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Conference on Kinesiology and
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25-28 July 2016, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH



Kinesiology and Exercise
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12th Annual International
Conference on

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Athens, Greece

Edited by Gregory T. Papanikos

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Preface

This abstract book includes all the summaries of the papers presented at the *12th Annual International Conference on Kinesiology and Exercise Sciences, 25-28 July 2016, Athens, Greece*, organized by the Sports Research Unit of the Athens Institute for Education and Research. In total there were 13 papers, coming from 10 different countries (Canada, Croatia, India, Lithuania, the Netherlands, Oman, Taiwan, UK, Ukraine, and USA). The conference was organized into 7 sessions that included areas of Exercise Physiology, Physical Therapy, Physical Activity & Disabilities and other related fields. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 150 international conferences and has published over 100 books. Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
12th Annual International Conference on Kinesiology and Exercise
Sciences, 25-28 July 2016, Athens, Greece

PROGRAM

Conference Venue: Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece

Monday 25 July 2016

(all sessions include 10 minutes break)

08:00-08:30 Registration and Refreshments

08:30-09:00 Welcome & Opening Address (ROOM B--Mezzanine Floor)

- Gregory T. Papanikos, President, ATINER.
- George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.

09:00-10:30 Session I (ROOM D- 10TH Floor): Exercise Physiology

Chair: Maria Konstantaki, Academic Member, ATINER & Senior Lecturer, Buckinghamshire New University, UK.

1. Ruta Dadeliene, Professor, Lithuanian University of Educational Science, Lithuania & Kazys Milasius, Professor, Lithuanian University of Educational Science, Lithuania. Correlation between the Indicators of the Critical Intensity Limit, and Lactate and Ventilatory Anaerobic Thresholds of Elite Kayakers Starting with the Distance of 1000 m.
2. Dajana Karaula, Postdoctoral Researcher, University of Zagreb, Croatia, Nada Grcic-Zubcevic, Professor, University of Zagreb, Croatia & Sime Zurak, University of Zagreb, Croatia. Differences between in Force Vital Capacity and Length of a Dive with and without Glossopharyngeal Insufflation in Breath-Hold Divers.

10:30-12:00 Session II (ROOM D- 10TH Floor): Physical Therapy

Chair: Ruta Dadeliene, Professor, Lithuanian University of Educational Science, Lithuania.

1. Sandra Mikuckyte, Ph.D. Student, Kaunas University of Technology, Lithuania & Vytautas Ostaševičius, Professor, Kaunas University of Technology, Lithuania. Design of Spinal Actuator and Investigation of its Influence on Human Spine.

12:00-13:30 Session III (ROOM D- 10TH Floor): Physical Activity & Disabilities

Chair: *Meenal Dhall, Assistant Professor, University of Delhi, India.

1. Jennifer Caputo, Professor, Middle Tennessee State University, USA, Hailie Cochran, Research Assistant, Middle Tennessee State University, USA & Sandra Stevens, Professor, Middle Tennessee State University, USA. An Examination of Physical Activity in Children with Disabilities.
2. Hailie Cochran, Research Assistant, Middle Tennessee State University, USA, Sandra Stevens, Professor, Middle Tennessee State University, USA & Jennifer Caputo, Professor, Middle Tennessee State University, USA. Parental Perceptions of Physical Activity in Children with Disabilities..
3. Sandra Stevens, Professor, Middle Tennessee State University, USA, Don Morgan, Professor, Middle Tennessee State University, USA & Jennifer Caputo, Professor, Middle Tennessee State University, USA. Increasing Physical Activity in Youth with Disabilities.

13:30-14:30 Lunch

21:00-23:00 Greek Night and Dinner (Details during registration)

Tuesday 26 July 2016

08:00-11:00 Educational and Cultural Urban Walk Around Modern and Ancient Athens (Details during registration)

11:00-12:30 Session V (ROOM D- 10TH Floor): Physical Activity and Health

Chair: Jennifer Caputo, Professor, Middle Tennessee State University, USA.

