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DECODED

TRANSLATING SCIENCE

Sports Excellence Through Research, Innovation & Technology

PERFORM

1st AGILEMAS RESEARCH IN HIGH PERFORMANCE SPORTS COLLOQUIUM(HPSC) 2022

23-25 August 2022

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PERFORM
HIGH
PERFORMANCE

AgileMAS

1st AGILEMAS RESEARCH IN HIGH PERFORMANCE SPORTS (HPSC) COLLOQUIUM 2022

23-25 August 2022

Program and Extended Abstracts

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Introduction

In this special issue, we present to you the contents of the 1st annual colloquium discussion which were held on 23-25 August 2022 virtually. You will find interesting research findings and prospective proposals in high performance sports written in the format of short communication style – extended abstract. In addition, you may also find the contact of the relevant researcher in the field that you may extend your interest and collaborate with. This colloquium also serves as a platform for all high performance sports researchers to exchange ideas for performance enhancement. We wish your participation and contribution will make a great impact on Malaysian sports a success!

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Disclaimer

Message

YB DATO' SERI AHMAD FAIZAL BIN DATO' AZUMU

THE MINISTER OF YOUTH AND SPORTS

The Ministry of Youth and Sports Malaysia is pleased to announce the 1st AgileMAS Research in High Performance Sports Colloquium (HPSC 2022). We firstly would like to express our gratitude to the National Sports Institute of Malaysia (ISN) for its outstanding commitment to hosting and planning an engaging programme for this colloquium across three days from August 23 to August 25, 2022.

This colloquium aims to bring together prominent academic scientists, researchers, and sports professionals who have an interest in high performance sports. With the theme "Sports Excellence through Research, Innovation, and Technology", this inaugural colloquium will serve as a medium for discussion and exchange of experiences, ideas, views, opinions, and issues on new and ongoing research findings in the fields of sports and exercise science, sports medicine and rehabilitation, and sports technology in empowering high-performance sports.

In addition, this colloquium acts as a platform for igniting interest in the field of potential sports research as well as a meeting place for academics, researchers, and sports professionals together with ISN to develop networking.

The 1st AgileMAS Research in High Performance Sports Colloquium 2022 offers comprehensive information on a variety of aspects, including sports and exercise science, sports medicine and rehabilitation, and sports technology. At the same time, it creates new learning opportunities and broad perspectives in sports science.

I believe in the high performance sports era, improving performance for elite athletes and fostering innovation based on science and global best practices are not just an advantage, but essential to give our coaches and athletes a competitive edge. I hope that the HPSC 2022 will inspire all participants to bring the ideals and aspirations of sporting excellence to bear for the betterment of sports as a whole.

AHMAD FAEDZAL MD RAMLI

CHIEF EXECUTIVE OFFICER
NATIONAL SPORTS INSTITUTE OF MALAYSIA

High performance sports is an extremely competitive sports arena. Creating a winning edge in this arena is what the National Sports Institute provides through research and evidence based solutions. This has been our driving force towards creating an integrated sports performance ecosystem and a sustainable sporting excellence.

The 1st AgileMAS Research in High Performance Sports Colloquium (HPSC2022) is among our commitments in emphasising the importance of integrated research. The theme of the colloquium, "Sports Excellence through Research, Innovation and Technology" reflects the need for comprehensiveness in addressing and putting forth a holistic approach to high performance sports.

We aim for this colloquium to be the catalyst and bridge for like-minded sports and research enthusiasts to come together in a transaction of mind and ideas, and collaborate on impactful research and innovation solutions for the future of the nation's sports. We believe this to be realistically achievable with the presence of our co-organisers and the support of our sponsors and partners.

I would like to thank our main sponsor, Data Sukan Consulting Sdn. Bhd. for their commitment and collaboration with ISN in developing the AgileMAS platform, a holistic sports data and digitisation platform that includes the sociological lifestyle of sports as well as the development and empowerment of athletes.

I believe that through the HPSC2022 platform, we will further forge our path towards achieving one of our strategic goals under the ISNV30 (Vision2030) plan.

Message

Dr. THUNG JIN SENG, CSCS

THE CHAIRMAN OF THE 1ST AGILEMAS RESEARCH IN HIGH PERFORMANCE SPORTS COLLOQUIUM 2022 (HPSC 2022)

Sports has always been a uniting factor, where people come together as a nation to show the strength of unity and patriotism for the beloved nation. Success in sports has also been a driving force in uplifting our society after the dampening effects of the pandemic. Embracing scientific principles, new knowledge creation and technological advances in innovation is the way to achieve this sporting success.

