementation has been disclosed as an ergogenic substance. However, the effectiveness of melatonin supplementation in healthy subjects has not been systematically investigated. The present study analyzed the effects of melatonin supplementation on physical performance and recovery. In addition, it was investigated whether exercise bout or training alter melatonin secretion in athletes and exercise practitioners. Methods: This systematic review and meta-analysis were conducted and reported according to the guidelines outlined in the PRISMA statement. Based on the search and inclusion criteria, 21 studies were included in the systematic review, and 19 were included in the meta-analysis. Results: Melatonin supplementation did not affect aerobic performance relative to time trial (−0.04; 95% CI: −0.51 to 0.44) and relative to VO2 (0.00; 95% CI: −0.57 to 0.57). Also, melatonin supplementation did not affect strength performance (0.19; 95% CI: −0.28 to 0.65). Only Glutathione Peroxidase (GPx) secretion increased after melatonin supplementation (1.40; 95% CI: 0.29 to 2.51). Post-exercise melatonin secretion was not changed immediately after an exercise session (0.56; 95% CI: −0.29 to 1.41) and 60 min after exercise (0.56; 95% CI: −0.29 to 1.41). Conclusion: The data indicate that melatonin is not an ergogenic hormone. In contrast, melatonin supplementation improves post-exercise recovery, even without altering its secretion.

Keywords: Melatonin supplementation performance aerobic exercise recovery secretion

Funding

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ORAL PRESENTATION SESSION II

20 OCTOBER 2023 (FRIDAY) 17.15-18.45 ROOM C
CHAIRS: KATARZYNA SZMIGIELSKA, HUBERT KRYSZTOFIAK

1.

Name: Łukasz Dalecki

Title: Preventive Nordic Exercise Program improves muscle strength better than multi-joint exercises

Author affiliations

Łukasz Dalecki 1,2, Andrzej Czamara 1,2 1 Department of Physiotherapy, The College of Physiotherapy in Wrocław, 50-038 Wrocław, Poland 2 Center of Rehabilitation and Medical Education in Wrocław, 50-038 Wrocław, Poland

Abstract

Introduction: Team sports athletes are at high risk for hamstring and knee injuries. The major biomechanical factors predisposing to injuries include strength deficits and asymmetry between the lower limb muscles and an imbalance in muscle strength ratio between knee flexors and extensors. Nordic hamstring exercises have been shown to reduce injuries in multiple studies. Objective measurements and biomechanical understanding of single-joint and multi-joint exercises will improve future injury prevention programs. Goal: To investigate the effect of a 10-week exercise program comparing single-joint hamstring exercises (Nordic hamstring) to multi-joint exercises, performed 3 times per week, on maximal moment strength of knee flexors and extensors, lower limb force, and timed run at maximal speed with direction changes. Methods: Subjects were divided into 2 groups: Group I (n=14, including 2 females)-single joint exercise. Group II (n=11, including 6 females)-multi-joint exercises. The participants performed the exercise program for 10 weeks. Subjects' baseline and post-exercise measurements included maximal peak torque (PT) in an isokinetic test and isometric torque strength during a maximal isometric contraction (IT) measured in newton-metres (N*m), power of lower limbs (P) in Watts (W) in a countermovement jump test and running time at maximal speed with direction change. PT and IT were calculated relative to body mass (bm) and expressed as RIT (N*m/bm) and RPT (N*m/bm). Limb Symmetry Index (LSI) was analysed for and RIT. Results: In the post-exercise intervention tests, Group I had a statistically significant increase in RPT of knee flexors in the nondominant limb in isokinetic testing at 180 °/s (assessment I: 1.18, assessment II: 0.97, p=0.022) and RIT (assessment I: 1.44, assessment II: 1.13, p=0.031) compared to group II. In group I the LSI value for hamstrings improved (from 124.11 to 110.97 p=0.048). No statistically significant difference was found in force, knee extensors strength and running time during maximal speed with direction change. Conclusion: A 10-week single-joint Nordic hamstring exercise program improved hamstring muscle strength and LSI compared to multi-joint exercises. Replicating these results on a larger athlete population may improve intervention programs designed to decrease knee and muscle injuries.

Keywords: functional assessment; single-joint and multi-joint exercises, injury prevention; hamstring, knee

Funding
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2.

Name: Barbara Morawin

Title Diagnostics of inflammaging in relation to sarcopenia

Author affiliations

Barbara Morawin[1], Anna Tylutka[1], Filip Bielewicz[2], Agnieszka Zembron-Lacny[1]
[1]Department of Applied and Clinical Physiology, [2]Student Research Group, Collegium Medicum University of Zielona Gora, Poland

Abstract

Introduction: One of the theories about aging focuses on the immune response and considers the activation of subclinical, chronic low-grade inflammation. Most human studies have concentrated on how the pro-inflammatory cytokines IL-6 and TNFα contribute to the damaging catabolic effects of inflammation on aging muscle fibers, which leads to skeletal muscle degradation, sarcopenia acceleration, and eventually, a decline in physical performance. Extensive scientific evidence has demonstrated the relation of low physical performance with subclinical and chronic inflammation which can lead to disabilities. Physical exercise is believed to be the most effective intervention which alleviates inflammation and delays sarcopenia. The present study focused firstly, on the evaluation of the major features of inflammaging in relation to sarcopenia, secondly, on the impact of lifestyle exercise on inflammatory profile and, thus, indications of therapeutic strategies to counteract the pathophysiological effect of skeletal muscle aging. Material and methods: One hundred seventy-three individuals aged 71.5±6.8 years were divided into two groups: sarcopenia (n=39) and no sarcopenia (n=134). Sarcopenia was assessed according to the algorithm of the European Working Group on Sarcopenia in the Elderly 2 [Cruz-Jentoft et al. Age Ageing 2019]. Biochemical analysis was determined by using BM200 Biomaxima. Measurement of CRP, IL-1β, IL-6 and TNFα were performed using ELISA kits (SunRed Biotechnology Company). cfDNA concentration was measured using the Qubit® Assay Kit. The project was approved by the Bioethics Commission at Regional Medical Chamber Zielona Gora, Poland (No. 01/66/2017). Results: C-reactive protein (CRP) (p=0.011) and CRP/albumin ratio (p=0.030) as well as IL-1β (p=0.002), cfDNA (p<0.001) and bilirubin levels (p<0.001) were significantly higher in the sarcopenia group compared to the no sarcopenia group. No significant differences were observed between groups in TNFα (p=0.429) and IL-6 (p=0.300) levels. An inverse correlation was found between gait speed and cfDNA (r_s=-0.234, p<0.01) and IL-1β (r_s=-0.263, p<0.01). The ROC analysis of cfDNA, CRP, IL-1β and bilirubin ranged from 0.6 to 0.7. Conclusion: In order to effectively prevent and predict sarcopenia, it is essential to identify the appropriate index and the corresponding optimal cut-off level. The results of this study indicate a relationship between sarcopenia and inflammatory mediators and the high clinical usefulness of cfDNA and bilirubin in the prediction of sarcopenia. We also demonstrated a link between inflammation and physical fitness in the elderly, and that lifestyle exercise should be a key therapeutic strategy in sarcopenia prevention. A better understanding of the inflammatory mechanisms involved in skeletal muscle aging could increase our knowledge of sarcopenia prevention. This work was supported by the NSC Poland (No 2016/21/N/NZ7/03329).

Keywords: Keywords: ageing, cytokines, inflammation, sarcopenia, lifestyle exercise, skeletal muscle

3.

Name: Gabor Kurucsai

Title Aerobic muscle metabolism plays a role in our sports performance

Author affiliations

G. Kurucsai, A. Lőw, M. Sári, Z. Réger, P. Takács Dr. Kurucsai Private Hospital, Internal Medicine, Szekesfehervar, Hungary

Abstract

Introduction: Our study searched the limits of muscle performance, which can be performed by aerobic metabolism and drew conclusions about eating habits and moving strategies. Physiological models of muscle function so far did not focus on the pathophysiological aspects of today's lifestyle Aims & Methods: We simulated a 50-minute performance test with a recumbent bicycle combined with a morning meal in 21 consecutively selected patients. During the tests an ergospirometry, a muscle oxygen saturation level measurement by near-infrared spectroscopy (NIRS), venous blood gas and insulin level analysis had been done per exercise steps. Our goal was to find the quantity and intensity of movements performed with aerobic metabolism and in following to know the biochemical characteristics. Results: The effect of the lower carb (15g) and protein rich (20g) normal morning meal and cycling on insulin values at 0- and 60-minute, intensive aerobic training zone and recovery (average +/-SD) were 9.37+/-6.4, 28.4+/-22.04, 12.34+/-7.2 , 16.95 +/- 9.0 uIU/ml. The insulin value decreased significantly during the warm-up and increased in early recovery (Student t-test, $p<0.05$) without new meals in those times. Venous partial pressures of oxygen sequentially were 31.4+/-5.8, 23,4+/-4,9, 43.0+/-10.0, 49.5+/-11.2 mmHg in a cubital vein, so the peripheral blood oxygen decreased significantly due to having meal, $p<0,05$. The 4 measured muscle's oxygen saturations by NIRS results were after meal 47.0+/-17.6%, and intensive aerobic training zone 91.0+/-6.2%. This improvement was sustained in the recovery period but it started only about in the 25-35 minutes of training, individually. RER averages were 0,91 +/- 0,06, and fat utilisation was 13-34% in energy production during the test shown by difference of oxygen consumption and carbon-dioxide genesis measured by ergospirometry. Conclusions: Earlier we found children's 0-minute insulin was significantly higher in the mother-child relationship in our obesity study. The improper insulin-raising leads to a prolonged improvement of muscle function, and could be explained by the connection of the visceral and muscle circulation and oxygen distribution. A controlled and prolonged warm-up seems to be essential in blood-muscle nutrient supply. Despite the pulse-controlled performance test, the significant insulin response in the recovery period observed in connection with fatigue indicates the functioning of the glucose transporter type 4 (GLUT4) in the muscle. (In response to insulin, GLUT4 is translocated to the cell surface, where it facilitates the uptake of glucose into the insulin-responsive tissues). This led to higher RER values and the poor fat utilisation. These could be pathological factors for a weight maintainer metabolism and unsuccessful personal training. Our result similar to the muscle and adipose tissue oxygen-sensitive functioning as in the hypoxia-inducible factor 1-alpha (HIF-1α) studies described.

Keywords: Aerobic training zone, HIF-1α, insulin resistance

Funding: Nothing to declare

4.

Name: Krzysztof Durkalec-Michalski

Title The effect of bovine colostrum supplementation on resting and exercise-induced changes in haematological blood parameters, physical capacity and performance in trained triathletes and swimmers

Author affiliations

Krzysztof Durkalec-Michalski 1,2*, Natalia Główka1, Tomasz Podgórski3, Jakub Malik4, Krystian Wochna5, Paulina M. Nowaczyk1 *1. Department of Sports Dietetics, Poznan University of Physical Education, Poland; 2. Sport Sciences–Biomedical Department, Faculty of Physical Education and Sport, Charles University, Prague, Czech Republic; 3. Department of Physiology and Biochemistry, Poznan University of Physical Education, Poznan, Poland; 4. Department of Physical Activity and Health Promotion Science, Poznan University of Physical Education, Poland; 5. Department of Swimming and Water Lifesaving, Poznan University of Physical Education, Poland* *Correspondence to: Krzysztof Durkalec-Michalski;

Abstract

Background: Bovine colostrum (BOV-COL) is a promising natural product applied to evoke ergogenic action in athletes experiencing high and prolonged training loads, especially in disciplines where immune system is particularly exposed to exercise-induced disturbances. Regular ingestion of BOV-COL may contribute to decreased risk of upper respiratory tract infections and eventually result in improved physical capacity and performance.
Methods: Nineteen trained male triathletes (n=16) and swimmers (n=3) aged 34.8±10.0 years (body mass 78.6±6.4 kg) completed this double-blind placebo(PLA)-controlled cross-over study aimed at investigating the effect of BOV-COL supplementation on resting and exercise-induced changes in haematological parameters, and selected indices of aerobic capacity and discipline specific performance (DSP). Study participants were supplemented with 25 g per day of BOV-COL and PLA (high-quality milk protein) in randomly assigned cross-over manner for 12 weeks with 4 weeks of wash-out period. The study protocol assumed 4 study visits – before/after supplementation with BOV-COL (BOV-COLPRE and BOV-COLPOST) and PLA (PLAPRE and PLAPOST). During each study visit the following evaluations were performed: body mass and composition, resting (REST), post-exercise (POST-EX; 3 min after test exercise) and post-short-term-recovery (REC; 1 h after test exercise) haematological blood parameters, incremental test on the rowing ergometer (IRT), and DSP (eight 100-m long swimming distances, of which the distances I–III were performed at level of 75% maximal effort [ME], IV–V at 85% ME, VI at 90% ME, VII at 95% ME and VIII at 100% ME). Data were analyzed via various relevant models of ANOVA with repeated measurements.
Results: Regarding blood indices, significant differences between study visits appeared for white blood cells (at REST), lymphocytes count (at REST and REC), and platelet-large cell ratio (at REST, POST-EX and REC). There was no significant effect of BOV-COL supplementation on time to exhaustion during IRT. Similarly, regarding DSP, BOV-COL did not affect times of particular 100-m swimming distances (I–VIII) or total time of entire test compared to PLA.
Conclusions: Despite alternations in haematological blood parameters, bovine colostrum supplementation did not affect aerobic capacity and discipline-specific performance. Further insightful analyses are needed to account for possible confounding factors and explain of inter-individual variability in response to BOV-COL supplementation.

Key words: physical capacity, performance, swimming, triathlon, ergogenic support, supplementation

Funding: This study was funded by Nutricia Foundation (Fundacja Nutricia), project no. RG 3/2019. The authors wish to thank the Agrapak Sp. z o.o., (Poland) for the donation of the evaluated high-quality preparations (BOV-COL and PLA). Furthermore, K.D.-M. has participated in the Exchange Programmes for Scientists as part of bilateral cooperation financed by The Polish National Agency for Academic Exchange (NAWA: BPN/BIL/2021/1/00108/U/00001 and PPN/WYM/2019/1/00267/U/01), as well as K.D.-M. and N.G. have participated in the PROM Programme (NAWA: PPI/PRO/2019/1/00045/U/00001; financed by The Polish National Agency for Academic Exchange).

5.

Name: Antonio Ammendolia

Title Efficacy of proprioceptive training on plantar pressure and jump performance in volleyball players: A Proof-of-Principle Study

Author affiliations

Ammendolia Antonio, Marotta Nicola, de Sire Alessandro Department of Medical and Surgical Sciences, University of Catanzaro "Magna Graecia", Viale Europa, Germaneto di Catanzaro, Italy

Abstract

Introduction. Volleyball players are often subject to micro-traumatisms of the heel fat pad and ankle injuries. Recently, mat-based proprioceptive training has assumed a key role in recovery from these disorders. Therefore, this proof-of-principle study aimed to assess the efficacy of proprioceptive mat training on plantar pressures and athletic performance in volleyball players. Methods. The participants included adult semi-professional volleyball players allocated into two groups: an experimental group, with mat-based proprioceptive and balance training, and a control group, with a sham protocol. For the outcome, we evaluated the barefoot plantar pressure, performing an analysis on a baropodometric resistive platform. The countermovement jump and squat jump were measured using an inertial measurement unit. Nineteen subjects were included in the two groups: the active proprioceptive group (n = 10) or the control group (n = 9). Results. The results show a more uniform redistribution of loads with pressure hindfoot relief in the experimental group compared to the control group (p = 0.021, RBC = 0.67). Moreover, we observed a significant increase in peak landing force and high concentric power development in the experimental group compared to the controls. Focused proprioceptive management provided hindfoot load attenuation by stimulating higher peaks of concentric force in the experimental group compared to the sham group. Conclusions. Even though the study included a small sample, the results obtained in this proof-of-principle study suggest a positive role of proprioceptive stimulation in the inter-seasonal scenario for volleyball players to improve their jump performance and reduce the micro-traumatisms of the heel fat pad and the ankle injury rate.

Keywords: baropodometric analysis; inertial sensor; mat-based; performance; proprioception; rehabilitation; volleyball

ORAL PRESENTATION SESSION III

21 OCTOBER 2023 (SATURDAY) 8.30-10.00 ROOM A-B
CHAIRS: ANDRZEJ BUGAJSKI, MACIEJ HESS

1.