1. *Meenal Dhall, Assistant Professor, University of Delhi, India & Satwanti Kapoor, Professor, University of Delhi, India. Physical Activity and Lifestyle Indicators.
2. Svitlana Stupnytska, Associate Professor, Lviv Regional Institute of Postgraduate Pedagogical Studies, Ukraine, Olena Shyyan, Professor, Lviv Regional Institute of Postgraduate, Pedagogical Studies, Ukraine & Olha Riabukha, Associate Professor, Associate Professor at the Department of anatomy, physiology and pathology, Lviv Medical Institute, Ukraine. Original Approach to the Use of Physical Rehabilitation and Physical Education in the Sphere of Health Restoration and Preservation of Children with Orthopedic Pathology in Lviv Region.
3. Rozalia Kouvelioti, PhD Candidate, Brock University, Canada, Kate Nelson, MSc Candidate, Brock University, Canada, Jennifer Dekker, MSc Candidate, Brock University, Canada, Katherine Denize, BSc Thesis Student, Brock University, Canada & Panagiota Klentrou, Professor, Brock University, Canada. The Acute Effects of High Impact Exercise on Wnt/ β Catenin Signaling Related Osteokines in Young Females.

12:30-14:00 Session VI (ROOM D- 10TH Floor): Exercise Biochemistry/Biomechanical Effects of Training

Chair: Maria Kosma, Associate Professor, Louisiana State University, USA.

1. Hwai-Ting Lin, Associate Professor, Kaohsiung Medical University, Taiwan, Kai-Chu Kang, MSc Student, Kaohsiung Medical University, Taiwan & Hong-Wen Wu, Associate Professor, National Taiwan University of Sport, Taiwan. Various Running and Fast Walking Speeds of Loading and Pressure Distribution in Hip.
2. *Ewa Klaver-Krol, Neurologist-Researcher, Roessingh Research and Development

Institute (RRD), The Netherlands. Reduced Electric Fatigue in the Muscles of Fibromyalgia Patients.

14:00-15:00 Lunch

15:00-16:30 Session VII (ROOM D- 10TH Floor): Psychological Interventions

Chair: Hwai-Ting Lin, Associate Professor, Kaohsiung Medical University, Taiwan.

1. Maria Kosma, Associate Professor, Louisiana State University, USA, David Buchanan, Professor, University of Massachusetts-Amherst, USA & Jan Hondzinski, Associate Professor, Louisiana State University, USA. Practical Reasoning in Physical Activity Promotion.
2. Mahfoodha Al Kitani, Assistant Professor, Sultan Qaboos University, Oman. Blood Pressure Responses to Isometric Handgrip Training in Normal Healthy Female Students.

21:00-22:30 Dinner (Details during registration)

Wednesday 27 July 2016
Cruise: (Details during registration)

Thursday 28 July 2016
Delphi Visit: (Details during registration)

Mahfoodha Al Kitani

Assistant Professor, Sultan Qaboos University, Oman

Blood Pressure Responses to Isometric Handgrip Training in Normal Healthy Female Students

Introduction: According to Oman national survey (2000) there was an improvement in reducing infectious diseases and increasing life expectancy at birth of 76 years for females and 71 years for males (Al - Moosa et al, 2006) . Studies have shown that the urban areas of the Sultanate could reach the diabetes prevalence rate (11.6%), obesity (20.5%), hypertension (27.0%), and the metabolic syndrome (21.0%) (Al-Mousa 0.2006 &). Regular physical activity was recommended to improve cardiovascular health and lower blood pressure among both the general population and patients with hypertension. Studies showed that deaths from strokes can be reduced by 14% by reducing systolic blood pressure by 5 mmHg, also deaths from coronary heart disease can be decreased by 9%. Regular exercise is key to preventing and treating hypertension (Chobanian et al, 2003).