The 1st AgileMAS Research in High Performance Sports Colloquium 2022 (HPSC 2022) is an initiative to cultivate researchers' interest in sports performance enhancement related research in the country. This colloquium is an advantageous platform to discuss proposals, sharing of thoughts and ideas, and meeting new friends, collaborators, and perhaps future supervisors. I strongly believe our unity in this front will be our winning formula for our nation's sporting future.

I take this opportunity to thank our co-organisers from higher learning institutions, sponsors, partners, and our hard at work organising committee for coming together and making this colloquium a success. Without your participation, this mission will remain as smoke in the sky.

I look forward to our collaborative sports research exploration.

Program

23 AUG 2022, Tuesday

Day 1

Time	Program	
0800 – 0830	Login	
0830 – 0845	**Welcoming Speech**	
0845 – 0900	**Opening Speech**	
0900 – 0950	**Speaker: Dr. Yeo Wee Kian** Physiology of Badminton - An Examination of Internal Match Load of Elite Badminton Players Across Different Disciplines **Chairperson: Mohd Rizal bin Md. Razali**	
1000 – 1050	**Speaker: Prof. Ir. Ts. Dr. Tan Chee Fei A.M.N.** Towards Digital Transformation in the Sports Industry **Chairperson: Dr. Thung Jin Seng, CSCS**	
1100 - 1230	**Chairperson: Dr. Eliza Binti Hafiz** **Oral Presentation**	
	HPS06	Comparing Physical Activity and Stress Between Genders Among TARUC Students During Transition to Covid-19 Endemic Phase
	HPS10	Compare the Eating Habits 'Before' and 'During' Movement Control Order and Perceived Healthy Eating Barriers on Health Maintenance Among College Athletes
	HPS19	The Impact of Covid-19 Pandemic Induced Restrictions on Physical Activity and Food Intake Habits Among University Students
	HPS26	Motivation Towards Sports Participation in Competitive Endurance Athletes During Covid-19 Lockdown
1230 – 1400	**Lunch Break**	
1400 – 1500	**Sergej Rosman** Introduction To Tensiomyography, Setup and Calibration, Cases Studies on Athletes **Chairperson: Dr. Thung Jin Seng, CSCS**	
1510 – 1630	**Chairperson: Cynthia Anne Cornelius** **Oral Presentation**	
	HPS01	Frontier Hotspots and Development Trend of Sports Medicine
	HPS02	Analysis of Knee Injuries in Taijiquan Athletes Based on Selective Functional Movement Assessment Perspective
	HPS03	Examining Post-injury Depression Symptoms Among Competitive Collegiate Athletes in Malaysia
	HPS09	Relationship of Personality Traits with Worry, Somatic Anxiety and Concentration Disruption in Individual Event Sports
	HPS24	Relationship Between Psychological Distress and Ankle Instability Among Collegiate Basketball Players

24 AUG 2022, Wednesday

Day 2

Time	Program		
0830 – 0900	Login		
0900 – 0950	**Dr. Thung Jin Seng, CSCS** Raising the Bar for Malaysia Swimming Performance **Chairperson: Ng Hui Hwa**		
1000 – 1050	**Mohd Rizal Md Razali, MSc** Potential Use of Fruits in Sports as an Ergogenic Aid **Chairperson: Nurhamizah Rahmat**		
1100 – 1230	**Chairperson: Dr. Chan Kai Quin** **Oral Presentation**		
	HPS05	Chronic Loading of Sodium Bicarbonate Supplementation Improved Endurance Performances Under Hot Conditions in Trained Runners	
	HPS21	Effects of Caffeine Mouth Rinse on Power and Endurance Performance and Fatigue	
	HPS25	The Readiness of Sports Dietitians and Nutritionists to Integrate Mobile App Technology in Nutrition Care: Online Survey in Three ASEAN Country	
	HPS07	Initial Comparison of Blood Flow Restriction Modalities for Post Activation Performance Enhancement of Sprint Performance	
	HPS12	The Effects of Static and Dynamic Stretching on Hamstring, Lumbar and Quadriceps Flexibility During Menstruation Among University Students	
1230 – 1400	**Lunch Break**		
1400 – 1500	**Associate Prof. Dr. Abdul Halim bin Mokhtar** **Dr. Edin Kardin Suwarganda** Injury & Prevention **Chairperson: Suresh Marathamuthu**		
1510 - 1700	**Chairperson: Mohd Nadzrin bin Mohd Hamdan** **Oral Presentation**		**Research Interest Group Meeting (Closed session)**
	HPS16	The Effects of Foam Rolling on Muscle Stiffness, Sprint Performance and Strength Performance	
	HPS20	Transfer of VO_2max Gain Between Upper and Lower Body	
	HPS23	Acute Effect of Tissue Flossing on Muscle Stiffness and Perceptive Rating in Middle Distance Runners: A Pilot Study	
	HPS11	Peak Knee Moment and Extension Angle Changes During Simulated Soccer Match-Play	
	HPS13	Relationship of Jump Asymmetry of Force Production and Leg Strength	
	HPS14	Comparison Between Traditional and Plyometric on Running Speed, Balance and Coordination Among Varsity Netball Players	
	HPS15	The Effects of Ecological Sandals and Flip-Flop on Gait Kinematics Among Healthy Male University Students	