Name: Philip Kurtz

Title A Comparison of Performance Indicators During Three Different Single Leg Jumps and Associated Lower-Limb Muscle Activity

Author affiliations Philip Kurtz, Andrew Quarmby, Mina Khajooei, Jakob Henschke, MyoungHwee Kim, Frank Mayer, Tilman Engel

Abstract

Introduction: Jump testing is often applied as an indicator of neuromuscular function in athletic performance and injury rehabilitation monitoring. To increase the applicability of jumps in a clinical setting, it is essential to expand knowledge about the characteristics and neuromuscular demands elicited by different jump variations. Therefore, the aim of this study was to investigate the characteristics of specific jump performance indicators measured by a force plate, in three commonly utilized plyometric single leg jumps. A secondary aim was to compare muscle activity of the lower limbs between the tasks by surface electromyography (sEMG). Methods: 12 asymptomatic participants (females=42%; 32±6years; 72±13kg; 176±10cm) performed sets of three standardized unilateral jumps on a force plate (Counter Movement Jump (CMJ), Rebound Jump (RJ) and a 20cm Drop Jump (DJ)) in a randomized order for three trials on each leg. For sEMG normalization, maximum voluntary isometric contractions (MVIC) were performed on an isokinetic device (single- and multi-joint testing). sEMG was captured on both legs for: tibialis anterior (TA), peroneus longus (PL), soleus (SOL), gastrocnemius medialis (GM), biceps femoris (BF), vastus medialis (VM) and gluteus maximus (GM). Jump performance Indicators (JPI) were analyzed descriptively (mean±SD) for flight time (FT [ms]), ground contact time (GCT [ms]), peak force (PF [N]), and reactive strength index (RSI% (=FT/GCT%)), calculated for the plyometric jump phase (trial with the highest force output; averaged for left and right side). sEMG amplitudes were calculated by the root mean square signal in the plyometric phase of corresponding jumps, normalized to a 1-sec duration peak force plateau in a single trial of MVIC (JUMP/MVIC%ratio) and averaged for left and right. Results: CMJ resulted in the highest FT (174±061ms) and GCT (448±138ms), whilst RSI% (39±6%) and PF (1305±232N) were lowest relative to all other jumps. The RJ yielded the highest PF (2296±623N) but the lowest FT (143±62ms), whereas the DJ had the lowest GCT (157±32ms) and the highest RSI% (96±18%). For CMJ the JUMP/MVIC%ratio ranged from 61±36% for TA to 199±186% for BF. RJ resulted in a range from 74±51% for TA to 272±168%, and DJ in a range from 79±72% for TA to 269±206% for BF. Discussion: JPI indicated different characteristics for all jumps especially comparing jumps with higher reactive demands (RJ & DJ) to a CMJ. This relationship corresponds with the sEMG findings, indicating higher muscle activity for more reactive jumps. These results support the assumption that jump variations elicit different neuromuscular characteristics. Therefore, they may serve different purposes in rehabilitation and training and should be applied appropriately, considering the reactive demand of each jump, matched to the current capacities and goals.

Keywords: Jump, plyometrics, force plate, reactive strength index, single-leg, muscle activity

2.

Name: Sara Meden

Title: The effect of static stretching on the stiffness of the plantar fascia and Achilles tendon in female basketball players

Author affiliations

Sara Meden, Orthopaedic hospital Valdoltra, Ankaran, Slovenia; Maja Frangež, Institute of Medical Rehabilitation, University Medical Centre Ljubljana, Ljubljana, Slovenia

Abstract

Basketball requires significant vertical and frontal plane motions that distinguish it from other multidirectional sports. Evidence suggests that most injuries in basketball players (58%-66%) are sustained in the lower extremity (1). Muscle and tendon stiffness is related to sports performance, tendinopathy, and tendon degeneration (2). Static stretching was considered an essential component of a warm-up for decades. The increased range of motion achieved by an acute bout of stretching has been attributed to changes in the length and stiffness (compliance) of the affected limb musculotendinous unit (3). This study aimed to investigate the effect of static stretching of the superficial back line on the stiffness of the plantar fascia and Achilles tendon in healthy female basketball players. The participants were professional female basketball athletes (n = 11) aged between 17 and 25 years. The stiffness of the plantar fascia and Achilles tendon was measured using MyotonPRO device. The participants were taught how to perform the 10 minutes protocol of static stretching and tested at baseline, immediately after performing the protocol and after 3 weeks of performing the protocol 4 times per week. Our results showed a significant reduction of the stiffness of the plantar fascia after the 10 minutes protocol and after 3 weeks in the dominant leg ($p<0.05$) compared to the undominant leg ($p>0.05$). No significant difference in the stiffness of the Achilles tendon was found after the 10 minutes protocol of static stretching in both legs ($p>0.05$), it was shown to increase after 3 weeks in both legs ($p<0.05$). In our study we concluded that the 10 minutes protocol of static stretching reduces the stiffness of the plantar fascia. Although we can find a lot of new approaches to reduce the stiffness in the literature that athletes use nowadays, according to the results of our study static stretching could still play an important role in the training programmes. References: 1: Taylor JB, Ford KR, Nguyen AD, Terry LN, Hegedus EJ. Prevention of Lower Extremity Injuries in Basketball: A Systematic Review and Meta-Analysis. Sports Health. 2015 Sep-Oct;7(5):392-8. doi: 10.1177/1941738115593441. Epub 2015 Jun 26. PMID: 26502412; PMCID: PMC4547118. 2: Chang TT, Li Z, Wang XQ, Zhang ZJ. Stiffness of the Gastrocnemius-Achilles Tendon Complex Between Amateur Basketball Players and the Non-athletic General Population. Front Physiol. 2020 Dec 10;11:606706. doi: 10.3389/fphys.2020.606706. PMID: 33362580; PMCID: PMC7758317. 3: Behm DG, Chaouachi A. A review of the acute effects of static and dynamic stretching on performance. Eur J Appl Physiol. 2011 Nov;111(11):2633-51. doi: 10.1007/s00421-011-1879-2. Epub 2011 Mar 4. PMID: 21373870

Keywords: Ftiffness, plantar fascia, Achilles tendon, basketball, stretching, myofascial lines.

Funding: The authors received no financial support for the research, authorship, and/or publication of this article.

3.

Name: Piotr Kosiorek

Title Post-COVID-19 early repolarization pattern changes in selected white athletes–athlete's heart phenocopy

Author affiliations Piotr Kosiorek, Juliusz Kosel, Dorota Waloch, Renata Brycka-Safrończyk Sports and Medical Clinic, ul. Sienkiewicza 79 A, 309, 15-003 Białystok Piotr Kosiorek

Abstract

Introduction: Early repolarization (ER) ECG changes are known as benign variants in athletes. Recent years related to the Coronavirus disease (COVID-19) have caused us to observe new changes in the shape of the ST segment in the ECG records of athletes in the outpatient clinic [1], rarely convex–variant A and more frequent concave–variant B. However, none reflect the clinical nature and sudden death risk stratification should base on the clinical ECG pattern [2]. Due to the lack of reports on the impact of SARS-CoV-2 on the ECG record, we do not know whether this is a natural tendency [3] or whether these are changes observed post-COVID-19. Methods: 1011 ECG records of athletes (men n=702) evaluated in 2021 at a sports clinic. Detailed analysis of variants of STE changes (A1, A2, B3, B2, B1, Brugada t.2 pattern) in all 12 ECG leads, taking into account the division into groups: V2-V4, V5-V6, I-AVL, II-III-AVF was accomplished. In addition, the anthropometric parameters of the players compare. Results: Women: average weight (kg)-height(cm)-BMI-body fat (%): 49-160-19.3-21.8 and men: 55-166-19.7-15 respectively. Of 43 sports disciplines, football (43%), combat sports (13%), and many others. Most STEs are variant B3 or B2 (65.8% man), previously considered a benign variant mimicking myocarditis. Variant B1, the "smiling" variant, occurred in 82% of men. We selected subgroups with A and B patterns (overtrained) with statistical significance ($p<0.0001$) for age (median 18 years), weight (median 64), height (median 173), BMI (median 14.5) ($p<0.05$), % body fat (median 21.7) and years of training (median 8) (Athlete's Heart Phenocopy). Conclusions: Our work is the first to establish the importance of the co-occurrence of different forms (patterns) of STE, along with other anomalies of ventricular repolarization, on all heart walls. Further clinical observation of people from the overtrained group may provide an answer to the significance of these changes in athletes. The work has no funds. Bibliography: 1. Kosiorek P, Waloch D, Kosel J, Brycka-Safrończyk R. ST domed Elevation – an Atypical Variant of Early Repolarization in the White Athlete after the COVID-19 Pandemic. A Case Report. Medical Research Archives. 2023;[S.l.], v. 11, n. 3, mar. 2023. 2. Conway JJ et al. Evaluation of a Preparticipation Cardiovascular Screening Program Among 1,686 National Collegiate Athletic Association Division I Athletes: Comparison of the Seattle, Refined, and International Electrocardiogram Screening Criteria. Clin J Sport Med. 2022;32(3):306-12. 3. Davis AJ, Semsarian C, Orchard JW, La Gerche A, Orchard JJ. The Impact of Ethnicity on Athlete ECG Interpretation: A Systematic Review. J Cardiovasc Dev Dis. 2022;9(6).

Keywords: Early repolarization; COVID-19; ECG pattern; ST Elevation; Athlete's Heart Phenocopy

4.

Name: Ziyu Wang

Title: In water or on land? A network META analysis of the effect of different aquatic interventions and land-based interventions on pain intensity in patients with chronic lower back pain

Author affiliations

Ziyu Wang1*, Yiwei Min1, Bopeng Qiu1, Penglin Diao1, Jie Gao1,* 1.China swimming college,Beijing Sport University, Beijing, China.

Abstract

Introduction: Chronic low back pain (CLBP) has become one of the leading causes of disability worldwide, with the prevalence of chronic low back pain accounting for approximately 23% of all low back pain. Current randomised controlled studies and META analyses have demonstrated that aquatic interventions, including aquatic exercise and therapeutic bathing, can improve pain intensity in patients with CLBP, but the number of aquatic interventions and their effectiveness are variable. Therefore, this study used a network Meta-analysis to evaluate the effectiveness of eight aquatic therapies and their corresponding control condition therapies for the treatment of pain intensity in patients with chronic low back pain (CLBP) and to provide a basis for exploring precise treatment options. Methods: Five databases, PubMed, EMbase, The Cochrane Library, CNKI and WanFang Data, were searched for randomized controlled trials (RCTs) of water interventions for patients with CLBP, all from the time of database establishment to September 2022. Two evaluators independently screened the literature, extracted information and assessed the risk of bias of the included studies before conducting a network meta-analysis using Stata 15.1 software. RESULTS: A total of 31 RCTs including 2078 patients with CLBP were included. The results of the reticulated Meta-analysis showed that bath therapy combined with land-based exercise [SMD=2.66, 95% CI (1.12, 4.20), P=0.001] was the most effective treatment for CLBP pain, followed by bath therapy combined with physiotherapy [SMD=2.63, 95% CI (1.26, 3.99), aquatic exercise [SMD=2.53, 95% CI (1.61, 3.44) P<0.001], land-based exercise [SMD=2.29, 95% CI (0.99, 3.58) P=0.001], balneotherapy [SMD=2.18, 95% CI (0.79, 3.56), P=0.002], core training [SMD=2.12, 95% CI (0.55, 3.68) P=0.008] and physiotherapy [SMD=1.73, 95% CI (0.47, 3.00) P=0.007]. The order of preference for improving overall pain intensity in patients with CLBP was: bath therapy combined with land-based exercise (SUCRA=73.9), bath therapy combined with physiotherapy (SUCRA=72.8), water exercise (SUCRA=69.1), land-based exercise (SUCRA=54.1), bath therapy (SUCRA=52.3), core training (SUCRA=48.3) and Physiotherapy (SUCRA=29.5). Conclusion: The study concludes that bath therapy combined with land-based exercise or physiotherapy may be the most effective way to improve the intensity of pain in patients with CLBP, and that aquatic exercise, land-based exercise and bath therapy may also be the three most promising ways to improve pain. More multi-arm randomised controlled trials based on bath therapy with aquatic exercise interventions for patients with CLBP could be conducted in the future.

Keywords: Chronic low back pain; network META-analysis; aquatic interventions; land-based interventions

5.

Name: Masoumeh Shojaei

Title: The Effect of Brailletonik on working memory in children with attention deficit hyperactivity disorder

Author affiliations

Maryam Zamani, Masoumeh Shojaei, Afkham Daneshfar Department of motor behavior, Faculty of sport sciences, Alzahra University, Tehran, Iran

Abstract

Introduction. One of the characteristics of individuals with attention deficit hyperactivity disorder (ADHD) is executive function deficits. According to a meta-analysis (Zhu et al.,2023), the best activities for improving the working memory of individuals with ADHD are closed skills dominated by aerobic exercises. Brailletonik is a new Iranian motor cognitive sport. In this sport, letters and words can be converted into movements using Braille codes. This skill is closed and serial and often performed aerobically. Thus, the purpose of the present study was to investigate the effect of Brailletonik training on the working memory in children with ADHD. Methods. Participants in the present study were 18 children with ADHD and 15 typically developing children (TD) aged 8-11 years old. The ADHD children were randomly assigned in 2 groups of Brailletonik and control. The working memory in pre-test and post-test were measured using the n-back task (owen et al., 2005). Experimental group participated in 11 sessions of Brailletonik training. The control group was asked to maintain their habitual daily activities during this period. Data were analyzed using independent-samples t test and ANOVA at $p<0.05$. Results. According to the results, there were no significant differences between the hits, commission errors, and reaction times of children with and without ADHD ($p > .05$), but the omission errors of children with ADHD ($M=7.6$) were significantly more than TD children ($p =0.024$). After Brailletonik training, the significant difference between the omission errors of children with ($M=2.5$) and without ADHD ($M=2.4$) disappeared ($p=0.93$). Conclusion. It seems that the Brailletonik due to its aerobic and cognitive nature and the need to memorize and remember the letters codes in the desired words can improve the spatial working memory in ADHD children. References: Owen AM, McMillan KM, Laird AR, Bullmore E. N-back working memory paradigm: A meta-analysis of normative functional neuroimaging studies. Human brain mapping. 2005 May;25(1):46-59. Zhu F, Zhu X, Bi X, Kuang D, Liu B, Zhou J, Yang Y, Ren Y. Comparative effectiveness of various physical exercise interventions on executive functions and related symptoms in children and adolescents with attention deficit hyperactivity disorder: A systematic review and network meta-analysis. Frontiers in Public Health. 2023;11.

Keywords: combined motor cognitive training, executive function, exercise, physical activity

6.

Name: Felipe Prado

Title A Retrospective Comparative Study of Post-operative Management After Double-row Suture Anchor Repair for Insertional Achilles Tendinopathy

Author affiliations

Universidade Federal de Minas Gerais (UFMG) - Brazil, Hospital Felício Rocho – MG – Brazil

Abstract

Background: This retrospective study compared two groups of patients who underwent double-row surgical technique for the treatment of Insertional Achilles Tendinopathy (IAT). Group 1 (G1) were submitted to non-functional (classical) rehabilitation program and Group 2 (G2) were submitted to an early and functional postoperative rehabilitation program. Methods: Data were collected from 63 patients (68 feet). In G1 there was 48 patients (51 feet) and in G2 17 patients (17 feet) were located. After a minimum follow-up of 1-year pre and post-op information from all patients in both groups were compared. Results: VAS pre/post G1 (7.49/1.39), G2 (7.8/2.2), are not statistically significant. (p=0.89). Postoperative FAAM-ADL, the score of patients in G1 was slightly higher than that of patients in G2 (p- =0.01167). Male patients showed better scores than females in the VAS and FAAM-AVD scores. Conclusions: The chosen technique proved to be effective, regardless of the postoperative approach performed, patients substantially improved their preoperative pain and functional status, both men and women.

Keywords: Achilles Tendon, Tendinopathy, Enthesopathy, Achilles Tendon Enthesitis, Pain

Funding: None

MODERATED E-POSTER SESSION I

21 OCTOBER 2023 (SATURDAY) 8.30-10.00 ROOM C-D
CHAIRS: ANNA TYLUTKA, JAROSŁAW KRZYWAŃSKI

1.

Name: Magdalena Kwaśniewska

Title Nutrition patterns and physical performance in athletes.