Objectives: to determining the effect of isometric handgrip training program on blood pressure in sedentary young female students and to compare and find the differences between the control group and the experimental group. **Methods:** Thirty nine untrained female students participated in this study (Age 18.47 ± 0.51). After taking resting measures, the experimental group was then required to perform an isometric hand grip strength contraction with one hand for 45 seconds at 30% of maximal voluntary contraction. One minute rest was given following this contraction. The left hand contraction was then performed for 45 seconds at 30% of maximal voluntary contraction. One minute resting period was also giving following the contraction. Four repeated isometric contraction was required (two per hand) with total of 3 minutes of exercise per session. Performing this exercise for 5 days elicited duration of 15 minutes for the entire study. Measurements of HR and BP were taken immediately before the first 45 seconds contraction, and immediately after the 4th contraction and after 3 minutes of sitting period. Measurements of resting HR and BP were performed for the control group after 5 minutes rest while they sit quietly and not performing any isometric contraction.

Results: There were no significant differences between the groups in terms of age, body mass, BMI, WHR, resting HR, SBP and DBP. However, there were significant differences between the groups for the

maximal voluntary contraction between pre and post intervention.
Conclusion: isometric handgrip training may reduce resting heart rate
and blood pressure.

Jennifer Caputo

Professor, Middle Tennessee State University, USA

&

Hailie Cochran

Research Assistant, Middle Tennessee State University, USA

An Examination of Physical Activity in Children with Disabilities

Purpose: To document changes in physical activity (PA) levels following a 1-week PA camp among children and adolescents with physical and cognitive disabilities (PCD).

Methods: Twenty-one boys and 12 girls with PCD (21 boys, 12 girls; age = 11.8 + 4.5 yrs) were interviewed in person prior to camp regarding their typical levels of community-based PA (Time 0; T1). During the camp, participants engaged in a variety of sport and fitness activities under the direction of skilled teachers and camp counselors. Participants were tracked by telephone at 4-month (T2), 8-month (T3), and 12-month (T4) intervals to document post-camp PA participation.

Results: Repeated-measures analysis of variance indicated a significant time effect ($p < .05$) for the number of physical activities (NPA) performed and weekly physical activity time (WPAT). Post-hoc comparisons revealed that NPA and WPAT were higher at T2, T3, and T4 compared to T1.

Conclusions: Short-term exposure in a camp setting to a broad range of recreational activities led to sustained improvements in the physical activity levels of children and adolescents with physical and cognitive challenges. These findings highlight the importance of expanding opportunities for youth with disabilities to engage in a wide array of appropriate and accessible physical activities to improve and sustain health, fitness, quality of life, and participation. Supported by the Centers for Disease Control and Prevention 5H75DP001728.

Hailie Cochran

Research Assistant, Middle Tennessee State University, USA

Sandra Stevens

Professor, Middle Tennessee State University, USA

&

Jennifer Caputo

Professor, Middle Tennessee State University, USA

Parental Perceptions of Physical Activity in Children with Disabilities

Purpose: To document the perspective of parents on physical activity (PA) related issues for children with cognitive and physical disabilities (CD).

Participants: Parents of CD (N = 27) were recruited through public advertisements and contacts with local clinicians.

Methods: Parents were provided with a link to an online survey. Respondents were permitted to submit answers one time across a two week period.

Results: Respondents (100%) reported that PA activity is related to the health and well-being of their child, and 89% reported that their child was currently involved in some structured PA program. However, the majority (88%) of parents indicated that they would like for their child to be more active and that activity was limited by barriers to participation. In addition, most parents indicated dissatisfaction with the quality and variety of PA programs for CD (54%) and reported a lack of appropriate and accessible opportunities for PA (62%).