25 AUG 2022, Thursday

Day 3

Time	Program	
0830 – 0900	Login	
0900 – 1000	**Mohd Nadzrin bin Mohd Hamdan** An Overview: Research Management and Integrated Lab ISN **ChM. Ts. Dr. Siti Khadijah binti Ab. Rahman** Performance-Enhancing Drugs: Can It Help or Harm? **Chairperson: Mohamad Faizal Bin Lan**	
1000 – 1050	**Chris Tee Chow Li, MSc, ACSM-EP, EIM** Improving Performance and Health Outcomes with Altitude/ Hypoxic Training **Chairperson: Ms. Ng Hui Hwa**	
1100 – 1150	**Associate Prof. Dr. Jaganathan Ramasamy** **Arul Anthoni Selvaraj** **Louis Pang Min Kain** Athletes' Glooming and Development: From the Coaches' Perspectives **Chairperson: Mohd Zaid bin Mohd Ghazali**	
1230 – 1400	**Lunch Break**	
1400 -1500	**Chairperson: Dr. Thung Jin Seng, CSCS** **Oral Presentation**	
	HPS08	The Effect of Fast Stretch-Shortening Cycle Plyometric Training On Lower Limb Strength Qualities Among Rhythmic Gymnasts
	HPS17	Effects Of Lower Body Plyometric Exercises on Endurance and Power Performances in Vertical Running
	HPS18	The Effect of Sleeping Time on Reaction Time Esports Athletes
	HPS22	Effect Of Visual Light Pacer On 200m Breaststroke Time Trial of Sub-Elite Swimmers: A Case Study
1510 – 1530	**Award Ceremony** Best Presenter Award Young Investigator Award Active Participation Award **Closing Speech**	

Speaker Profile

Dr. Yeo Wee Kian, PhD (RMIT)

Director

Research and Innovation Division, ISN

Email: weekian.yeo@isn.gov.my

Title :

Physiology of Badminton - An Examination of Internal Match Load of Elite Badminton Players Across Different Disciplines

Schedule : 23 August 2022 / Tuesday / 0900 – 0950

Chair : **Mr. Mohd Rizal bin Md. Razali**

Wee Kian has vast experiences working with elite athletes in the area of performance diagnosis and exercise training prescription. He started as a conditioning specialist at ISN, before being appointed as Head Physiologist and Performance Lead, helping elite Malaysian athletes to prepare for many major games/events and tournaments. He is currently the Director of Research and Innovation Division in ISN and is enjoying his role to bridge the gap between science and practice as well as to provide solutions to human performance issues. Wee Kian's current research focus includes optimising exercise (as well as other potent adjuvants such as nutrition and environmental factors) to improve health, metabolic fitness and human performance, with an aim to provide practical solutions to different cohort of population. Some of his work have been published in reputable journals such as the Journal of Applied Physiology, Medicine and Science in Sport and Exercise, Experimental Physiology, Applied Physiology, Nutrition and Metabolism and Journal of Sport Rehabilitation.

His favourite pastime is playing badminton and basketball and now that the sports sector is fully opened after long COVID-19 restrictions, he is enjoying watching and playing sports again.

Prof. Ir. Ts. Dr. Tan Chee Fai A.M.N.

Deputy Vice-Chancellor (Research),
Infrastructure University Kuala Lumpur.