Author affiliations Oliwia Grygorczuk1, Martyna Mrozik2, Julia Bachór1, Magdalena Kwaśniewska1,2. 1Lifestyle Medicine Students' Scientific Association, Medical University of Lodz 2Department of Preventive Medicine, Medical University of Lodz

Abstract

Well-balanced nutrition is crucial for athletes' performance and safety. However, there are a variety different dietary patterns followed by athletes representing various sport disciplines. Gluten-free, high-protein, lactose free, vegetarian, vegan and other diets differ in nutrient composition compared to an omnivorous diet and may therefore alter physiological responses to physical exercise and influence physical performance. The aim of the study is to analyze the frequency of different nutrition patterns in athletes as well as the association of specific diets with clinical outcomes and physical performance based on the sports nutrition literature. It is also important to assess safety and probability of deficiencies of crucial nutrients due to common dietary strategies in physically active persons. This review will also asses if there is enough evidence to recommend the intake of specific prebiotics, probiotics, synbiotics, unsaturated fatty acids, „superfoods" in optimizing athlete health and performance.

Keywords: nutrition patterns; physical performance, athletes, diet, sports nutrition

2.

Name: Benedykt Opaszowski

Title Effect of naloxone on thermoregulation and cortisol and growth hormone response during exercise

Author affiliations

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Abstract

Introduction: The involvement of the endogenous opioid system in the thermoregulatory and the growth hormone and cortisol responses to submaximal exercise was investigated with the use of naloxone as a pharmacologic probe. Material and methods: Seven healthy men (19-24 years) volunteered for this study. The subjects performed 40 min. cycle-ergometer exercise at the intensity of 100 W (20 min) and 150 W (20 min) on three occasions in a randomized order. In the recovery period (60 min) the subjects rested in the sitting position. The first test served as a control. On the second and third experimental day they performed the same exercise program, but either placebo (5 ml saline) or 2 mg of naloxone (naloxone hydrochloride) was administered intravenously five minutes before exercise. The heart rate, ventilation, tidal volume, oxygen uptake, carbon dioxide production, respiratory exchange ratio, rectal temperature (Tre), auditory canal temp. accepted as the same measurement of tympanic (Tty), sublingual temp. (Tsub), the forehead and thorax skin temp. were measured. Serial arterialized blood samples were collected before, during and after exercise. Growth hormone (GH) and cortisol (C) levels in the plasma were determined. Body weight was measured. Results: There were no significant differences in cardiorespiratory responses during placebo compared to nalaxone. A similar course (rise) in both tests had temperature of forehead and thorax skin. We found no difference in fluid loss. In both tests (placebo or naloxone) the increase of Tre and Tty was similar athough after administering naloxone the changes were lower. The administration of naloxone completely abolished this rise in Tsub: before exercise the sublingual temp. in the naloxone test was 35.68 oC and after 35.43 oC. The difference between the placebo and naloxone tests was significant ($p<0.05$). In both causes the exercise increased significantly GH secretion: placebo – “peak” at +40 min 55.29 μU/ml vs 59.71 μU/ml – naloxone. There was no significant effect of naloxone. Cortisol levels were higher after naloxone than placebo (455 > 392 nmol/l). Summary: The date suggests, that endogenous opioids play important role in the regulation of body temperature during exercise (move of “set-point?). The release of GH by exercise in independent of endogenous opioid peptides. Blocking the opioid receptors resulted in increased secretion of cortisol, that may indicate more intense exercise stress (lowering the pain threshold). Key words: endogenous opioids, thermoregulatory, growth hormone, cortisol, exercise Działalność Statutowa IS-PIB 103.12

Keywords: endogenous opioids, thermoregulatory, growth hormone, cortisol, exercise

3.

Name: Shunong Zeng

Title Match-play characteristics of Chinese women rugby sevens team in 2022 World Cup

Author affiliations

Shunong Zeng1, Jun Wang1 1 Department of Kinesiology, Beijing Sport University, Beijing, China Corresponding author: Jun Wang

Abstract

This study analyzed the activity profile of Chinese female rugby sevens players during competitive matches in 2022 World Cup in South Africa. 13 (6 forwards, 7 backs) female rugby players wore GPS during 4 competitive matches in 2022 World Cup in South Africa. Heart rate (HR) collected by Firstbeat Analytics System during matches. Match time recorded through official game video and import videos to the Hudl Sportscode (12.4.19) software to analyze the contact technique. The average of the total time of the 4 games was 15.30 minutes, and the ball-in-play time was 7.57 minutes. The match time to recovery time ratio was almost 1:1. The total running distance (TRD) was 1513.6m. Over this distance, 21.6% (328.0±74.1m) was spent in high-intensity running, and 5.7% (86.3±47.8m) in sprinting. The number of high-intensity decelerations was twice as high as the number of high-intensity accelerations, reaching 7.6 times. The TRD, relative distance, high-intensity running distance and sprint distance of backs were higher than those of forwards, but there was no significant difference. Results revealed differences between winning and losing teams in the number of tackling and rucking, tackle effectiveness, ruck effectiveness. Winning teams tackled and rucked less, gained more possession from effective rucks, and had less ineffective tackling and rucking than losing teams. When competed against a higher-ranked nation, just 50% of Chinese team's tackling and rucking were successful, while the opponents can reach about 70%. However, the tackling success rate of the Chinese team had significantly improved in matches against teams with lower rankings. Additionally, forwards performed more contact techniques than backs. When compared to the first half (177.4±2.9b/min), the maximum HR (HRmax) in the second half (185.3±8.1b/min) rose significantly (40.2±11.6%). In the second half, the proportion of HR in the 91-100% HRmax range dramatically rose. Moreover, it was observed that the backs had a higher average HR than the forwards. This was reflected in the proportion of HR in the range of 81-90% HRmax and 91-100% HRmax, which was noticeably higher than that of the forwards. These findings suggest that players must have great aerobic recovery ability in order to quickly regain their physical strength during brief breaks and strong upper and lower body strength to keep the ball. The competition requires athlete's capacity for quick sprints and agility (high-intensity direction changes). Additionally, backs covered longer distances and have a higher running speed than forwards, while forwards perform more contact actions. The Chinese team needs to increase their ability to recover because their HR are high and they recover slowly, as there are a larger proportion of high HR in the second half than in the first. Coaches should pay more attention to position difference and try to improve the recovery ability of players.

Keywords: Rugby Sevens; match analysis; athletes' performance; GPS

4.

Name: Monika Michalska

Title The evaluation of the major features of anemia in relation to physical activity in older adults

Author affiliations

Monika Michalska1, Eryk Wacka2, Barbara Morawin2, Anna Tylutka2, Jakub Wojtacha1, Tomasz Staszewski1, Agnieszka Zembron-Lacny2 1 Student Research Group, University of Zielona Gora, Collegium Medicum University of Zielona Gora, Zielona Gora, Poland 2 Department of Applied and Clinical Physiology, Collegium Medicum University of Zielona Gora, Zielona Gora, Poland

Abstract

Introduction. Anemia is a common hematological disorder that affects 17% of persons aged >65 years. Anemia contributes to age-related diseases and significantly affects the health-related quality of life. In older individuals, even mild anemia is associated with an increased risk of falls, decreased physical performance, longer and more frequent stays in hospital, and increased mortality [Wacka et al. IJMS 2023]. Therefore, the present study focused primarily on the evaluation of the major features of anemia in relation to physical performance. Material and methods. The participants (73.0 ± 7.2 years) were allocated into anemic (n=47) and non-anemic (n=66) groups according to Culleton et al. [Blood 2006]. Physical performance was evaluated by 6-min walk test (6MWT gait speed) according to the standards of European Respiratory Society and American Thoracic Society. Hematological variables including total white blood cell count (WBC), red blood cell count (RBC), platelet count, and hemoglobin concentration (Hb) were determined by Sysmex XN-1000 (Germany). Iron and ferritin levels were determined using BM200 Biomaxima (Poland). The level of transferrin (Tf) and hepcidin were identified by using ELISA kits from SunRed Biotechnology Company (China). The percentage of transferrin saturation (TfS) was calculated as follows: TfS% = (serum iron level/transferrin level) x100. The study protocol was approved by the Regional Bioethics Commission (No. 04/133/2020 and No. UZ/19/2021). Results. In anemic group, the participants were significantly older than in non-anemic group. According to Culleton et al. classification [Blood 2006], 42% of our study individuals were described as anemic (Hb <13.0 g/dL for women and Hb <14.0 g/dL for men). Anemic group demonstrated a significantly lower gait speed (1.14 ± 0.24 m/s) than non-anemic group (1.41 ± 0.18 m/s). In the total observed population, men demonstrated significantly lower levels of iron and Tf (84.38 ± 26.72 µg/dL and 2.75 ± 1.16 mg/dL) than women (100.82 ± 31.71 µg/dL and 3.17 ± 1.99 mg/dL), whereas ferritin levels did not differ between sexes. The hematological variables such as RBC, MCV, MCH, RDV, iron and ferritin were significantly lower, whereas hepcidin approximately 3-fold higher in anemic than non-anemic group. Approximately 26% of the study individuals demonstrated TfS <20% and 20% had ferritin <10-15 ng/mL, which together indicates age-related iron deficiency. For the hepcidin, AUC is relatively high in tested model: anemic vs. non-anemic group (AUC = 0.735, sensitivity 84.8%, specificity 59.6%, OR = 8.069, 95%CI 3.131 – 22.397), which indicates good affiliation of hepcidin to the observed population compared to other markers of iron deficiency. Conclusions. Our study demonstrated that changes in hepcidin levels were ultimately affecting iron metabolism and resulting in lower physical performance in older adults.

Keywords: gait speed, hepcidin, iron, transferrin saturation

Funding: This work was supported by funds from the University of Zielona Gora

5.

Name: Gabriela Kołodyńska

Title Assessment of the possibility of using sonofeedback training in the treatment of stress urinary incontinence in women.

Author affiliations

Gabriela Kołodyńska 1,2, Maciej Zalewski 3, Anna Mucha 4, Krystyna Rożek-Piechura 1, Waldemar Andrzejewski 1 1 Department of Physiotherapy, Wroclaw University of Health and Sport Sciences, 51-612 Wrocław, Poland 2 Department of Physiotherapy, University School of Physical Education, al. I. Paderewskiego 35, 51-612 Wrocław, Poland 3 Department of Gynaecology and Obstetrics, Faculty of Health Sciences, Medical University of Wrocław, 50-367 Wrocław, Poland 4 Department of Genetics, Wrocław University of Environmental and Life Sciences, 50-375 Wrocław, Poland

Abstract

The number of people suffering from urinary incontinence increases every year. Along with it, the knowledge of the society increases that there are various methods of eliminating this ailment. Both patients and researchers are constantly looking for new treatments for urinary incontinence. One of the new solutions is sonofeedback of the pelvic floor muscles, which may help to strengthen them and thus reduce the problem. The aim of this study was to evaluate the effectiveness of sonofeedback and transvaginal electrostimulation in increasing the bioelectrical activity of pelvic floor muscles in postmenopausal women with stress urinary incontinence. Sixty women with stress urinary incontinence were enrolled in the study. The patients were divided into two groups: A - where sonofeedback was used and B - where electrostimulation of the pelvic floor muscles was performed with biofeedback training. In patients, the resting bioelectrical activity of the pelvic floor muscles was assessed using an electromyograph. The assessment of the resting bioelectrical activity of the pelvic floor muscles was performed before the therapy, after the 5th training and after the therapy. It was observed that after the end of the therapy, the average biometrical potential increased by 1.1 μV compared with baseline in group A. It can be suggested that the sonofeedback method is comparatively effective in reducing symptoms that are associated with urinary incontinence as an electrostimulation method with biofeedback training.

Keywords: sonofeedback, stress urinary incontinence, postmenopausal women, physiotheraphy

6.

Name: Magdalena Fronczek

Title Use of objective movement analysis in the case of a knee injury in a 15-year-old football (soccer) player.

Author affiliations

Fronczek M, Kopacz K, Kopacz Ł, Krasowski M, Padula G

Academic Laboratory of Movement and Human Physical Performance, Medical University of Lodz, Poland Warsaw Medical Academy, Warsaw, Poland

Abstract

Introduction: The objective movement analysis can be used in case of teen athletes to evaluate the risk of injury. This group could be also examined after the injury to assess the progress of physiotherapy and the possibility of returning to sports activity. The aim of this case study was to show how objective movement analysis could be helpful in teen athlete evaluation in various health conditions. Methods: The 15-year-old male football (soccer) player was examined three times with the use of objective movement analysis. The first and second examination, before the knee injury, was related to gait and load distribution analysis (Zebris treadmill, Zebris, Germany). The right knee injury was an ACL tear with swelling and rupture of the medial meniscus. The second examination took place after half a year from the injury and it was related to gait and load distribution analysis (Zebris treadmill, Zebris, Germany), dynamometry (Primus RS, BTE, USA), muscles elasticity, range of motion and jump evaluation (Baiobit and BTS SMART DX7000, BTS Bioengineering, Italy). The athlete has a family history of knee injuries and provided full medical documentation of the injury. Results: In the first two examinations, an overload of both heels was present. In the third analysis, the feet load improved. COP parameters improved in subsequent analyses (path length: 163 mm vs. 83 vs. 44 mm, velocity: 17 vs. 8 vs. 4 mm/s). In the second examination, gait and dynamic balance parameters improved as well but the gait results deteriorated in the third measurement. In the third analysis, the maximum height of the countermovement jump was 28 cm with a maximum strength of 0,78 kN. Significant isometric strength advantage in the left lower limb was observed for ankle dorsi flexion, hip extension and adduction. There were no differences in isometric strength between limbs for knee flexion and hip abduction. Conclusions: Objective movement analysis is a useful tool for teen athlete evaluation in order to introduce training changes and avoid further injuries in the post physiotherapeutic period. References: 1. Bram JT, Pascual-Leone N, Patel NM, DeFrancesco ChJ, Talathi NS, Ganley TJ. Do Pediatric Patients With Anterior Cruciate Ligament Tears Have a Higher Rate of Familial Anterior Cruciate Ligament Injury? Orthop J Sports Med. 2020 Oct 30;8(10):2325967120959665. doi: 10.1177/2325967120959665. 2. Hewett TE, Myer GD, Ford KR, Paterno MV, Quatman CE. Mechanisms, prediction, and prevention of ACL injuries: Cut risk with three sharpened and validated tools. J Orthop Res. 2016 Nov;34(11):1843-1855. doi: 10.1002/jor.23414. 3. Jonathan D Samet JD. Pediatric Sports Injuries. Clin Sports Med. 2021 Oct;40(4):781-799. doi: 10.1016/j.csm.2021.05.012. The authors received no financial support for the research.

Keywords: biomechanics, optoelectronic analysis, wearable device, dynamometry, knee injury

7.

Name: Masoumeh Shojaei

Title The Effect of Brailletonik training on body fat and self- concept in obese children

Author affiliations

Fatemeh Seyfi, Masoumeh Shojaei, Afkham Daneshfar Department of motor behavior, Faculty of sport sciences, Alzahra University, Tehran, Iran

Abstract

Introduction. Childhood Obesity is a global health problem (1). The prevalence of childhood obesity is increasing in many countries (2). Obesity has a negative effect on children's self-concept (3). Physical activity is associated with increased self-concept in children (4). Brailletonik is a new Iranian motor cognitive sport. In this sport, it is possible to convert letters and words into movements by using Braille codes. The purpose of the present study was to investigate the effect of Brailletonik training on body fat and self-concept in obese children. Methods. Participants were 26 obese girls with mean age 10.6 ±3.1 yr. and BMI above the 95th percentile who were randomly selected from a district of Tehran and assigned to Brailletonik and control groups. Pre-test and post-test were performed by using the brief form of Pyryt-Mendaglio Self-Perception Survey (5) and skinfold caliper. Percent body fat (PBF) was predicted by Dezenberg Equation (6). Experimental group performed Brailletonik training for 6 weeks (3 days per week, 60 min per session). Results. The results of one-way ANOVA indicated the changes of weight ($p<0.0001$, $\eta2=0.611$), PBF ($p<0.0001$, $\eta2=0.46$), and self-perception of Brailletonik group ($p<0.0001$,$\eta2=0.412$) were significantly more than control group. Conclusion. Brailletonik training reduces weight and PBF and improves self-concept. Although, physical activity alone has an effect on self-concept (4), it seems that the motor-cognitive nature of Brailletonik training can have considerable effect due to repetition of positive phrases using Braille codes in addition to aerobic exercises. References: 1. Lanigan J, Tee L, Brandreth R. Childhood obesity. Medicine. 2019 Mar 1;47(3):190-4. 2. GBD 2015 Obesity Collaborators. Health effects of overweight and obesity in 195 countries over 25 years. New England journal of medicine. 2017 Jul 6;377(1):13-27. 3. Serassuel Junior H, Cavazzotto TG, Paludo AC, Zambrin LF, Simões AC. The impact of obesity on the perception of self-concept in children and adolescents. Revista Brasileira de Cineantropometria & Desempenho Humano. 2015 Mar; 17:165-74. 4. Liu M, Wu L, Ming Q. How does physical activity intervention improve self-esteem and self-concept in children and adolescents? Evidence from a meta-analysis. PloS one. 2015 Aug 4;10(8): e0134804. 5. Mendaglio S, Pyryt MC. Self-Concept of Gifted Students Assessment Based Intervention. Teaching Exceptional Children. 1995 Mar;27(3):40-5. 6. Dezenberg CV, Nagy TR, Gower BA, Johnson R, Goran MI. Predicting body composition from anthropometry in pre-adolescent children. International journal of obesity. 1999 Mar;23(3):253-9.