Conclusions: Parental participants correctly identified the importance of PA in relation to the health of their child and the majority reported that their child was physically active. Efforts are needed to assist families with CD in increasing PA levels of their children and the ease at which they can access appropriate and accessible opportunities for PA.

Ruta Dadeliene

Professor, Lithuanian University of Educational Science, Lithuania
&

Kazys Milasius

Professor, Lithuanian University of Educational Science, Lithuania

Correlation between the Indicators of the Critical Intensity Limit, and Lactate and Ventilatory Anaerobic Thresholds of Elite Kayakers Starting with the Distance of 1000 m

Athletes develop aerobic and glycolytic capacity during intense training according to the indicators of the anaerobic threshold. The object of studies is to analyse what is common and what are the differences between the lactate and ventilatory anaerobic thresholds, and how data of the anaerobic threshold is used in developing endurance. Both anaerobic and aerobic reactions are involved in energetic of kayakers starting with the distance of 1000 meters, and it is very important to analyse in studies peculiarities of development of their relationship.

The aim of our work is to find out the correlation between the indicators of lactate and ventilatory anaerobic thresholds of elite kayakers starting with the distance of 1000 m, and other indicators of aerobic capacity.

There were performed 42 tests of elite kayakers. Indicators of aerobic capacity and anaerobic threshold were tested using the Oxycon Mobile gas analysis system by gradually increasing exercise intensity until VO₂max was reached and O₂ began to decline.

It was found that indicators of the lactate anaerobic threshold heart rate (LATHR) have a very close correlation with the indicators of the ventilatory anaerobic threshold heart rate (VATHR) and with O₂ consumption, and a strong link with the indicators of work capacity, a reliable correlation with pulmonary ventilation, but do not have a reliable correlation with work capacity of ventilatory and lactate thresholds. Work capacity of the lactate anaerobic threshold ($r = 0,723$) has a very strong correlation with critical intensity, which is close to the capacity of covering the distance of 1000 m, whereas the correlation with the ventilatory threshold capacity is weak.

Thus, studies revealed that indicators of work capacity of the lactate anaerobic threshold are more informative than indicators of work capacity of the ventilatory anaerobic threshold in assessing the special preparedness of highly skilled kayakers. HR indicators of both anaerobic thresholds are essentially the same, and can equally serve for the preparation of athletes.

Meenal Dhall
Assistant Professor, University of Delhi, India
&
Satwanti Kapoor
Professor, University of Delhi, India

Physical Activity and Lifestyle Indicators

Introduction: Physical activity directly benefits a person's physical and psychosocial health. People who exercise regularly are less susceptible to a number of chronic health conditions. Evidence also suggests that regular physical activity can contribute to improved mental and social health.

Aim of the present study is to find the association of pattern of physical activity with lifestyle factors.

Methodology: A cross-sectional study among 318 adult population of Delhi of 20 to 55 years was conducted. Out of 318 subjects, 208 came under physically active group and 110 under sedentary group. Active group was identified as one with regular physical activity (at least 5 days/week brisk walk for 30 minutes and doing yoga for 45 minutes) and sedentary group not followed any physical activity. Participants were interviewed through structured proforma. Structured schedules containing both open ended and close ended questions were used to collect information on health status, physical activity level through duration, type, regularity etc, life style indicators, television watching, dietary pattern, medical histories etc. Physical activity was assessed with a validated self-administered proforma.

Results: It was found that TV watching for longer duration was more among sedentary subjects as compared to active group. Higher percentage of sedentary group (22.7%) slept for more than 8 hours per day as compared to active group (13.0%). Active group showed lower percentage of smoking habit (21%) and alcohol consumption (30%) as compared to the sedentary males (58.5% and 69.8% respectively), whereas none of the females were reported to be smokers and consume alcohol in both the groups.

Conclusion: It may conclude that way of living interlinked with physical activity. Without regular physical activity, the body slowly loses its strength, stamina and ability to function well. Change in lifestyle pattern further linked to metabolic health problems.