Title :

Towards digital transformation in the sports industry

Schedule : 23 August 2022 / Tuesday / 1000 – 1050

Chair : **Dr. Thung Jin Seng**

Prof Ir. Ts. Tan Chee Fai has more than 20 years of experience in the advanced engineering industry. He is a Professional Engineer with Practicing Certificate (Board of Engineers Malaysia), ASEAN Chartered Professional Engineer (ACPE), Registered Foreign Professional Engineer (Cambodia), ASEAN Engineer (AER), APEC Engineer (IPEA), and International Professional Engineer (IPEA). Chee Fai is a Fellow of ASEAN Academy of Engineering & Technology (AAET), Honorary Fellow of ASEAN Federation of Engineering Organizations (AFEO), and Fellow of the Institution of Engineers Malaysia (IEM). He is an alumni of Technical University Eindhoven (TU/e), the Netherlands, and Stanford Graduate School of Business, USA.

Currently, he is the Deputy Vice-Chancellor (Research) in Infrastucture University Kuala Lumpur, and Chief Technical Officer, Robolab Technology Sdn Bhd. He is actively involved as Digital Transformation Advisor for Malaysia Productivity Corporation.

Based on his contribution to the ASEAN engineering community since the year 1998, Ir. Dr. Tan was awarded the 2014 JCI Ten Outstanding Young Malaysian Award Honoree on Humanitarian and Voluntary Services Category. In the following year, Ir. Dr. Tan also received *Ahli Mangku Negara* (A.M.N.) [Member of the Order of the Defender of the Realm] bestowed by His Majesty the Yang di-Pertuan Agong of Malaysia in 2015.

Sergej Rozman

BMed Product Consultant

Email: sergej.rozman@tmg.si

Title :

Introduction to Tensiomyography, setup and calibration, case studies on athletes

Schedule : 23 August 2022 / Tuesday / 1400 – 1500

Chair : **Dr. Thung Jin Seng**

As a former elite track and field athlete and a bachelor of sport sciences, Sergej Rozman has valuable experience in physical fitness and optimisation of training protocols. He has been conducting TMG diagnostics for more than a decade and is one of the most experienced experts in the field. Sergej's tasks in the company vary from sales presentations to new product tests and customer training.

Dr. Thung Jin Seng, CSCS

Centre Head
Translational Research, ISN

Email: jinseng@isn.gov.my

Title :

Raising the bar for Malaysia swimming performance

Schedule : 24 August 2022 / Wednesday / 0900 – 0950

Chair : **Ms. Ng Hui Hwa**

Dr. Thung Jin Seng, CSCS is the head of translational research at the National Sports Institute of Malaysia. Thung was awarded his PhD in sports kinesiology from Shanghai University of Sport, China in 2019, MSc in Sports Science in 2009 and BSc (Hons) in Physical Education in 1999 from University of Putra Malaysia. He has more than 20 years of hands-on experience as a strength and conditioning coach with elite athletes in preparation for international meets. He also contributed significantly to the achievement of the China Olympic team in artistic gymnastics and figure skating as a strength and conditioning coach during his stay in China. Thung is a retired karate athlete who coached grassroots development in his earlier career path.

Dr. Thung's current primary research interests are in the area of strength and conditioning, sports performance science and injury prevention.

Mohd Rizal Md Razali, MSc

Research Officer

Research and Innovation Division, ISN

Email: rizal@isn.gov.my

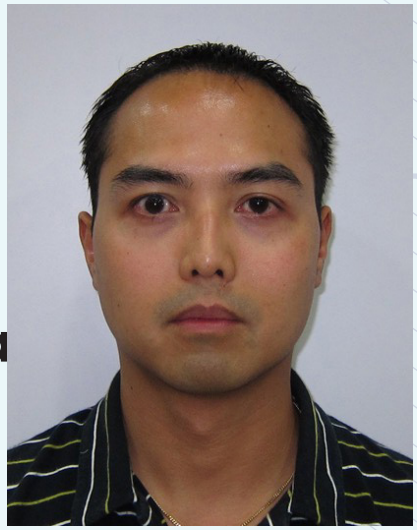
Title :