Keywords: exercise, motor cognitive training, overweight, physical activity, self-perception, weight loss

8.

Name: Gabriel Oliveira

Title Plant-based diets improve aerobic performance and do not compromise anaerobic performance: A systematic review and meta-analysis.

Author affiliations

Federal University Minas Gerais (UFMG), Belo Horizonte, MG, Brazil.

Abstract

Plant-based diets have emerged as athletic performance enhancers for various types of exercise. Therefore, the present study evaluated the effectiveness of plant-based diets on aerobic and anaerobic performances, as well as on body mass index (BMI) of physically active individuals. This systematic review and meta-analysis were conducted and reported according to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement. A systematic search of electronic databases, including PubMed, Web of Science and SPORTDiscus, was performed. On the basis of the search and inclusion criteria, four and six studies evaluating the effects of plant- based diets on aerobic and anaerobic performances in humans were respectively included in the systematic review and meta-analysis. Plant- based diets had a moderate but positive effect on aerobic performance (0.55; 95% CI: 0.29 to 0.81), and no effect on anaerobic performance (-0.30; 95% CI: -0.67 to 0.07). The altogether analyses of both aerobic and anaerobic exercises revealed that athletic performance was unchanged (0.01; 95% CI: -0.21 to 0.22) in athletes that adopted plant- based diets. However, a small negative effect on BMI (-0.27; 95% CI: - 0.40 to –0.15) was induced by these diets. The results indicate that plant-based diets have the potential to exclusively improve aerobic performance. On the other hand, despite its animal protein restriction, these diets do not jeopardize anaerobic performance. Overall, the predicted effects of plant-based diets on physical performance are impactless, even though the BMI of their adherents is reduced.

Keywords: plant-based, performance, vegan, aerobic exercise

9.

Name: Iwona Szadkowska

Title The implementation of physical activity recommendations and factors limiting it in hypertensive adults

Author affiliations

Iwona Szadkowska 1, presenting author Mateusz Zdaniewicz 2, Katarzyna Ostrowska 2 1. Department of Sports Medicine, Medical University of Lodz, Pomorska 251, 92-213 Lodz, Poland 2. Medical University of Lodz, Pomorska 251, 92-213 Lodz, Poland

Abstract

Introduction Physical activity (PA) plays an important role in the management of hypertension (HT), but some types of exercise or its high intensity may be contraindicated in individuals with uncontrolled HT or concomitant diseases. The aim of the study was to assess the implementation of PA recommendations and factors limiting it in hypertensive adults. Materials and Methods The study group consisted of 172 hypertensive individuals, 92 women (53.5%) and 80 (46.5%) men, in mean age 53±10 years, who filled in the anonymous questionnaire survey concerning health status and PA, including the short version of International Physical Activity Questionnaire (IPAQ). Results Only about 20% of the respondents met the general recommendations of PA for adults. Among the most frequently indicated reasons limiting PA, both women and men reported excessive shortness of breath, joint pain, headaches and dizziness. However, only 64% of patients had well controlled HT, that means resting blood pressure < 140/90 mmHg. When analyzing comorbidities, diabetes occurred in 22% of women and 28% of men (ns), coronary artery disease in 10% vs. 24% (p=0.014), thyroid disorders in 28% vs. 3% (p<0.001), depression in 24% vs. 19% (ns), and excessive body weight (BMI ≥25 kg/m2) – in 71% of both groups. Conclusions: Insufficient PA and multimorbidity found in the studied group of hypertensive adults indicate the need for comprehensive counseling, individualization of PA recommendations and appropriate qualification for PA depending on the health status.

Keywords: physical activity, excercise, recommendations, hypertension, adults, multimorbidity

Funding: Medical University of Lodz, 503/6-029-05/503-61-001-19-00.

10.

Name: Jakub Wojtacha

Title Prognostic values of combined ratios of white blood cells in assessment of physical performance in older adults

Author affiliations

Jakub Wojtacha1, Barbara Morawin2, Tomasz Staszewski1, Monika Michalska1, Agnieszka Zembron-Lacny2 1 Student Research Group, University of Zielona Gora, Collegium Medicum University of Zielona Gora, Zielona Gora, Poland 2 Department of Applied and Clinical Physiology, Collegium Medicum University of Zielona Gora, Zielona Gora, Poland

Abstract

Introduction. Routine blood tests to assess inflammatory processes are often useful in the early diagnosis of several diseases associated with old age as well as in clinical prognosis in cancers, obesity, diabetes and acute ischaemic stroke. Recently, some studies have found that the combinations of the haematological components, such as the neutrophil-to-lymphocyte ratio (NLR), the platelet-to-lymphocyte ratio (PLR) and systemic inflammation index (SII) were effective prognostic indicators in aging comorbidities. The study was designed to assess the prognostic values of changes in blood counts to better predict and prevent aging-related vascular dysfunction. Material and methods. Sixty participants aged 71.2 ± 5.3 years were allocated to a low- (LGI) or high-grade inflammation (HGI) group, based on CRP (<3 or ≥3 mg/L) as a conventional risk marker of inflammaging described by Wyczalkowska-Tomasik et al. [Arch Immunol Ther Exp 2016]. Total white blood cell count (WBC), platelet count (PLT) and differential WBC were determined by Sysmex XN-1000 (Sysmex Europe Gmbh, Norderstedt, Germany). The complete blood count and biochemical analysis was carried out in Central Laboratory of the University Hospital in Zielona Gora. NLR, PLR and SII were calculated and compared with references values according to Luo et al. [Clin Lab 2019]. Physical performance was evaluated by 6-min walk test (6MWT gait speed) according to the standards of European Respiratory Society and American Thoracic Society. Statistical analyses were performed using the RStudio, version 4.1.2. The study protocol was approved by the Regional Bioethics Commission (No. 04/133/2020 and No. UZ/19/2021), in accordance with the Helsinki Declaration. Results. Neutrophils, monocytes and platelets tended toward high values in HGI whereas lymphocyte count was significantly higher in HGI compared to LGI group. The inflammatory variables NLR, PLR and SII were found to fall within the referential ranges and did not differ significantly between groups. HGI group with CRP≥3 mg/L demonstrated a significantly lower gait speed (1.27 ± 0.18 m/s) than LGI (1.43 ± 0.17 m/s). Conclusions. Our study demonstrated that inflammatory state is associated with profound changes of the physical performance, however, the utility of potential diagnostic value of inflammatory parameters derived from complete blood cell count for clinical prognosis in inflammaging requires further study.

Keywords: blood cell count, systemic inflammation index, neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte-ratio, aging

Funding: This work was supported by funds from the University of Zielona Gora

MODERATED E-POSTER SESSION II

21 OCTOBER 2023 (SATURDAY) 10.20-11.50 ROOM C-D
CHAIRS: TOMASZ MIKULSKI, RAFAŁ SZAFRANIEC

1.

Name: Noa Martonovich

Title Chronic Wrist Pain Among Handstand Practitioners

Author affiliations

Noa Martonovich, David Maman, Liad Alfandari and Eyal Behrbalk Hillel Yaffe medical center, Department of Orthopedics,Hadera, Israel.

Abstract

The human body is designed for upright standing and walking, with the lower extremities and axial skeleton supporting weight-bearing. Constant weight-bearing on joints not meant for this action can lead to various pathologies, as seen in wheelchair users. Handstand practitioners use their wrists as weight-bearing joints during activities, but little is known about wrist injuries in this population. This study aims to investigate the epidemiology of wrist pain among handstand practitioners, as no such data currently exists. The study is a cross-sectional online survey. Participants were asked to complete a three-part questionnaire regarding their workout regimen, training habits, and history of wrist pain. The inclusion criteria were athletes over 18 years old who practice handstands more than twice a month for at least 4 months. All data were collected using Google Forms, organized, and anonymized using Microsoft Excel, and analyzed using IBM SPSS 26.0. Descriptive statistics were calculated, and potential risk factors were tested using asymptotic t-tests and Fisher's tests. Differences were considered significant when $p < 0.05$. Results: This study surveyed 402 athletes who regularly practice handstands to investigate the prevalence of chronic wrist pain and potential risk factors. The participants had a mean age of 31.3 years, with most being male and having an average of 5 years of training experience. 56% of participants reported chronic wrist pain, and 14.4% reported a history of distal radial fracture. Yoga was the most practiced form, followed by Capoeira. No significant differences were found in demographic data between participants with and without chronic wrist pain, and no significant associations were found between chronic wrist pain prevalence and warm-up routines or protective aids. Discussion: The lower half of the body is meant to handle weight-bearing and impact, while transferring the load to upper extremities can lead to various pathologies. Athletes who perform handstands are particularly prone to chronic wrist pain, which affects over half of them. Warm-up sessions and protective instruments like wrist braces do not seem to prevent chronic wrist pain, and there are no significant differences in age or training volume between athletes with and without the condition. Further research is needed to understand the causes of chronic wrist pain in athletes, given the growing popularity of sports and activities that can cause this type of injury. Conclusion: Chronic wrist pain is prevalent in athletes practicing hand standing exercises. Protective instruments such as wrist braces do not significantly affect incidence, and age, training volume, and years of training do not play significant roles. Further research is needed to understand the underlying causes of chronic wrist pain in athletes, which may become a significant health burden due to the popularity of wrist-straining activities.

Keywords: Handstand, Wrist Pain, Yoga, Capoeira, calisthenics, arm balancing, circus

Funding: none

2.

Name: Yixiao Xu

Title Four-weeks heat acclimation upregulates mitochondrial turnover of skeletal muscle in mice

Author affiliations

Authors: Yixiao Xu1, Binghong Gao2* Affiliations: 1. School of Exercise and Health, Shanghai University of Sport, Shanghai, China; 2. School of Athletic Performance, Shanghai University of Sport, Shanghai, China

Abstract

Objectives: The study examined the effects of heat exposure, exercise training, and heat acclimation on mitochondrial turnover and angiogenesis, trying to clarify the potential mechanism of heat acclimation-induced skeletal muscle adaptations. Methods: C57BL/6 J mice were divided into control (C), heat exposure (H), exercise training (E) and heat acclimation groups (HE, n = 6/group). Western blot and immunohistochemistry fluorescence were used to evaluate mitochondrial turnover of gastrocnemius after four weeks interventions. Results: ATPase activity and Cytochrome c in HE group increased greatly compared with C or E group ($p < 0.05$). The mitochondria in HE group were expanded in volume, and interconnected networks were more obvious than that in C group ($p < 0.05$). Compared with C groups, expression of p-p38 MAPK, PGC-1α, Parkin and Pink1 in HE group increased significantly ($p < 0.05$). the TRPV1 expressions were upregulated significantly in HE group ($p < 0.05$) but TRPV1 expressions in E and H groups were no significant differences compared with C groups. Conclusion: the results demonstrated that four-weeks heat acclimation can induce the high core temperature and upregulated mitochondrial turnover to varying degrees, as well as ATP synthesis in skeletal muscle, which may partly account for the benefits of heat acclimation in improving aerobic exercise capacity in the heat. Specifically, high core temperature induced by four-weeks heat acclimation promoted the TRPV1 expressions as well as activation of PINK1/Parkin, PGC-1α respectively. Further studies are necessary to better understand the molecular mechanisms underlying these effects.

Keywords: Heat acclimation; Mitochondrial biogenesis; Mitophagy; Skeletal muscle

Funding: This study was supported by the Shanghai Key Lab of Human Performance (11DZ2261100)

3.

Name: Tomasz Staszewski

Title Lifestyle exercise reduces aging-related vascular dysfunction

Author affiliations

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1Student Research Group, University of Zielona Gora, Collegium Medicum University of Zielona Gora, Zielona Gora, Poland
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Abstract

Introduction: The inflammatory state can result from the establishment of chronic oxidative stress by the immune system activity. Indeed, both oxidative stress and inflammation occur in endothelial dysfunction since excessive or uncontrolled reactive nitric oxide species production. Regular physical activity including cardiovascular and resistance exercise has been associated with lower levels of inflammatory mediators and higher anti-inflammatory capacity. Therefore, the analysis of oxi-inflammatory profile in the physically active and inactive elderly can provide a more profound knowledge on the effects of exercise in aging-related vascular dysfunction. Material and methods: Eighty individuals aged 70.9 ± 5.3 years were allocated to a low- (LGI) or high-grade inflammation (HGI) group, based on CRP (<3 or ≥3 mg/L) as a conventional risk marker of cardiovascular diseases. Physical performance was evaluated by 6-min walk test (6MWT gait speed) according to the standards of European Respiratory Society and American Thoracic Society. The value of gait speed <1.3 m/s classified the subjects as physically inactive. Serum triglycerides (TG), total cholesterol (TC), high-density lipoproteins (HDL) and low-density lipoproteins (LDL) were determined using BM200 Biomaxima (Poland). Oxidised low-density lipoprotein (oxLDL), nitric oxide (NO), hydrogen peroxide H2O2, and 3-nitrotyrosine (3-NitroT) were determined using ELISA kits from SunRed Biotechnology Company (China). Statistical analyses were performed using the RStudio, version 4.1.2. The study protocol was approved by the Regional Bioethics Commission (No. 04/133/2020 and No. UZ/19/2021). Results: The LGI group with CRP<3 mg/L demonstrated a significantly higher gait speed (1.41 ± 0.18 m/s) than HGI (1.29 ± 0.18 m/s). The high levels of TG>150 mg/dL were found in 32% whereas high levels of TC>200 mg/dL and non-HDL>130 mg/dL were found in 80% of our study sample. However, the lipoprotein-lipid profile did not differ between LGI and HGI contrary to oxLDL that was two-fold higher in the HGI group. NO generation was enhanced in the HGI group but its bioavailability was reduced, which was demonstrated by increased 3-NitroT concentration. The relationships of 3-NitroT/NO (r_s=0.725, p<0.001) and 3-NitroT/oxLDL (r_s=0.579, p<0.001) demonstrated that 3-NitroT could be a new risk factor of endothelial dysfunction in older individuals. Conclusions: Our study showed that aging is associated with profound changes of the endothelium-specific variables, and physical activity sustained throughout life attenuates the progression of vascular dysfunction thereby pointing to exercise therapy to counteract the pathophysiological effect of aging.

Keywords: gait speed, hydrogen peroxide, inflammation, nitric oxide

Funding: This work was supported by funds from the University of Zielona Gora.

4.

Name: Pierre Abraham

Title: Interest of venous photo-plethysmography in athletes with suspected Mc Cleary syndrome resulting from thoracic outlet positional compression

Author affiliations

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Abstract

Introduction: Venous thoracic outlet syndrome is a frequent disease in athletes. Hemodynamic investigations in thoracic outlet syndrome (TOS) remain difficult, even in trained hands. Indeed, ultrasound was reported relatively insensitive in venous-TOS, even in case of sub clavicular occlusion (Paget-Schoetter syndrome). Methods: We use venous photo-plethysmography (V-PPG) in patients with suspected TOS. The subjects elevated their arms to the "candlestick/surrender" (Ca) position for 30 s and then kept their arm elevated in front of the body for an additional 15 s ("prayer" position; Pra). We report here our experience based on classification of V-PPG recordings and positioning of probes. Results: We found 28% of our V-PPG recordings suggesting the presence of a positional outflow impairment either with or without arterial inflow impairment. Further, we observed that probe positioning should be close to the elbow to be able to detect these hemodynamic original observations. Conclusion: Although an old tool, we think that V-PPG is of renewed interest in TOS, specifically during the Ca-Pra procedure that allows normalization of this otherwise semi quantitative technique. The diagnosis of venous-TOS remains based on a holistic approach in which V-PPG at the elbow level can add bilateral recordable objective arguments for the presence of a positional outflow impairment.

Keywords: Thoracic outlet syndrome; Upper limb; Veins; Sports; Pain;

Funding: none

5.