Dajana Karaula

Postdoctoral Researcher, University of Zagreb, Croatia

Nada Grcic-Zubcevic

Professor, University of Zagreb, Croatia

&

Sime Zurak

University of Zagreb, Croatia

Differences between in Force Vital Capacity and Length of a Dive with and without Glossopharyngeal Insufflation in Breath-Hold Divers

Introduction: Apnea duration is a prerequisite of successful performance in all free diving events and can be prolonged by training and improving the technique itself, which then enables better performance. Systematic training implemented by divers around the world is undoubtedly an important aspect in the development of effective training methods.

The purpose: The aim of this research is to determine the differences between in force vital capacity and length of a dive with and without glossopharyngeal insufflations (GI) in breath-hold divers.

The methods: The sample of subjects for this study was consisted of 15 elite breath-hold divers (3 female, 12 male who was in regular training process). The sample of variables were composed of two measures for estimating of force vital capacity (FVC without GI and FVCGI with GI) and two measures for determining length of a dive in meters (DIVE without GI, DIVEGI with GI).

The results: All variables were submitted to standard descriptive methods for determining their basic statistic parameters. Based on a t-test for dependent samples, a significant discrepancy was found to exist between force vital capacity and length of a dive with and without glossopharyngeal insufflations (FVC, FVCGI; $t = -9, 19$; $p = 0,000$; DIVE, DIVEGI; $t = -8, 09$; $p = 0,000$).

Conclusion: This enables us to conclude that glossopharyngeal insufflations can increase force vital capacity and dive length, thereby prolonging the time of breath-holding, as well as other physiological reactions that might contribute to improved sport performances.

Ewa Klaver-Krol

Neurologist-Researcher, Roessingh Research and Development
Institute (RRD), the Netherlands

Reduced Electric Fatigue in the Muscles of Fibromyalgia Patients

Introduction: Fibromyalgia (FM) is an ailment characterized by widespread pain and general fatigue. The etiology is unknown. FM patients tend to continue their activities for too long while pain and fatigue appear later. For that reason, in therapeutic programs, FM patients are taught to structure their daily activities for a better balance between efforts and rest; these measures have been developed empirically. Disturbances in the effort-rest regulation may form a pathophysiological basis of pain and fatigue in FM.

Purpose: To investigate the electric muscle fatigue in relation to mechanical fatigue (endurance time) in FM patients versus healthy subjects.

Methods: 13 female FM patients and 14 age, weight and height matched female controls underwent surface electromyography (sEMG) of a non-painful biceps brachii muscle. The tests were under dynamic condition, with lifting rhythmically a weight of 20% of maximum voluntary contraction, up to fatigue. As signs of sEMG fatigue were measured: decrease in muscle fibre conduction velocity and increase in surface of the EMG signal (average rectified voltage).

Results: Maximum voluntary contraction was lower in FM patients than in controls. Fibre conduction velocity in FM patients was throughout higher ($P < 0.05$). sEMG fatigue was in FM patients significantly less expressed than in controls (for both variables $P < 0.01$), whereas endurance time was equal.

Discussion and Conclusions: In FM patients, there appears to be a reduced sEMG fatigue. This can be due to a lower force used, such that fatigue could not be reached. Another explanation may be a diminished reaction of the muscle membrane to fatigue. This might affect the feedback between muscles and central nervous system for stopping physical activity on time, resulting in protracted pain and fatigue. The latter finding may explain why FM patients have to regulate their activities more cognitively.