Potential use of fruits in sports as an ergogenic aid

Schedule : 24 August 2022 / Wednesday / 1000 – 1050

Chair : **Ms. Nurhamizah Rahmat**

Mohd Rizal Md Razali is a research officer in the National Sports Institute (ISN). He graduated with a degree in nutrition from UKM in the year 1999. He started his work as a nutritionist in ISN. He worked closely for national sports teams such as hockey, football, netball, rugby, sepaktakraw, basketball, volleyball and kabaddi. His involvement was to prepare athletes for major competitions such as Olympic, Commonwealth, Asian, SEA Games and other major international championships. In the year 2015, he graduated with a Master of Science (Sports Science) from UiTM and was appointed as a research officer in ISN. He has been successful in publishing several articles on high performance sports, including hockey, badminton, and cycling. He is also involved as an international collaborator with New Zealand and Singapore researches on body composition with the title of 'Absolute size characteristics differences between 'best' and 'rest' world badminton players' and 'Differences in World Badminton Players' physical and proportionality characteristic between singles and doubles players'. His contribution to the nutrition community as a member of the Writing Panel of '*Panduan Pemakanan Kanak-Kanak* in 2011 and also a member of the Technical Committee Group Nutrition Promotion, Ministry of Health in the year 2009 to 2010.



Dr. Edin Kardin Suwarganda

Senior Biomechanist
Sports Biomechanics Centre, ISN

Email: edin@isn.gov.my

Title :

Neuromusculoskeletal modeling for movement simulation and analysis

Schedule : 24 August 2022 / Wednesday / 1400 – 1500

Chair : **Mr. Suresh Marathamuthu**

Dr. Edin K. Suwarganda has been servicing high performance sport for 12 years as a senior biomechanist at the National Sport Institute of Malaysia. His passion is to 'run' an effective high performance program and concurrently to utilise musculoskeletal modelling for the benefit of an athlete's performance. With limited time before the next major tournament, a high performance program is a roadmap for an athlete's success. While musculoskeletal modelling allows monitoring of muscle contribution during exercise. Therefore, musculoskeletal modelling may improve an athlete's physical preparation more effectively leading up to a tournament. Besides the biomechanics of sport, many other factors may affect an athlete's preparation and lifestyle. Most of which, he has experience managing across a range of sports, whilst always targeting the next performance gain.

Musculoskeletal modelling and movement simulation have been his main investigative tools during his master's at the faculty of Human Movement Sciences, Vrije University in Amsterdam, The Netherlands as well as his PhD at the faculty of Allied Health Sciences, Griffith University in the Gold Coast, Australia. For his master's he compared lower back loading between inverse kinetics and a trunk muscle model. For his PhD, he developed a method to estimate hip cartilage stresses during walking. Currently, his interest lies with the evaluation of exercise variations in relation to performance and/or injury. The foreseeing future of high performance sport service, it is important to include musculoskeletal modelling and simulation for identifying possible muscular gains and/or identifying stresses associated with damaged tendon, ligament, cartilage, or bone. However, musculoskeletal models vary in its subject-specificity and the choice of the best models will depend on the implication sought.

Associate Prof Dr. Abdul Halim bin Mokhtar

Director

Centre for Sports And Exercise Science, Universiti Malaya

Title :

Injury Prevention

Schedule : 24 August 2022 / Wednesday / 1400 – 1500

Chair : **Mr. Suresh Marathamuthu**

Dr. Halim is an Associate Professor in Sports Medicine from the Faculty of Medicine, University Malaya. He is a senior lecturer in Master of Sports Medicine program in the University, and practices as a consultant sports physician in Universiti Malaya Medical Centre and UM Specialist Centre. He graduated as a physician in 2005 from University of Malaya with Master in Sports Medicine.

Dr. Halim is a medical panel/committee member in several international sports bodies including Asian Football Confederation (AFC) Medical, Badminton World Federation (BWF), Federation of International University Sports Federation (FISU), The Football Association of Malaysia (FAM) and a visiting specialist for the National Sports Institute of Malaysia. He is also the President of Malaysian Association of Sports Medicine.

He has great experience in both sports medicine and sports science, and is the current Director of Centre for Sports and Exercise Science, and Deputy Commandant of the Reserve Officer Training Unit (ROTU) of University of Malaya.
He has diversified interest in research, mainly in sports and exercise medicine, biomedical engineering and sports science in which he authored a number of articles with colleagues. He is the Principal Investigator in several research projects.