Name: Gong Yishun

Title Role and Mechanism of TRPV1 in Hyperthermia-Induced Mitochondrial Biogenesis in Hypothalamus

Author affiliations

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Abstract

Exogenous thermal stimuli from a hot environment superimposed on the endogenous heat load generated by exercise produce hyperthermia within the body, reducing aerobic capacity by affecting core temperature, skin temperature, brain temperature, and heart rate. Heat acclimation can induce the body to produce physiological adaptation and reduce the decrease of aerobic exercise capacity in the heat. The increased heat build-up within the body can affect mitochondrial function. Previous studies have demonstrated that skeletal muscle mitochondrial function is critical to aerobic capacity and that increasing mitochondrial biogenesis improves mitochondrial function. The hypothalamus acts as a thermoregulatory center, where hypothalamic mitochondria are involved in the regulation of body temperature. Transient receptor potential vanilloid 1 (TRPV1) can be activated by high temperatures (40-45°C) and expressed in the hypothalamus, which may play a role in the influence of hyperthermia on mitochondrial biogenesis in the hypothalamus. This review aims to explore the possible roles and mechanisms of TRPV1 in the hypothalamic mitochondrial biogenesis affected by hyperthermia. The relationship between acute-induced hyperthermia and mitochondrial biogenesis remains unclear. Repeatedly-induced hyperthermia can promote mitochondrial biogenesis. The key pathway of mitochondrial biogenesis includes the peroxisome proliferator-activated receptor-γ coactivator-1α(PGC-1α), nuclear respiration factors 1 and 2 (NRF1/2), and mitochondrial transcription factor A (TFAM). The temperature at which TRPV1 is activated in the hypothalamus is probably around 38°C. Long-term activation of TRPV1 can improve the adaptability to the thermal environment and may promote mitochondrial biogenesis by upregulating the level of PGC-1α. Current studies lack direct evidence that repeatedly-induced hyperthermia and TRPV1 activation affect hypothalamic mitochondrial interactions, and the regulation of hypothalamic mitochondrial biogenesis by hyperthermia-activated TRPV1 remains to be investigated in depth.

Keywords: Hyperthermia; Thermoregulation; Hypothalamus; Mitochondrial biogenesis; TRPV1

Funding: This study was supported by the Shanghai Key Lab of Human Performance (11DZ2261100)

6.

Name: Zhong Jiafa

Title Role and Mechanism of TRPV1 in Hyperthermia-induced Hepatic Mitophagy

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Abstract

Hyperthermia is the major physiological stressor when humans exercise in hot environments. Acute exposure to a hot environment during intense exercise will cause heat stress, adversely affecting aerobic performance. However, long-term and repeated exercise in hot environments will induce heat acclimation and enhance humans' ability to withstand hyperthermia. The liver is one of the central organs of energy metabolism, in which the hepatic mitochondria participate in the energy metabolism process of exercise in a hot environment. The tricarboxylic acid cycle and the β-oxidation of free fatty acids occurring in the hepatic mitochondria can provide the required energy for organisms during exercise in a hot environment. Hepatic mitophagy, however, can effectively eliminate the excessive generation of ROS (reactive oxygen species) and damaged mitochondria during exercise, maintaining hepatic mitochondrial health and liver metabolic function, ultimately sustaining aerobic performance in a hot environment. Additionally, transient receptor potential vanilloid 1 (TRPV1) is a thermosensitive channel that can be activated by hyperthermia, and its wide expression in the liver may play a role in hyperthermia-induced hepatic mitophagy. This review provided a literature-based overview of the interrelationships between hyperthermia, hepatic mitophagy and TRPV1, and preliminarily explores the potential role and mechanism of TRPV1 in the impact of hyperthermia on hepatic mitophagy. Results showed that acute heat stress induced hyperthermia can increase the level of hepatic mitophagy, and its mechanism may be related to the ubiquitination pathway of PTEN-induced kinase 1 (PINK1)/E3 Ubiquitin ligase (Parkin), adapter protein SQSTM1/p62 and Microtubule-Associated Proteins 1A/1B Light Chain 3A II (LC3II). However, the effects of repeated-induced hyperthermia on hepatic mitophagy are still unclear. Hyperthermia (≥40℃) and capsaicin can both activate the TRPV1 channel. Long-term dietary intake of capsaicin enhanced the expression of TRPV1 in the liver of wild-type mice, significantly increasing the expression of LC3. However, whether repeated-induced hyperthermia can activate TRPV1 in the liver, and whether the activated TRPV1 is involved in the regulation of hepatic mitophagy still requires further study. The mechanism by which hyperthermia activates TRPV1 to regulate the hepatic mitophagy process requires further investigation.

Keywords: Hyperthermia ; Hepatic mitophagy ; Transient receptor potential vanilloid 1

Funding: This study was supported by the Shanghai Key Lab of Human Performance (11DZ2261100)

7.

Name: Zoran Handjiski

Title Somatotype and its correlations with body composition, aerobic capacity and strenght of legs in young soccer players

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Abstract

Introduction: It is of interest to evaluate if some somatotypes of soccer players could develop higher aerobic capacity and strength of quadriceps and hamstrings. The aim of this study is to determine the somatotype and its influence on body composition, Yo-Yo IE2 and peak force and peak time of force development of quadriceps and hamstrings during the training process of young soccer players aged 15-17 years. Material and methods: In 46 soccer players, 15-17 years, 3 times during a season, we measured relative muscle (MM%) and fat mass (FM%) , BMI and muscle (AMC) and total (AC) surface of upper arm-cm2 (bioelectrical impedance); speed of running (km/h) and total distance covered (m) with Yo-Yo intermittent endurance test level 2 on field (Yo-Yo IE2); peak force (m/kg) of both quadriceps (PForQR, , PForQL) and both hamstrings (PForHR, PForHL)and peak time of force development (msec) of both quadriceps (PTimQR, PTimQL) and hamstrings (PTimHR, PTimHL) (hand dynamometer, manual muscle testing) by Kendall et Kendall). With Heath-Carter anthropometric somatotype model, we determined 13 categories of somatotype. Descriptive statistics and multiple regression were used ($p<0.05$) Results: The mesomorph–ectomorph (44.68%), balanced mesomorph (17.02%) and balanced ectomorph (14.89%) were the most frequent somatotypes. There was a significant decrease of PForQL (17.89 to 16,28), PTimQl (2.63 to 2,46) of left quadriceps and PTimQR (3.84 to 2,42) at the end of season. PForHR (13.75 to 14.06) significantly increased and PTimHR (3.68 to 3.05) and PTimHL (3.52 to 2.60) decreased at the end of season. Balanced endomorphic players had for 5 times higher negative influence on AMC than other somatotypes. Mesomorph-endomorphic and balanced mesomorphic players had for 2 to 3 times higher negative influence on PTimQL than other somatotypes. Central players had for 2 times higher negative influence on PTimRL than other somatotypes. Mesomorph-endomorphic players for 1.3 times higher positive influence on PTimQR. Conclusion: Balanced endomorphic players should expect decreasing of protein status during the training process, provoking a new nutritional strategy for them. Mesomorph-endomorphic and balanced mesomorph players have for 3 times higher negative influence on peak time of force development of quadriceps muscles than other somatotypes during the training process, expecting more qualitative and quantitative improvement of quadriceps contraction during the training process, especially of the time of neuromuscular activation.

Keywords somatotype, body composition, aerobic capacity, strength of legs, soccer

8.

Name: HAN ChaoRan

Title Global Trends and Research Hotspots of "Flexibility" in Sports Science: A Bibliometric Analysis

Author affiliations

HAN ChaoRan 1, GAO BingHong 1*

Abstract

Objectives: Flexibility is an important concept in sports science that refers to the ability of all joints of the human body to move within the normal range of motion and to stretch soft tissues such as muscles and ligaments.The development of flexibility involves various fields such as sports training,health promotion, injury prevention and rehabilitation.This study aims to do so by adopting bibliometric and visualization analyses to examine the research on"flexibility"in the field of international sports science.It provides bibliometric analyses and visualization maps that outline the overall framework, research focus and development trend of the current research on "flexibility"for researchers in this field. Methods: This study searched the Web of Science Core Collection database for articles published between 2000 and 2023 with the subject terms ("flexibility") OR ("flexibleness") OR ("flexibility") OR ("pliability") OR ("pliability"),and limited the category to "Sport Science".Only original and review articles were selected.After screening and removing duplicates, 3392 articles were retrieved and their bibliographic information was imported into statistical software as the data source.The data were analyzed by R language Bibliometrics, CiteSpace v.6.2.R2(64-bit), VosViewer1.6.19 and other software to conduct in-depth analysis on four indicators: literature quantity index, literature quality index, literature topic index, and literature relationship indicators. Results: (1)The number of publications on "flexibility" in the field of international sports science increased.A total of 3,392 papers were published in 132 academic journals,with most of them from U.S. This bibliometric analysis involved a total of 64 countries/regions and 3072 institutions to identify the leading countries/regions and journals in this field of research.(2)Vosviewer was used to identify 85 high-frequency keywords for the screened articles and form a co-occurrence network diagram.The clusters covered a total of 17 different and varied topics.(3) Citespace was used to generate their aggregated network timeline graphs by level from the cited references, showing the shift in research hotspots in this field over the past 23 years. In the past five years, it concentrated on self-fatigue recovery, crossover experiments, and more.The top twenty most cited keywords were examined to determine the research hotspots in this field at different time periods. Conclusions:(1)Flexibility,as an important concept in sports science,has great potential for development and will be a constantly updated research field.(2)The study found that the focus of research has shifted from the effect of stretching on sports performance to the health-promoting and fatigue-reducing effects of flexibility exercises on special populations.(3)Future research in this area may continue to explore the issues of self-fatigue recovery and sports injury prevention for competitive athletes.

Keywords Sport Science, Flexibility, Research Hotspots, Bibliometric analysis, Web of Science

Funding: Shanghai Key Laboratory for Human Athletic Ability Development and Support China

9.

Name: Gundega Akuratere

Title Comparative Analysis of Physiological Parameters, Physical Fitness, and Biomechanical Characteristics in Adult and Adolescent Female Athletes

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Abstract

Football provides numerous health benefits, including enhanced cardiovascular fitness, muscular strength, agility, mental well-being, and a lower risk of chronic diseases, making it an effective sport for improving both physical and mental health. Despite the inherent benefits of physical activity, it is essential for athletes to undergo a comprehensive health and fitness assessment to facilitate performance optimization, injury prevention, ongoing health monitoring, individualized training, and long-term career sustainability. As part of a prospective study, 24 female athletes of the Latvia women's national football team underwent cardiopulmonary exercise testing and running technique analysis at the Centre for Sports Medicine “Sports Laboratory” - FIMS CCSM in April 2022. Prior to the test, all athletes were interviewed about their demographic and medical data, training schedule, and complaints. Data was analysed using IBM SPSS29, with p-values below 0.05 indicating statistical significance. Athletes were divided into two groups by age: adolescents between 14 and 17 years of age (n=11) and adults between 18 and 23 (n=13). Both groups exhibited homogeneity in terms of BMI, training regimen, and years of football experience. During the cardiopulmonary exercise testing, the adult group demonstrated a maximum physical working capacity for the adult group was 3.59+/-0.63w/kg, in contrast to the adolescent 2.91+/-0.54w/kg ($p>0.05$). Adult athletes attained a maximum running speed 14% faster than adolescents ($p<0.05$), and similarly, the maximal oxygen uptake for adults was also 14% higher ($p<0.05$). Blood analysis revealed that within the adult group, 15% of the athletes exhibited reduced hemoglobin levels, in contrast to only 9% of adolescent athletes. Suboptimal ferritin levels were observed in 23% of adult athletes and 18% of adolescent athletes. Post-test assessments of blood creatine kinase levels indicated an elevation in 38% of adults and 64% of adolescents ($p>0.05$). Additionally, the lactate levels in the adolescent group were 0.39 mmol/L higher in comparison to the adults ($p<0.05$). Only one athlete across both groups displayed optimal vitamin D levels. 75% of the athletes used a rearfoot striking pattern, with 92% adults and 51% adolescents using this biomechanical approach. Adult athletes displayed greater total physical fitness when the two groups were compared. However, haematological studies revealed significant deviations from normative levels in both groups. Furthermore, biomechanical examination of the running technique revealed distinct running styles in both groups, which could have implications for knee and pelvic injury susceptibility. As a result, it is important to introduce preventative measures to facilitate the timely identification of at-risk athletes with underlying risk factors or health issues that may impair their well-being and lifespan.

Keywords: Female Football Players, Cardiopulmonary Exercise Testing, Biomechanical Analysis, Physical Fitness

Funding: No funding received.

E-POSTERS

Name: Andrew Quarmby

Title Force plate metrics during three different single-leg plyometric jumps: a test-retest reliability analysis

Author affiliations

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Abstract

Introduction: Plyometric jump testing is often used in performance and rehabilitation, but the reliability of commonly extracted metrics is rarely reported. Therefore, the aim of this study was to describe four commonly used force plate metrics across three different single-leg plyometric jumps, and to investigate the test-retest reliability of these variables. Methods: 12 asymptomatic active individuals (5f/7m; 32±6yrs; 72±13kg; 176±10cm) participated in a test-retest design (M1/M2) two weeks apart. Participants completed three single leg jumps (counter movement jump (CMJ), rebound jump (RJ), and a 20cm drop jump (DJ)). Three trials were performed on each leg, on a force plate (1000 Hz frequency). A single trial with the highest force output for each jump and leg was analysed for each participant. Variables for flight time (FT (ms)), ground contact time (GCT (ms)), reactive strength index (RSI% (=FT/GCT%)), and peak force (PF (N)) were extracted for the plyometric phase (mean±SD). Test-retest reliability was evaluated via intra-class correlation coefficients (ICC; 3,1), alongside Bland-Altman analysis (BLA; bias and limits of agreement (bias±1.96*SD)) between M1/M2. Results: Mean results showed FT was longer in CMJ (171±58 to 177±57ms) than in RJ and DJ (142±25 to 154±57ms). GCT was also longer in duration during the CMJ (434±118 to 482±155ms) compared with RJ and DJ (156±28 to 163±29ms). RSI% was higher in the RJ and DJ (85±18 to 97±19%) in comparison with CMJ (38±73 to 41±79%). PF was also higher in the RJ and DJ (2087±356 to 2363±735N) relative to the CMJ (1277±252 to 1346±293N). ICCs for FT and GCT in all jumps were between 0.08 to 0.47. ICCs for RSI% for CMJ were 0.26 to 0.36, whilst it ranged from 0.52 to 0.71 for RJ and DJ. ICC reliability was 0.72 to 0.95 for PF. BLA was 124±276 to 132±305ms for GCT in CMJ, 36±123 to 39±134ms for FT in the CMJ, and 30±85 to 43±139ms in FT and GCT for the remaining jump tasks. BLA for RSI% ranged from 6±9 to 12±25% across all three jumps. BLA for PF ranged from 64±85 to 87±119N for CMJ and from 234±238 to 300±746N for RJ and DJ. Conclusion: Commonly used force plate timing metrics such as FT and GCT calculated during single-leg plyometric jumps are not reliable between sessions. However, RSI% was moderately reliable for RJ and DJ tasks. RSI% is quickly calculated and might serve as a relevant alternative for performance and rehabilitation. Data from PF during the three jumps displayed good reliability between sessions and can be recommended as a reliable metric. There appears to be large variability between-sessions in the single-leg jumping strategies of participants, despite reliable peak force outcomes. Practitioners should consider these findings when applying jump testing on force plates in athletic and patient populations, especially when measuring longitudinally. The reproducibility of timing metrics is poor, which will affect test outcomes over a sports season or during a rehabilitation program.

Keywords: Jump, plyometrics, force plate, reliability, test-retest, performance, strength and conditioning

Funding: Not applicable.

Name: Karolina Kopacz

Title Use of a wearable movement analysis device in case of female rugby team players.