Maria Kosma

Associate Professor, Louisiana State University, USA

David Buchanan

Professor, University of Massachusetts-Amherst, USA

&

Jan Hondzinski

Associate Professor, Louisiana State University, USA

Practical Reasoning in Physical Activity Promotion

Despite widespread interest in developing effective theory-based behaviour-change programs to promote physical activity, obesity and diabetes rates continue to rise. Given the notable lack of effective interventions, it is important to examine why these efforts have been unsuccessful and consider potential alternatives. The purpose of this presentation is to consider the role of values in decisions-making about physical activity and to describe a framework for investigating them. Aristotle originally proposed that human behaviour is better understood as a function of phronesis (practical reasoning), aimed at realizing valued goals, rather than the result of antecedent causal determinants. Instead of relying exclusively on scientific methodologies, a more comprehensive approach to the study of physical activity must also incorporate analytical processes used in the humanities, especially related to examining the role of values in guiding human behaviour. We recommend revising and expanding the research, teaching, and practice conducted in physical activity education. In phronetic research, decisions about physical activity participation are context-dependent and inextricably influenced by history, culture, and socio-political system. Phronetic researchers examine the reasons that community members cite regarding the importance of physical activity relative to other priorities: How much time can I spend exercising this week versus other obligations? Community-based physical activity education programs may be more widely adopted when they originate from within the community, demonstrating respect for local autonomy in decision making. This can be achieved by promoting democratic dialogue and debates about values that matter, such as leading a healthy life. Regarding curriculum reform the study of philosophical assumptions underlying different approaches to promoting physical activity is recommended so students can better understand the strengths and limitations of physical activity promotion. By reforming physical activity education research, curriculum, and programs, the gap between physical activity educators

and the lay public regarding various behavioural choices may start diminishing.

Rozalia Kouvelioti

Ph.D. Candidate, Brock University, Canada

Katlynn Nelson

MSc Candidate, Brock University, Canada

Jennifer Dekker

MSc Candidate, Brock University, Canada

Kathryn Denize

BSc Thesis Student, Brock University, Canada

&

Panagiota Klentrou

Professor, Brock University, Canada

The Acute Effects of High Impact Exercise on Wnt Signalling Related Osteokines in Young Females

Wnt signaling is a bone-anabolic pathway leading to increased bone formation through activation of osteoblast activity. Wnt also regulates the expression of osteoprotegerin (OPG), which is secreted by osteoblasts to inhibit the bone-catabolic RANKL pathway reducing osteoclast differentiation, and therefore bone resorption. Extracellular inhibitors of Wnt including sclerostin (Sost) and dickkopf 1 (Dkk1) proteins, reduce osteoblast activity, and in turn OPG secretion via inactivation of the Wnt signaling, overall affecting bone turnover. Sost is a bone-specific cytokine (i.e., osteokine) secreted by osteocytes. In rodents, mechanical loading results in decreased levels of Sost whereas unloading in increased levels of Sost. In humans, the Sost response to exercise remains unclear. The purpose of this study was to examine the acute response of Wnt signalling related osteokines to a single bout of high impact exercise in young females. Twelve young, recreationally active females (23.1±2.2 years) participated in this study during their follicular phase performing one plyometric session of 5 exercises in 3 sets of 8 repetitions with 3 min recovery between exercises (144 high impact jumps in total). Blood samples were taken at baseline, 5 min, 60 min, and 24 hours post-exercise and were analyzed for serum Sost, Dkk1 and OPG using MAGPIX assays. Sost increased from baseline (94.5±11.1 pg/ml) to 5 min post-exercise (108.0±11.1 pg/ml) while decreased at 60 min and 24 hours post-exercise (82.7±11.5 and 68.553±6.2 pg/ml, respectively, p<0.05). Dkk1 did not change significantly across time (p>0.05). OPG showed a slight increase at 60 min post-exercise followed by a decrease at 24 hours (10.0±0.3 vs. 8.6±0.7 pmol/L, respectively, p<0.05). These findings suggest time dependent fluctuations in Sost after one single bout of high impact exercise may be leading to an overall increase in bone turnover potentially via a negative Wnt feedback loop.