Author affiliations

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Abstract

Introduction: Wearable sensors are a convenient form of objective movement analysis to be applied in the field instead of laboratory conditions. Although in Poland rugby is still recognized as a niche sport, it belongs in the world to one of the most popular sports. Due to this, there is a need for extensive diagnostics and biomechanical analysis of players' movements. The aim of the study was to show the usefulness of one wearable movement analysis device in case of diverse pre-post evaluations of a rugby team. Methods: Twelve female rugby players from one team were examined twice – before and after the match season. The evaluation was performed with the use of a wearable movement analysis device – Baiobit (BTS Bioengineering, Italy). Studied activities were related to: trunk rotation during ball pass, jump parameters and running parameters. Baiobit was placed on the sacrum of each player. Results: Based on preliminary studies, it was shown that the average maximum jump height was 26±2 cm before the season. Mean trunk rotation during ball pass was 95±5° with a velocity of 60±2°/s. The overall results will be presented during the congress due to the ongoing match season. Conclusions: Wearable sensors are a convenient form of objective movement analysis for rugby players. Laboratory conditions are artificially created conditions, and task activities may be slightly different from those performed during the match. Rugby player diagnosis under match-like conditions is preferable. The use of a single, non-invasive wearable sensor is a good idea to objectify and monitor the athlete's progress and sports results. References: 1. Rizi R.M., Yeung S., Stewart N.J., Yeung E. W. Risk factors that predict severe injuries in university rugby seven players. Journal of Science and Medicine in Sport 20 (2017) 648–652 2. Krause L.M., Naughton G.A., Denny G., Patton D., Hartwig T., Gabbett T.J. Understanding mismatches in body size, speed and power among adolescent rugby union players. Journal of Science and Medicine in Sport 18 (2015) 358–363 3. Quinn K., Newans T., Buxton S., Thomson T., Tyler R., Minahan C. Movement patterns of players in the Australian Women's Rugby League team during international competition. Journal of Science and Medicine in Sport 23 (2020) 315–319 The authors received no financial support for the research.

Keywords: biomechanics, wearable device, rugby, jump analysis, running analysis

Funding: Not applicable.

Name: Jakub Florek

Title Rolando-type fracture of the base of the first metacarpal bone in a handball goalkeeper - non-standard surgical procedure for this type of fractures - case report

Author affiliations

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Abstract

INTRODUCTION: According to the 1998 National Hospital Ambulatory Medical Care Survey, metacarpal fractures account for 18% of all forearm and/or hand fractures in the United States. Displaced fractures should be treated surgically due to the increased risk of subluxation in the CMC joint leading to degenerative changes. The most commonly used surgical methods include: percutaneous stabilization with Kirschner tips, the use of external fixators, and in the case of bloody reposition, microcompression screws or LCP microplates are used. The wide range of Rolando fracture treatment methods shows how big a problem it can be for both the patient and the operator. The applied method of treatment involving the implantation of an endoprosthesis into the CMC joint of the thumb after an injury to the base of the first phalanx is innovative. There are no reports of a similar procedure in medical sources. MATERIAL AND METHODS OF STUDY: The paper describes a case of a 34-year-old patient admitted to the Trauma and Orthopedic Surgery Department of the Hospital in Brzesko due to an extensive left thumb injury. The X-ray image showed the presence of a multifragmental articular fracture of the proximal end of the first metacarpal bone with subluxation in the CMC joint. The X-ray image also showed degenerative changes in the form of numerous osteophytes after a fracture of the scaphoid bone complicated by a pseudoarthrosis. On this basis, the patient developed advanced degenerative changes in the wrist (SNAC III). During the procedure, a decision was made to implant the Dual mobility endoprosthesis into the CMC joint of the left thumb. The following research tools were used to evaluate the treatment results: radiological assessment of the position of the endoprosthesis elements, assessment of the intensity of pain in the wrist and thumb area on the VAS scale, assessment of the range of motion in the thumb carpometacarpal joint (using a handheld goniometer), assessment of the value of global hand grip strength (using SAEHAN manual hydraulic dynamometer), assessment of the quality of life and limb efficiency (based on the Quick DASH questionnaire). The assessment of the described parameters was made after 4 weeks, 8 weeks and 6 months after the surgery. CONCLUSIONS: The implantation of the CMC endoprosthesis allowed for: a significant reduction in the intensity of pain in the wrist and thumb area, restoration of the joint's range of motion, significant improvement in the efficiency of the limb and the patient's quality of life, as well as improvement in grip strength. The innovative method of treatment used at the same time allowed for a quick return to work and sports without the pain associated with it in the past.

Keywords: Fracture of the base of the first metacarpal bone Rolando

Funding: Not applicable.

Name: Katarzyna Stańczyk

Title: Physical activity and perceived stress in polycystic ovary syndrome: a preliminary study

Author affiliations

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Abstract

Introduction: Polycystic ovary syndrome (PCOS) is the most frequently diagnosed endocrine disorder among women in reproductive age, with an estimated prevalence of 10–18% [March WA. et al. The prevalence of polycystic ovary syndrome in a community sample assessed under contrasting diagnostic criteria. Hum reprod. 2010; 25:544–51]. PCOS women are at greater risk of moderate to severe psychological distress than general population [Damone AL. et al. Depression, anxiety and perceived stress in women with and without PCOS: a community-based study. Psychol Med. 2019; 49(9):1510–1520], while exercise is thought to be effective in reducing stress and improving mental health [Patten RK. et al. Effectiveness of exercise interventions on mental health and health-related quality of life in women with polycystic ovary syndrome: a systematic review. BMC Public Health. 2021; 21: 2310]. Therefore, the aim of the study was to investigate the relationship between the level of physical activity and perceived stress among PCOS patients. Material and methods: The study included the data obtained from 15 women aged 23-43. The diagnostic survey was conducted by using the International Physical Activity Questionnaire (IPAQ) and the Perceived Stress Scale (PSS-10), which were shared on-line on 3 Facebook PCOS patients' groups. Results: PCOS was diagnosed on average 55.67±45.15 months before participation in the study. Excess body weight was observed in ⅕ women – 61.42±7.59 kg on average in underweight and healthy weight group, and 82.00±5.35 on average in overweight and obese group. Overall, the average body weight was 65.53±10.94 kg. Sufficient physical activity (sPA) characterized more than half of the respondents (f=0.60), while high (hPA) and insufficient physical activity (iPA) concerned ⅕ patients respectively – the average MET-min/week value was 4307.80±3375.04. Less than half of the women (f=0.40) undertook intensive PA (920.00±419.91 MET-min/week on average), and ⅓ of the participants undertook moderate PA (1120.00±688.19 MET-min/week on average). Participants spent on average 8.56±2,25 hours per day sitting. The moderate level of perceived stress concerned ¼ of the patients (17.25±1.48 points on average), high level characterized ¾ of women (22.55±1.78 points on average). Overall, the average result obtained in the PSS-10 was 21.13±2.89 points. A negative and moderate correlation between stress level and body weight (rS=-0.4; p>0.05), as well as a negative and small correlation between PA and stress level (rS=-0.2; p>0.05), and between PA and body weight (rS=-0.2; p>0.05) were observed. Conclusions: The relationship between physical activity, perceived stress and body weight was observed. A more active lifestyle can be an effective non-pharmacological method of reducing stress and body weight among PCOS patients. However, further research with a larger sample size would be recommended.

Keywords: polycystic ovary syndrome, exercise, sports, distress, women

Funding: Not applicable.

Name: Mohamed Amessou

Title A phase 3 randomised study evaluating the efficacy and safety of FIRTECH, an infrared patch, in acute mild-to-moderate low back pain subjects

Author affiliations

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Abstract

1) Introduction. Low back pain (LBP) affects 10-15% of young athletes.1 Musculoskeletal (MSK) injuries represent 10-19% of all acute injuries in the emergency department.2 Nonpharmacological therapies are recommended as first-line treatment for MSK pain.3 FIRTECH, a drug-free patch with infrared (IR) emitting bioceramic particles absorb the body's natural heat to re-emit the IR energy. Here, we evaluated the efficacy and safety of FIRTECH in acute mild-to-moderate LBP. 2) Methods. This open-label, randomized study (NCT05137041) compared the FIRTECH patch with no-patch control arm in subjects (≥18–<65 years) with acute mild-to-moderate LBP (<1M duration, intensity ≤6 on 0-10 Numerical Rating Scale [NRS]). e-diary activation and patch application on LBP site were completed on Day1 (baseline) and final evaluations with patch removal on Day5 with an additional follow-up day. Primary endpoint: NRS responder rate at Day5 (≥30% decrease from baseline of instantaneous pain and no rescue medication needed) by no difference (between group) hypothesis using Fisher's exact test. Secondary endpoints: Normalized Sum of Pain Intensity Difference over 5 days (SPID0-5), % change in Roland-Morris Disability Questionnaire (RMDQ) score and change in mobility evaluation (Schöber's Test) from baseline to Day5; time to reach acceptable pain, time to reach no pain (NRS=0), time course of pain intensity difference (PID) and pain-relief over time from baseline to Day5, normalized sum of total pain-relief over 5 days (TOTPAR0-5). Descriptive, inferential analyses were used. 3) Results. Total of 221 [54.8% female; mean (SD) age: 45.2 (12.97) years] subjects were randomised (FIRTECH, n=113; no-patch, n=108). At Day5, the NRS-responder rate was significantly higher in FIRTECH (72.5% [n=66/91]; 95%CI: 62.2, 81.4) vs no-patch arms (49.4% [n=44/89]; 95%CI: 38.7, 60.3; p=0.002). Among non-responders, 3 (3.3%) subjects in FIRTECH and 14 (15.7%) in no-patch arms used rescue medication. A significant decrease in normalised SPID0-5 (LSM difference [95%CI]: −0.5 [−0.82,−1.14]; p=0.015), and improved mobility (LSM difference [95%CI]: 1.0 [0.51, 1.58]; p<0.001) by Day5 was seen in the FIRTECH vs no-patch arms. On Day5, RMDQ scores, median time to reach acceptable pain and time to reach no pain had no significant difference. Time course of PID, time course of pain-relief and TOTPAR0-5 (LSM:1.5 vs 0.8) showed a higher pain-relief over 5-days for FIRTECH vs no-patch starting from Day1-evening. Device related treatment emergent adverse events were reported in 12 (10.5%) subjects in FIRTECH arm. 4) Conclusion. FIRTECH showed efficacy in relieving LBP and improving mobility for up to 5-days with a favourable safety profile. These IR patches can be a potential drug-free and easy-to-use option in managing sports-related MSK injuries. References 1. Chowdhury B. Saudi J Biomed. Res. 2016;1:34-41. 2. de Sire, et al. Medicina. 2021;57:1208. 3. McSwan J, et al. J Pain Res. 2021;14:2943–58.

Keywords: nonpharmacological, drug-free, infrared, musculoskeletal pain, low back pain

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Name: Mari Arak

Title COVID-19 infection in Estonian athletes: descriptive retrospective questionnaire-based study

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Abstract

ackground Studies have shown increased risk for upper respiratory tract infections in athletes. However, there is still inconclusive data about the risk of athletes getting SARS-CoV-2 virus, what kind of factors contribute to the severity of the disease and how athletes recover from the infection. Aim of the study The purpose of the study was to give an overview about the prevalence of Estonian professional and amateur athletes getting SARS-CoV-2 virus infection from February 2020 until May 2022, symptoms and course of the disease as well as postinfectious complaints after returning to sports. Additionally, the attitude toward vaccination against COVID-19 was examined. Methods Anonymous self-report online questionnaire was sent to the Estonian athletes (using data from different sports federations) during the period from 1st of March until 31th of May 2022. All regularly training athletes from the age 10 were included in the study. Descriptive statistical analysis was performed with SPSS (SPSS Inc., version 29, Chicago, Illinois, USA). Between-group differences $\chi 2$-test was used. Results There were 1243 fully answered questionnaires (746 males and 497 females) with the average age of respondents being 23 years. 70% of all athletes were professional (n=862), 30% were amateur (n=377). There were 34% individual sports and 66% team sports athletes. Until 31th of May 2022, 75 % (n=903) had been tested positive for SARS-CoV-2 virus. Among them, 85% had one COVID-19 episode, 15% of athletes reported having two COVID-19 episodes. No significant difference ($p>0.05$) among positive athletes was found between men and women (74% and 76%, respectively) and professional athletes (67%) compared to amateur athletes (33%). Female athletes experienced all symptoms more than men. Seven diagnosed viral pneumonias were reported. Asymptomatic COVID-19 was reported 11% during first and 18% during second infection episodes. 4 were hospitalized due to COVID-19. No serious post-COVID complications were noted. Average time spent away from trainings was 1-2 weeks. Among all athletes, 81% (n=1006) were vaccinated against COVID-19 (by 1st of May 2022). There was higher prevalence of COVID-19 among unvaccinated athletes (85%) compared to vaccinated athletes (respectively, 85% and 73%; $p<0,01$). Among unvaccinated athletes (n=231), 78% would definitely not vaccinate, if possible, only 3% would have the vaccine in the future. Conclusions Our study results revealed that COVID-19 in Estonian athletes is usually with mild symptoms. There is no significant difference in COVID-19 prevalence between men and women and between professional and amateur athletes. Unvaccinated athletes suffered from COVID-19 more than vaccinated athletes. Female athletes experienced symptoms more than men.

Keywords: Athletes, COVID-19, vaccination

Funding Not applicable.

Name: Vangel Ristovski

Title: Physiological variations of ecg parameters in young athletes regarding the age

Author affiliations

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Abstract

Introduction: Many children begin with participation in regular sports activities at a young age when demanding trainings could cause physiological and functional changes in the cardiovascular system. A great amount of attention is paid to the heart function of the young athletes as one of the key conditions for safe sports practice. The aim of this study is to analyze the common ECG parameters:(HR=Heart Rate, TWI=T-Wave Inversion, ST=ST segment elevation or depression, QRS complex amplitude, LAE=Left Atrial Enlargement, AD =Axis Deviation and IBBB=Incomplete Bundle Branch Block) in athletic pediatric subjectswho participated in teams sport activities (soccer, handball and basketball), regarding their age. Material and methods: This study involved 312 children (262 male and 50 female), aged 6 to 18, who were divided into three groups: Under the age of 10 (N= 76), under the age of 14 (N=153) and under the age of 18 (N=83). Results: We found that variations in HR (mostly bradycardia) were seen in 14% of the children in the U10, compared to 21% in the U14 group and 32% in the U18 category. T wave inversion in the precordial leads was the most present in the younger group of U10, 35% versus 23% in the U14 group and 22% in the U18 group. Changes in ST segment (mild elevation or depression) were found in 8% of the U10 children, 14% of the U14s and 16% of the U18s. 18% of the children under 10 showed R waves taller than 25mm.This parameter was present in 17% of the U14 group and 11% of the oldest group. Rare cases of LAE were present in only 3% of the youngest group, almost 2% of the middle and 2% of the “oldest” children. The axis deviations were also rare, showing 1% of the U10, and 6% of both the U14 and U18 age groups. The last but most common parameter is the IBBB, which was present in 40% of the children in the U10 category, 47% in our U14 subjects and 46% in the U18s. Conclusions: Majority of athletic children show some physiological ECG changes with IBBB being the most common one within all of the groups. As expected, sports bradycardia was more present in the older age groups. Opposed to that, the TWI and the tall R waves, were more present in the younger athletes’ ECG. There was no significant difference in the other parameters.

Keywords: pediatric ECG, child athletes, physiological adaptations

Funding: Institute of Medical Physiology and Anthropology, Faculty of Medicine, University Saints Cyril and Methodius, Skopje, Republic of North Macedonia.

Name: YE Chengjie

Title: Application of RPE-Based Load Evaluation in Olympic Combat Sports Training and Competition: A System Review

Author affiliations

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Abstract

Objectives: To analyze the application of Rating of Perceived Exertion (RPE) and session-RPE (sRPE) in Olympic Combat Sports. The application effect is discussed from the aspects of training and competition load quantification. In recent years, researchers have begun to further combine them with traditional load monitoring theories to quantify load intensity by RPE scales and load volume by sRPE. This study conducts a systematic review of the literature related to the application of RPE and sRPE. It also discusses the current research position, application value, and development tendency of RPE in Olympic combat sports. Methods: Searches for all published works were conducted in English-language databases such as Pubmed, Web of Science (WOS), and Google Scholar. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement served as the basis for conducting the systematic review. Combat sports and RPE were utilized as relevant subject terms in the search, and Boolean operators were used to creating links between the results. The relevant research from the last ten years was screened, and the included studies underwent quality and bias risk assessments. Results: (1) A total of 24 studies meeting the criteria were included and detailed RPE values were reported. 16 studies in total documented the use of RPE and sRPE in striking combat sports, of which 8 were used in competition (4 taekwondo and 4 karate) and 8 in training (2 boxing, 3 taekwondo, and 4 karate). Seven studies in all documented the use of RPE and sRPE in combat sports involving grappling, of which one was used in judo training and six in competition (five in judo and one in wrestling). (2) When applied to training load quantification, factors such as playing level, training intensity, and the number of groups affect RPE and sRPE, with athletes in high-level striking combat sports having a lower RPE. RPE scales, collecting time, and cognitive level affect the accuracy of RPE values. (3) When applied to match load quantification, age, competition advantages, and the number of competition rounds have a greater influence on the RPE values. The RPE and sRPE in formal competitions can effectively reflect the match load of combat sports. Conclusion: (1) In practical scenarios, choosing the right collection time and aligning athletes' cognitive levels can both increase the effectiveness of load monitoring. (2) Current load evaluation studies applying RPE are mainly focused on taekwondo, karate, and judo, it is recommended that researchers further increase the research in boxing and wrestling in the future to optimize and improve the load monitoring system for combat sports. (3) The RPE and sRPE of official competitions can provide more accurate feedback on the load volume and intensity of athletes during competitions, and formulating and adjusting training plans based on the RPE of official competitions can help coaches improve the effectiveness of daily training.

Keywords: training load, match load, load monitoring, load quantification

Funding: Weighting and Combat Sports Administrative Center of the General Administration of Sport of China

Name: Stella Michailidou

Title: Heart rate recovery and risk of cardiovascular disease and all-cause mortality: a systematic review of prospective cohort studies

Author affiliations

Stella Michailidou

Abstract

Purpose: An attenuated decrease of heart rate recovery (HRR) immediately after exercise is an indicator of autonomic dysfunction and has been linked with a higher risk of cardiovascular disease and all-cause mortality in both healthy and clinical population. However, evidence regarding its potential prognostic value varies across studies making its implementation in clinical practice for risk assessment difficult. The purpose of the present systematic review is, therefore, to investigate the predictive value of heart rate recovery in CVD disease and all-cause mortality, in an evidenced-based manner to encourage its incorporation in clinical practice Methods and Results: A systematic review was performed through a comprehensive search on PubMed that focused only on prospective cohort studies. Of the studies retrieved, a total of 13 eligible articles were included in this systematic review with nine of them enrolling 37 457 participants and 709 CVD cases for cardiovascular events, and 12 comprising 45 905 participants and 4 301 deaths for all-cause mortality. The study quality of the included studies was rated moderate to high (4-8) with high heterogeneity (I^2 = 0.0001). Results revealed no statistically significant difference in HRR for patients with and without cardiovascular events M=-2672.16, at 95% CI [-7341.6,1997.32]; P-value = .234 as well as for people who died and those who did not M= -3141.667, at 95% CI [-7627.448,1344.144], P-value = .151. Also, the association between CVD and mortality was presented as statistically significant, Chi-Square = p<0.0001 while a further analysis of heart rate recovery revealed that when distinguished between low and high, it was found to have a strong positive association with all-cause mortality, Chi-Square = p<0.0001. Conclusion: The current systematic review findings indicated that a low HRR is directly linked with greater all-cause mortality risk. Also, given the strong association found between CVD and mortality, the study further supported that even though indirectly, a low HRR is also associated with an increased risk of cardiovascular events, supporting the notion that HRR has a prognostic value and could be used in clinical practice.

Keywords: heart rate recovery, cardiovascular disease, all-cause mortality, prognosis

Funding: Not applicable.

Name: Michael Michaelides

Title: Sports medicine for a more active and healthier society

Author affiliations

Dr. Michael Michaelides
CYPRUS ASSOCIATION OF SPORTS MEDICINE, DR. MICHAEL MICHAELIDES, HEALTHIER SOCIETY

Abstract

INTRODUCTION: Sports medicine has emerged itself as the science that exists solely for the benefit of competitive elite athletes, usually related to the diagnosis and treatment of sports injuries, etc., and less or hardly at all, as a means of prevention and overall health protection from the scourge of physical inactivity and sedentary lifestyle diseases. PURPOSE: In order to address the major problem that our society is facing today with the tremendous increase of morbidity and mortality from cardiovascular diseases and other chronic diseases related to sedentary lifestyle and physical inactivity, the National Sports Medicine & Research Centre of Cyprus, which belongs to the Cyprus Sports Organization, has implemented various forms of "Good Practices", to inform and raise awareness of both citizens and the stakeholders of the State. METHODS: Various forms of activities were carried out, through seminars, lectures, educational interventions in school curricula, fitness tests and ergometric examinations, in various sectors of the society, such as, the Police, Fire Department, Army, and Special Forces, which includes, Anti-Terrorist Unit, Commando and Underwater Demolition Unit. Furthermore, certain governmental and semi-governmental organizations, have started implementing, physical fitness test, in the hiring process of personnel, for example, Electricity Authority and Water Board Authority, of Cyprus. RESULTS & DISCUSSION: The impact so far and the response from the various Organizations and Individuals are extremely positive. Our aim is to develop the above initiatives and actions into standard National Policy, especially within the sectors of Education, Health and Sports.

Funding: CYPRUS ASSOCIATION OF SPORTS MEDICINE - EFSMA MEMBER

Name: Oleksandr Romanchuk

Title: Changes in the frequency and the volume synchronization of the cardiorespiratory system during tests with controlled breathing under the influence of training on the development of strength endurance

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Abstract

Introduction. In sports medicine, the determination of the effects and adaptation reactions of the athletes' body is given a leading place. The purpose of this work was to investigate changes in indicators of cardiorespiratory interaction when performing a breathing maneuver with a change in breathing frequency in physically fit persons who trained for strength endurance. Methods. 22 persons, male, aged 20.5 (20.2; 21.0) years old, who for 4 months 2 times a week engaged in training for the development of strength endurance, were under supervision. A total of 30 training sessions were held. Before the beginning of the classes and at the end of them, a study of the cardiorespiratory system was carried out using a spiroarteriocardiorhythmograph (SACR). The study was conducted in a sitting position. The duration of the study was 6 minutes. Sequential (for 2 minutes) registration of SACR indicators was carried out during spontaneous breathing (SB) and controlled breathing 6 (CB6) and 15 (CB15) times per minute. In this message, we will consider the changes in the indicators of the cardiovascular and respiratory systems synchronization during the performance of breathing maneuver. For the analysis, we have chosen the indicators of the Hildebrandt index (frequency synchronization) – HI (c.u.) and the indicator of volume synchronization, namely the ratio of cardiac output (CO, dm3) to minute vemtilation (V, L). The physiological meaning of the latter lies in the capabilities of the hemodynamic system to ensure the utilization of air gases. Results. At SB after 4 months of training, there were no significant differences in HI (c.u.) 5.06 (4.08; 7.12) versus 4.91 (4.53; 5.35), p=0.408, and the CO/V indicator significantly increased to 0.725 (0.564; 1.148) versus 0.597 (0.490; 0.832), p= 0.008. This, in the presence of insignificant changes in CO (dm3) 4.35 (4.00; 4.80) vs. 4.45 (4.20; 5.10), p=0.175 and significant changes in V (L) 6.40 (3.73; 7.74) vs. 8.19 (6.24; 8.86), p=0.005 allows us to demonstrate a significant increase in the capabilities of the hemodynamics system for oxygenation security. Analyzing the changes in these indicators when performing a breathing maneuver, it should be noted that their significant differences are noted both at CB6 and at CB15. At CB6 – HI (c.u.) decreased to 10.18 (9.54; 11.00) versus 11.14 (10.43; 12.49), p=0.001, CO/V (dm3/L) increased to 0.532 (0.441; 0.723) versus 0.327 (0.382; 0.529), p=0.012. At CB15 – HI (c.u.) decreased to 4.46 (4.13; 4.78) versus 5.33 (4.68; 5.85), p=0.000, and CO/V (dm3/L) increased to 0.481 (0.373; 0.616) versus 0.245 (0.339; 0.455), p=0.003. Conclusion. Strength endurance training leads to changes in the frequency and volume synchronization of the cardiovascular and respiratory systems when performing tests with controlled breathing, which can have a prognostic value in determining the state of the athletes' body.

Keywords: cardiorespiratory system, controlled breathing, synchronization, strength endurance

Funding: Not applicable.

Name: Oleksandr Romanchuk

Title: Comparison of respiratory pattern changes during the formation of sympathetic and parasympathetic overstrain after training load

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Abstract

Introduction. Spontaneous breathing is an important component of the body's functional homeostasis in conditions of rest and under the influence of various stimuli, and also ensures the course of all adaptive mechanisms in the body of athletes. The purpose of this study was to investigate the differences in changes in pattern breathing (PB) indicators in highly qualified athletes under the influence of intense training load during formation of sympathetic and parasympathetic overstrain. Methods. 202 highly qualified male athletes aged 22.6±2.8 years were under supervision. The research was conducted in the pre-competition period. Examination using spiroarteriocardiorhythmography was carried out twice: in the morning hours, on an empty stomach, in a sitting position on the day of training (K1) and on an empty stomach the next morning after training (K2). Based on the changes in heart rate variability indicators under the influence of training loads, two groups of athletes were formed: OG1 – 10 people who had a stable predominance of sympathetic regulation, and OG2 - 9 people who had a stable predominance of parasympathetic regulation. The results of all 202 athletes who were under supervision were used as a control group (CG). Results. At K1 in OG1 in comparison with CG, is a shorter duration of inspiration (Ti, s) was noted – 1.4 (1.3; 1.8) vs. 1.6 (1.4; 2.1), $p<0.05$, against the background of a similar duration of exhalation (Te, s) - 2.3 (1.8; 2.6) vs. 2.4 (2.0; 3.1), $p>0.05$, what were accompanied by increased Vt (L) – to 0.695 (0.530; 0.860) from 0.530 (0.420; 0.760), $p<0.05$, and V (L) – to 10.9 (8.0; 12.4) from 7.8 (5.9; 10.3), $p<0.05$. At the same time, RR (min-1) indicators did not differ significantly. There was a tendency to less RR (min-1) in OG2 compared to CG – 11.3 (9.6; 16.7) versus 15.0 (11.2; 17.5), $p< 0.05$. Also in OG2 there was been are significant differences in the duration of exhalation (Te, s) – 3.5 (2.2; 4.2) versus 2.4 (2.0; 3.1), $p< 0.05$. All the PB parameters during K2 in OG1, as well as in CG, return to their initial values with the exception of RR, which is a little greater than during K1 – 17.5 (11.0; 19.8) versus 14.6 (11.2; 17.2), $p< 0.05$. In OG2 at K2, against the background of recovery of exhalation volume flow (Ve, L×s-1) to initial level, a significant slowdown of inspiratory volume flow (Vi, L×s-1) was registered – 0.24 (0.21; 0.27), which differed significantly ($p<0.05$) from initial values (K1) - 0.28 (0.19; 0.31), as well from as CG – 0.28 (0.21; 0.27). 0.36) and OG1 – 0.39 (0.26; 0.46). During K2 in OG2 Vt (L), RR (min-1) and V (L) have been restored to initial values. Conclusion. The respiratory pattern changes significantly supplement the data on regulatory processes that ensure functional homeostasis during the formation of overstrains of the cardiovascular system according to sympathetic and parasympathetic types.

Keywords: respiratory pattern, physical load, overstrain

Funding: Not applicable.

Name: Oleksandr Romanchuk

Title: Changes in the athletes' stroke volume when performing controlled breathing tests and their relationship with pattern breathing indicators

Author affiliations

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Abstract

Introduction. The stroke volume (SV) is an important indicator of the cardiovascular system activity, namely the maintenance of systemic hemodynamics. Its changes in the training process can indicate the formation of the level of training, or the processes of recovery of the body after loads. The purpose of this work was to determine the changes in the SV when performing tests with controlled breathing, as well as to investigate the correlations with the breathing pattern. Methods. 183 qualified male athletes who were engaged in various sports were under supervision. The study of indicators of the cardiovascular and respiratory systems was carried out using a Spiroarteriocardiorhythmograph device. The examination was carried out in a sitting position for 6 minutes, when three combined recordings of the cardiorespiratory system function (ECG in 1 lead, pulse curve with determination of beat-to-beat blood pressure and flows of inhaled and exhaled air) were sequentially performed during spontaneous breathing (SB), controlled breathing 6 (CB6) and 15 (CB15) per minute. Results. The analysis of the combined changes in the indicators of the cardiorespiratory system showed that the SV (cm3) when performing CB6 decreases from 66.0 (60.3; 73.9) to 65.7 (60.1; 72.9), p=0.010, and with CB15 it decreases to 63.6 (57.9; 71.2), p=0.000. Accordingly, the increments of SV (cm3) were -0.6 (-2.8; 1.7) and -2.2 (-5.3; 0.10), p=0.000. That is, with both variants of controlled breathing (CB6, CB15), SV decreased compared to SB. Subsequently, increments in pattern breathing indicators were determined, which, respectively, for CB6 and CB15 in comparison with SB were: for VT (L) 1.100 (0.700; 1.690) and 0.320 (0.120; 0.680); for Ve (L×s-1) 0.090 (0.022; 0.172) and 0.197 (0.099; 0.356); for (L×s-1) 0.082 (-0.013; 0.216) and 0.205 (0.080; 0.367); for V (L×min-1) 3.037 (0.932; 6.159) and 6.058 (3.004; 10.351). Spearman's correlation analysis at the level of p<0.05 showed that the decrease in SV (cm3) at CB6 is associated with VT (L), r = -0.272 and V (L×min-1), r = -0.242. At CB15, the decrease in SV (cm3) is associated with VT (L), r = -0.309 and V (L×min-1), r = -0.288, as well as with Ve (L×s-1), r = -0.288 and VI (L×s-1), r = -0.309. Conclusion. With CB6 and CB15 times per minute, there is a significantly decrease in SV (cm3). Given that breathing in CB6 and CB15 is deep, the differences in changes may indicate the specifics of switching on postganglionic sympathetic activity, which may be useful in the diagnosis of overstrain states. References Guzii O, Romanchuk A. Determinants of the functional state of sportsmen using heart rate variability measurements in tests with controlled respiration. Journal of Physical Education and Sport. 2018;18(2):715-724. doi:10.7752/jpes.2018.02105

Keywords: athletes, stroke volume, controlled breathing, breathing pattern

Funding: Not applicable.

Name: Arkadiusz Matras

Title Association of "weight cutting" with bench press performance in powerlifters

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Abstract

Introduction: Rapid body mass loss ("weight cutting") can be an effective method to improve powerlifting performance. Previous studies have focused on assessing the impact of single methods leading to rapid body mass loss (such as ketogenic diet [1] or dehydration [2]) on strength. During a rapid body mass loss, powerlifters usually use several different methods leading to reduce body mass [3]. Therefore, the aim of the study was to assess the impact of combined methods leading to a rapid body mass loss on the one repetition maximum bench press performance. Methods: Nine powerlifters (age: 26.7 ± 5.3 years, body height: 179.3 ± 8.3 cm, body mass: 95.3 ± 16.4 kg) were examined. During the first week of the study, the athletes followed standard eating habits with no change in body mass. On the 7th day, the competitors took part in a simulated powerlifting competition (T1). In the second week, the athletes underwent a rapid body mass loss leading to a reduce of approximately 5% of body mass. On the 14th day, the competitors repeated their participation in a simulated powerlifting competition (T2). Between the weigh-in and the start of the competition, the competitors used the recovery strategy for 2 hours. Results: In the process of rapid body mass loss, the athletes lost an average of 4.5 ± 0.6 kg (4.8 ± 1.0%, $p < 0.01$). There was no statistically significant difference in bench press performance between T1 and T2 (T1 bench press: 123.7 ± 28.5 kg, T2 bench press: 123.9 ± 30.6 kg). However, because of the body mass reduction, the relative strength calculated using the IPF Good Lifts formula turned out to be significantly higher (T1 bench press IPF GL: 58.3 ± 12.7 points, T2 bench press IPF GL: 60.3 ± 13.2 points, $p < 0.05$). Conclusions: Applying a rapid body mass loss strategy of approximately 5% of body mass can be an effective method of body mass reduction without negatively affecting the performance of powerlifters in the bench press. In addition, due to the reduction of the body mass of the athletes, the use of a rapid body mass reduction strategy is associated with an increase in the bench press IPF GL points. 1. Sawyer JC, Wood RJ, Davidson PW, Collins SM, Matthews TD, Gregory SM, Paolone VJ. Effects of a short-term carbohydrate-restricted diet on strength and power performance. J Strength Cond Res. 2013 Aug;27(8):2255-62. 2. Schoffstall JE, Branch JD, Leutholtz BC, Swain DE. Effects of dehydration and rehydration on the one-repetition maximum bench press of weight-trained males. J Strength Cond Res. 2001 Feb;15(1):102-8. 3. Nolan D, Lynch AE, Egan B. Self-reported prevalence, magnitude, and methods of rapid weight loss in male and female competitive powerlifters. J Strength Cond Res. 2022 Feb 1;36(2):405-410.