Hwai-Ting Lin

Associate Professor, Kaohsiung Medical University, Taiwan

Kai-Chu Kang

MSc Student, Kaohsiung Medical University, Taiwan

&

Hong-Wen Wu

Associate Professor, National Taiwan University of Sport, Taiwan

Various Running and Fast Walking Speeds of Loading and Pressure Distribution in Hip

Introduction: The hip joint is the connection of trunk and lower limb, bearing the load of upper limb. It plays an important role on walking, running and other activities. Running and fast walking are the primary choice for regular exercises of many people, and also the rehabilitation programs after injury and the necessary motion in many sports. Many people discussed about the loading of these two exercises in knee, however are rare in hip. During running and fast walking, the stance phase of the running and fast walking is bearing the ground reaction force by single leg, that is why the hip pressure higher than usual activities. And when speed become faster, the pushing power becomes stronger, the reaction force will be higher and the same of the hip pressure. Therefore, the purpose of this study is using the computer simulation technique and motion analysis system to investigate the hip pressure's magnitude, loading location and area at various speeds of running and walking.

Methods: Ten healthy males (age: 21.9 ± 1.6 years, height: 170.5 ± 4.3 cm, weight: 70.8 ± 9.8 kg) without lower extremity injury and were participated in this randomized cross-over trials. In this study, every subject took anterior-posterior view of the hip joint X-ray radiograph to build its own three-dimensional possible contact area of femur and acetabular computer simulation model (Genda et al., 2001). Use the high-speed camera and force plate to collect kinematics data and ground reaction force during running and fast walking. Finally, apply the discrete element analysis (DEA) to calculate the contact area and pressure of the hip during running or walking.

Results: The results showed that the hip joint reaction force and torque were increased when the running and walking speed increasing (Joint force: 1.4 BW to 2.3 BW; Joint torque: 2.5 Nm/kg to 3.5 Nm/kg). In DEA results, the contact area was not significant different at various speeds, and the hip joint force concentrate on the lateral and medial roof, the peak pressure was higher when speed increased (3.28 to 3.83 Mpa).

Discussion & Conclusion: When walking and running in the same speed, higher lower limb joint force and torque was occurred during running. In DEA results, higher contact area and higher peak pressure also found during running. Our results provide the information about the hip pressure distribution to the people who are applied running or walking as rehabilitation program and training. This algorithm can also apply to calculate the hip joint contact area and peak pressure in different kinds of exercise.

Sandra Mikuckyte

Ph.D. Student, Kaunas University of Technology, Lithuania

&

Vytautas Ostasevičius

Professor, Kaunas University of Technology, Lithuania

Design of Spinal Actuator and Investigation of its Influence on Human Spine

Spinal disorders are one of the most common health issues in the EU. In present study, a spinal actuator was created to improve the efficiency of spinal exercises and engage spine in lateral bending movements which are based on goldfish exercise movements introduced by Japanese K. Nishi. The hypothesis is that spinal actuator could be used to strengthen spinal muscles and improve nutrient supply to intervertebral discs. Also it could allow to monitor spine condition and progress of the patients. The purpose of this study is to investigate the influence of this spinal actuator on human spine.

Understanding of human spine biomechanical behaviour is crucial in order to develop new human spine rehabilitation methods so that finite element analysis "Comsol MultiPhysics" software was used to create a finite element model, representing segment of human spine. Material properties of nucleus pulposus, annulus fibrosus with tension-only truss fiber layers and vertebral endplates were changed to model different degrees of intervertebral discs degeneration. Poroelastic model was used to evaluate solute transportation in intervertebral discs and vertebral bodies were modeled as rigid bodies.

As the result of modeling the lateral bending movements, stresses and reaction moments of intervertebral discs were calculated and solution transportation levels were identified. The results also show that stresses in annulus fibrosus of degenerated discs in comparison to health discs remain almost unchanged while the stresses in nucleus pulposus significantly increase.

Obtained modeling results suggest that the spinal actuator could help to increase solution transportation level into intervertebral discs which leads to their better nutrition. Also in vivo experiments are planned to study muscles activity when subjects are exercising with proposed spinal actuator and the spinal actuator influence on treatment of Ankylosing Spondylitis, which is aimed at reducing inflammation in the joints and maintaining flexibility and is mainly achieved by exercising routine treatment

Sandra Stevens

Professor, Middle Tennessee State University, USA

Don Morgan

Professor, Middle Tennessee State University, USA

&

Jennifer Caputo

Professor, Middle Tennessee State University, USA

Increasing Physical Activity in Youth with Disabilities

Purpose: To document changes in physical activity (PA) levels following a 1-week PA camp among children and adolescents with physical and cognitive disabilities (PCD).

Methods: Twenty-one boys and 12 girls with PCD (21 boys, 12 girls; age = 11.8 + 4.5 yrs) were interviewed in person prior to camp regarding their typical levels of community-based PA (Time 0; T1). During the camp, participants engaged in a variety of sport and fitness activities under the direction of skilled teachers and camp counsellors. Participants were tracked by telephone at 4-month (T2), 8-month (T3), and 12-month (T4) intervals to document post-camp PA participation.

Results: Repeated-measures analysis of variance indicated a significant time effect ($p < .05$) for the number of physical activities (NPA) performed and weekly physical activity time (WPAT). Post-hoc comparisons revealed that NPA and WPAT were higher at T2, T3, and T4 compared to T1.

Conclusions: Short-term exposure in a camp setting to a broad range of recreational activities led to sustained improvements in the physical activity levels of children and adolescents with physical and cognitive challenges. These findings highlight the importance of expanding opportunities for youth with disabilities to engage in a wide array of appropriate and accessible physical activities to improve and sustain health, fitness, quality of life, and participation.

Supported by the Centers for Disease Control and Prevention 5H75DP001728.

Svitlana Stupnytska

Associate Professor, Lviv Regional Institute of Postgraduate
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**Original Approach to the Use of Physical Rehabilitation
and Physical Education in the Sphere of Health Restoration
and Preservation of Children with Orthopaedic Pathology
in Lviv Region**

Introduction. There is a lack of rehabilitation programs, systematic data on rehabilitation examination as well as guidelines for integrated application of physical rehabilitation for children with torticollis with the aim of physical rehabilitation individualization. The relevance of the problem is supported by the fact that the first in Ukraine Municipal Rehabilitation Centre for Children with Congenital and Acquired Forms of Torticollis was established in Lviv.

Objective: to analyze practice of the City Centre for rehabilitation of children diagnosed with torticollis.

Methods: somatoscopy (author's original algorithm), palpation, proprietary methods measuring the angle of head tilt and distance between acromial and mastoid bones when there is a tilt in cervical spine, neck extension, cervical rotation, interfacial bioelectric potentials of pectoral-clavicular-papillary muscles of the neck); methods of statistical theory.

Results: between 2008 and 2016 CCRCT consulted 804 parents whose children were diagnosed with torticollis. Out of these patients 301 children were diagnosed with innate torticollis, 119 children were diagnosed with torticollis and the affected ancillary nerve, 126 children had spinal curvatures and deformations of posture, and 253 children suffered from neurogenic torticollis. Thus, 15260 procedures were performed, in particular 7630 sessions of therapeutic exercise and 7630 massage sessions.

Conclusion: individual approach to physical rehabilitation of children diagnosed with torticollis improved functioning of the affected and non-affected pectoral-clavicular-papillary muscles, fostered recovery of muscle tone and body build, narrowed the angle of head

tilt, improved mobility of the cervical part of spinal cord and reduced secondary deformations in the body build. The application of physical rehabilitation measures for infants with torticollis should be considered not only as a correction of existing disorders, but as a preventive measure, aimed at reducing the number of children with congenital motor area disorders as well as prevention of disability in older age.