Keywords: dehydration, ketogenic diet, low-fiber diet, powerlifting, rapid body mass loss

Funding: Not applicable.

Name: Michał Skowronek

Title: Understanding the pathophysiology of the knee osteoarthritis related to sports injuries. Current concept.

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Abstract

Osteoarthritis of the knee is a chronic disease and together with hip is the most common orthopedic disorder. Understanding pathogenetic mechanisms underlying this pathology is essential including sports injuries and orthopaedic procedures. Degenerative changes in the knee are not only congenital or due to systemic diseases, but more and more often the cause is sports injuries and related operations. The aim of the study is to analyze the cause of the development of the knee osteoarthritis related to sports injuries. Understanding of the treatment and prevention of osteoarthrosis after acute injuries to the knee is crucial. This presentation provides an overview of the most recent and relevant data on the secondary cartilage damage after sports knee injury and development of the knee osteoartrhritis.

Keywords: sport injuries, knee osteoarthritis, pathophysiology

Funding: Not applicable.

Name: Bogna Jiravska-Godula

Title: Prevalence and Predictors of Positive Family History in Preparticipation Screening of Athletes

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Abstract

Introduction: Family history of sudden cardiac death (SCD) and cardiovascular disease (CVD) is an important risk factor assessed in preparticipation screening (PPS) of athletes. This study aimed to determine the prevalence and predictors of positive family history using different PPS systems in a large cohort of athletes. Aim: The primary aim was to assess the prevalence and predictors of positive family history of SCD and CVD using four PPS systems - PPE-4, FIFA, AHA, and IOC. The secondary aim was to compare the efficacy of these systems in identifying positive family history. Methods: This retrospective analysis included 13,876 athletes undergoing PPS from 2015-2022 in the Czech Republic. Demographic, clinical, family history and exercise test data were extracted from medical records. Positive family history was defined as SCD/CVD occurrence ≤50 years in a first-degree relative in at least one PPS system. Logistic regression identified predictors of positive family history. Results: Positive family history was found in 177 athletes (1.28%). Higher maximum heart rate was an independent predictor (OR 1.042 per bpm increase, $p<0.001$). Prevalence differed significantly between PPS systems (PPE-4: 1.20%, FIFA: 1.11%, AHA: 0.89%, IOC: 0.71%, $p<0.01$). Conclusion: The prevalence of positive family history of SCD/CVD in athletes was low at 1.28%. Maximum heart rate was associated with increased likelihood of positive family history. Significant differences existed between PPS protocols in identifying positive family history. Further research on optimizing family history screening in athletes is warranted.

Keywords: Family history, sudden cardiac death, preparticipation screening

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Name: Bogna Jiravska-Godula

Title: Sports cardiology centre - experience to date, data from the 2020-2023 registry and challenges of the fourth year of operation

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Abstract

Introduction: Sports cardiology is a dynamically developing subspecialty of cardiology. There are four Sports Cardiology Centres in the Czech Republic, which were established under the leadership of the Sports Cardiology Working Group thanks to the Czech Society of Cardiology (CSC) and the Czech Society of Sports Medicine (CSSM). Objective: To describe the experience, data from the registry of the Sports Cardiology Centre of our hospital for the period 1.1.2020-30.6.2023. Functioning and file: A) The patient logs into our way by way of the web interface, where the basic information and previous examinations are given. B) These input data will be incorporated by the center coordinator, ensure communication with the client, other necessary information or examination and after consultation with cardiologists, who subspecialize in the subunits, determine a plan of care. C) The organisational aspects of the established procedure are ensured by the nurses. D) After the follow-up examination, the client has a final consultation with the sports cardiologist, where the suitability or limitations for sport and other recommendations for dispensation are always indicated. Between 1/2020 and 6/2023, 193 athletes were consulted at our Sports Cardiology Centre. Of these, 17 athletes did not complete examinations and 176 clients were included, where 144 were male (81.8%) and 32 were female (18.2%). The median age was 23 years (IQR 18-33, range 15-73). The median weekly training volume was 8 hours (IQR 6-12, range 3-30). The median years of training was 10 (IQR 8-16, range 1-55). The most frequent request for consultation was self-referral (43.8%), sports medicine referral in 30.1%, cardiologist in 13.6%. Reasons for referral were most commonly abnormal preparticipation screening (42.4%), symptoms (30.3%) and post-COVID evaluation (10.3%). A final diagnosis was set in 68.2%, suspected in 10.8%, and not set in 21.0%. Sports eligibility was 51.7% eligible, 26.1% conditionally eligible, 3.4% not eligible, and 18.8% not finalized yet. Conclusion: In the pursuit of the development of the field and the achievement of a stable quality of care, our centre is potentially able to meet the requirements of the European Society of Cardiology/ European Association of Preventive Cardiology for a sports cardiology unit in terms of methodological/procedural and personnel parameters.

Keywords: Sports cardiology centre, experience to date, data from the 2020-2023

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Name: Svitlana Drozdovska

Title The association of irisin and leptin with metabolic and gut microbiota parameters in obese women under aerobic and resistance health-enhancing exercise programs

Author affiliations

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Abstract

INTRODUCTION. The aim of the study was to investigate the relationship between irisin and leptin and biochemical parameters of carbohydrate metabolism and gut microbiota composition under resistance and aerobic health-enhancing exercise programs in obese women. METHODS: We randomized 73 obese women (43 ± 7.9 years, BMI 31.3± 3,8) into 3 groups: either aerobic (group I) or resistance (group II) exercise programs or control. HR, BP, the body weight, the BMI, body composition (the content of fat, the lean body mass, percentage of visceral fat) and body circumferences of women involved into health-enhancing exercise programs were evaluated before and after the 3-month exercise training. The body fat reduction and changes in the main metabolic markers (HDL, LDL, TG, total cholesterol, blood glucose, HbA1c, insulin, HOMA-IR index, AST and ALT, irisin, leptin, GLP1) were assessed. Determination of microbiota composition at the level of major bacterial phyla was performed with quantitative real-time PCR using universal primers targeting bacterial 16S rRNA gene, as well as primers specific for Actinobacteria, Firmicutes and Bacteroidetes. RESULTS: Significant increase (p=0.0001) of the Bacteroides by 18.4% was established simultaneously with a decrease in Firmicutes by 36.8% (p=0.02) under the influence of resistance exercise, while aerobic exercise only showed an 8% (p=0.24) increase in Bacteroides along with a slight decrease in Firmicutes by 4.9 (p=0.24). The presence of Akkermansia muciniphila, which has an inverse correlation with the fasting glucose level, enrichment of the diversity of the intestinal microbiome and tolerance to exercise, was detected in the faecal samples of the group of resistance exercises, together with Bacteroides fragilis. Comparative analysis of the two groups revealed significant differences (P<0.05) of HbA1c, Homa-IR, glucose and ALT after exercise programs. The levels of irisin and leptin in the blood of obese women in both groups decreased after 3 months of health fitness programs. In group 1, the level of irisin decreased by 8.6%, while in the second group it decreased by 11.8%. Level of irisin and leptin showed association with BMI and the F/B ratio in group II (P<0.05). CONCLUSION: In our studies, resistance training had a more significant effect on improving carbohydrate metabolism, body weight, BMI, fat mass, visceral fat, increasing Bacteroidetes and changing the F/B ratio.

Keywords: irisin, leptin, obesity, health-enhancing exercise programs, gut microbiota

Funding: Ministry of Education and Science of Ukraine

Name: Kinga Żmuda

Title: Peripheral brain-derived neurotrophic factor is related to cardiorespiratory fitness

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Abstract

Regular exercise is known to improve the physiological performance of skeletal and cardiac muscles and decrease the incidence of a wide range of diseases, including heart and vascular diseases, certain kinds of cancers, type 2 diabetes, etc. In the last decade, it has become clear that regular exercise beneficially affects brain function too and could play an important preventive and therapeutic role in stroke and degenerative diseases. The effects of exercise appear to be very complex and could include enhanced angiogenesis, neurogenesis and mitogenesis via neurotrophic factors [Zembron-Lacny et al. Braz J Med Biol Res 2016]. The study was designed to identify the age-related changes in peripheral brain-derived neurotrophic factor (BDNF) and its relationship to conventional cardiovascular disease (CVD) biomarkers in active and inactive men. According to the 6-min Åstrand-Rhyming bike test, the young (n=17 aged 20-24 years) and older (n=17 aged 61-80 years) men were classified into active and inactive groups. The active young and older men exhibited a significantly improved lipoprotein-lipid profile, reduced levels of oxLDL and C-reactive protein (CRP), as well as significantly higher circulating BDNF levels compared to their inactive peers. BDNF was correlated with VO2max ($r=0.765$, $p<0.001$). In addition, BDNF significantly indirectly correlated with atherogenic index (TC/HDL $r=-0.473$, $p<0.01$), CRP ($r=-0.466$, $p<0.01$) and oxLDL ($r=-0.560$, $p<0.01$). The study demonstrated that a high level of cardiorespiratory fitness reflected in VO2max is associated with a higher level of circulating BDNF, which in turn resulted in a reduction in the level of CVD risk factors.

Keywords: aging, neurotrophins, oxidative LDL, physical activity

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Name: Teodora Simina Dragoiu

Title: Multivitamin supplements as a general recommendation for athletes: to be continued or not?

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Abstract

Introduction: The supplement industry is growing in popularity, particularly among the youth and those committed to a healthy lifestyle and involved in regular physical activity. While certain vitamin deficiencies (like vitamin D) are prevalent, multivitamin supplements are frequently prescribed for all engaged in intense physical activities. This review assesses the effectiveness of this broad approach, questioning if tailored methods are more appropriate. Methods: This brief systematic review analyzed literature from the past twenty years from the PubMed database concerning multivitamin effects on athletes. Predominantly, systematic reviews or meta-analyses were considered, spanning athletes across diverse sports and age groups. Results: Athletes often exhibit biomarker concentrations that differ notably from the general population, indicating sport-specific loads that directly influence their individual nutritional and micronutrient needs. It was noted that athletes have unique nutritional and biochemical profiles, demanding individualized reference values. Additionally, while the consumption of vitamins exceeding the Recommended Daily Allowance (RDA) often does not provide additional benefits and can be detrimental for healthy individuals, only specific subsets of athletes with conditions like malabsorption issues, Celiac disease, irritable bowel syndrome, or those participating in indoor sports, require supplementary vitamins. Those with eating disorders, RED-S syndrome, and other conditions leading to low energy availability need special attention. Conclusion. The Sports Nutrition is still a challenging chapter for those involved in the care of athletes and the quality of an adequate diet is decisive for both performance and prevention of multiple conditions. The tailored nutritional needs of athletes demand a more discerning approach to multivitamin supplementation than simply exceeding RDAs. As the field of biomarker research rapidly advances, there's a significant promise for the development of precise nutritional guidelines for athletes, emphasizing the need for research to produce guidelines for vitamin level testing, deficit screenings, and personalized supplement prescription plans.

Keywords: supplements, vitamins, sports nutrition, athletes, RDA

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Name: Rafał Szafraniec

Title: Effects of acute systemic hypoxia on short-term resistance exercise to repetition failure

Author affiliations

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Abstract

Introduction: Recent research suggests that performing resistance exercise under hypoxic conditions enhances muscular development using low loads (20% 1 repetition maximum [1RM]) (1), moderate loads (60% 1RM) (2), and high loads (80% 1RM) (3). These studies used various training protocols, but most often consisted of several exercises involving large muscle groups. The aim of our study was to investigate the mechanical, hormonal, and metabolic responses to short-term resistance exercise of small muscle groups performed to failure under conditions of systemic hypoxia. Methods: Thirteen resistance-trained men performed moderate-load resistance exercise in normoxia (NORM; 21% oxygen) and acute hypoxia (HYPO; 13% oxygen), separated by 72 h of recovery. Subjects breathed through a mask connected to a hypoxic generator. The exercise comprised 5 sets to repetition failure of a single arm dumbbell row at 50% 1RM with a 30-second interset rest. Load (dumbbell weight [kg]×reps), mean velocity (Vel), mean heart rate (HR), and rate of perceived exertion (RPE) were assessed. Growth hormone (GH), blood pH, latate, and oxygen saturation were measured before and after exercise. Results: Load was significantly lower (p =.009) in HYPO (2,342±792 kg) as compared to NORM (2,681±762 kg), which was a result of the reduced number of repetitions performed to failure when breathing hypoxic air. There were no significant differences between NORM and HYPO in RPE (8.1 vs. 7.9 points), Vel (0.93 vs. 0.89 m/s), HR (140 vs. 140 bpm), or post-exercise GH values (3.6 vs. 3.5 ng/ml), lactate (7.11 vs. 7.13 mmol/L), or blood pH (7.28 vs. 7.29). Conclusions: The use of acute systemic hypoxia results in a reduction in the number of repetitions of resistance exercise performed to failure. Despite performing less work in hypoxic conditions, cardiovascular workload (HR) and the subjective sensation of exertion (RPE) are at a similar level as in the case of performing more work while breathing normoxic air. Post-exercise analysis also showed that a lower load (fewer repetitions), accompanied by an additional stressor in the form of hypoxia, causes similar changes in growth hormone concentrations and blood acid-base balance as a higher load under normoxia. Resistance exercise with additional systemic hypoxia allows the training session to be shortened, thereby reducing the external load on the musculoskeletal system.

References 1. Manimmanakorn, A, et al. (2013) Effects of low-load resistance training combined with blood flow restriction or hypoxia on muscle function and performance in netball athletes. J Sci Med Sport, 16(4), 337-342. 2. Scott, BR, et al. (2017) Acute physiological responses to moderate-load resistance exercise in hypoxia. J Strength Cond Res, 31(7), 1973-1981. 3. Scott, BR, et al. (2015) Physical performance during high-intensity resistance exercise in normoxic and hypoxic conditions. J Strength Cond Res, 29(3), 807-815.

Keywords: hypoxic training, strength training, metabolic stress, lactate, growth hormone

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Name: Alston Choong Wai Kwong

Title: Single Injection of Platelet-rich Plasma or Prolotherapy Improve the Pain and Function in Rotator Cuff Tendinopathy: A Randomized Control Trial

Author affiliations

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Abstract

Introduction: Rotator cuff (RC) tendinopathy, a leading contributor to shoulder pain globally, has posed significant challenges to the medical fraternity. Despite its ubiquity, the therapeutic potential of platelet-rich plasma (PRP) and prolotherapy injections remains shrouded in uncertainty, primarily due to the dearth of comprehensive, high-caliber studies. The imperative primarily drove this research endeavor to discern the comparative therapeutic efficacies of PRP and prolotherapy in ameliorating pain and enhancing function in RC tendinopathy patients. Additionally, the study cast its investigative net wider to encompass secondary outcomes such as alterations in the range of motion, ultrasound-detectable changes in the affected region, and potential adverse reactions post-treatment. Methods: A meticulously designed parallel, double-blind, randomized control trial was executed to ensure rigorous scientific scrutiny, enrolling 69 participants. Within this cohort, individuals in the PRP group were administered a single 2 ml injection of leucocyte-depleted PRP. Simultaneously, under the precision of ultrasound guidance, the prolotherapy group received a single injection comprising 16.7% dextrose saline targeted at the afflicted rotator cuff tendon. The research framework mandated periodic assessments at baseline, 3-week, 6-week, 3-month, and 6-month intervals post-injection, focusing on parameters like the numerical rating pain scale, Shoulder Pain and Disability Index (SPADI), range of motion, and ultrasound changes. Results: The empirical data gleaned showcased a noteworthy reduction in pain intensity from the 3-week mark and a decline in SPADI scores from the 6-week point within both groups. Intriguingly, no discernible differences emerged between the two groups across all timeframes for both pain and SPADI scores. The study also revealed a stagnation in shoulder range of motion improvements in both cohorts. While both groups manifested a marked decrease in tendon thickness, inter-group comparisons yielded no significant variations. A post-injection feedback loop indicated the PRP group grappling with heightened pain levels compared to their prolotherapy counterparts within the initial 48 hours, albeit no grave adverse reactions were reported. Conclusions: In summation, this study underscores the potential of a single leucocyte-depleted PRP or prolotherapy injection in significantly mitigating pain and bolstering function in RC tendinopathy patients, with effects discernible as early as 3 weeks and sustained up to 6 months post-administration. The absence of significant disparities between the two injection types warrants further exploration, ideally in studies with more expansive sample sizes, to delve deeper into the long-term ramifications of these orthobiologic interventions in the context of RC tendinopathy.

Keywords: platelet-rich plasma, prolotherapy, rotator cuff tendinopathy, pain score, SPADI

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