Mr. Mohd Nadzrin Mohd Hamdan

Centre Head
Research Management and Integrated Lab, ISN

Email: nadzrin@isn.gov.my

Title :

An overview : Research Management and Integrated Lab ISN

Schedule : 25 August 2022 / Thursday / 0900 – 0930

Chair : **Mr. Mohamad Faizal bin Lan**

Mohd Nadzrin Bin Mohd Hamdan works as a Sports Officer at the National Sports Institute of Malaysia's Research and Innovation Division. He graduated with honours from University Technology Mara (UiTM) with a degree in sports science. His responsibilities at this institute as the head of *Cawangan Pengurusan Penyelidikan dan Makmal Bersepadu* are to manage research grant for researchers internally (ISN) and externally for collaborative research projects and also to manage the operation of all integrated lab such as the Human Movement lab and Altitude and Environmental Chamber. He started his career in ISN as a sports scientist in Centre for Biomechanics since 2003 until 2015. He was also a Group Leader for skills sports in 2016-2017 and in 2018 was transferred to the PODIUM program as a sports Manager for Lawn Bowls and Silat in preparation for Commonwealth and Asian Games 2018.

Chm. Ts Dr. Siti Khadijah bt. Ab. Rahman

Title :

Performance-enhancing Drugs: Can it help or harm?

Schedule : 25 August 2022 / Thursday / 0930 – 1000

Chair : **Mr. Mohamad Faizal bin Lan**

Siti Khadijah Ab Rahman works as a chemist at the National Sports Institute of Malaysia's Research and Innovation Division. She graduated with honours from University of Putra Malaysia with a doctorate degree in analytical chemistry. Her responsibilities at this institute include leading the chemistry laboratory and doing sports-related chemistry research, such as determining prohibited drugs in athlete supplements using liquid chromatography mass spectrometry (LCMS/MS), antioxidant nutrition, and sports performance. Her expertise is in analytical chemistry, molecular imprinting technology, polymer synthesis, and drug analysis.

Mr. Chris Tee Chow Li,

PhD (candidate) MSc BSc ACSM-EP EIM

Research Officer

Research and Innovation Division, ISN

Title :

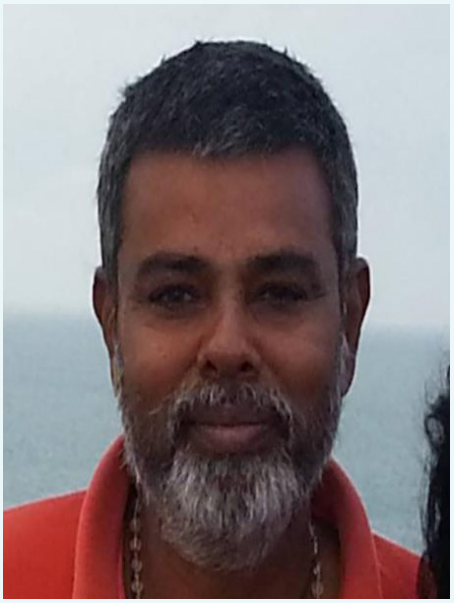
Improving performance and health outcomes with altitude / hypoxic training

Schedule : 25 August 2022 / Thursday / 1000 – 1050

Chair : **Ms. Ng Hui Hwa**

Chris is currently a research scientist and exercise physiologist at the National Sports Institute of Malaysia (ISN). As a research scientist and exercise physiologist with more than 5-years of experience working with Malaysian National Elite athletes, he aims to provide the highest quality, evidence-based applied sports science, physiology, education and research to athletes and general populations in Malaysia through ISN.

He holds an MSc in Sport and Exercise Physiology from Liverpool John Moores University, UK on research related to exercise physiology, muscle damage, recovery, and nutrition. He is a certified exercise physiologist and Exercise is Medicine Level 2 (EIM) credential with the American College of Sports Medicine (ACSM) and is currently a doctoral candidate in Applied Health Sciences at Swinburne University, Melbourne, Australia. His primary research interest is in the field of exercise physiology and hypoxia and how it relates to health and exercise performance.



Associate Prof Dr. Jaganathan Ramasamy

Ex-National Paralympic Athletic Head Coach

Email: jaga@qew.edu.my

Title :

Leading sports to excellency

Schedule : 25 August 2022 / Thursday / 1400 – 1500

Chair : **Mr. Mohd Zaid Bin Mohd Ghazali**

Dr. Jaganathan Ramasamy is well known as the former athletics coach for our national Paralympics team. During his 10 year tenure as the Chief Athletics Coach, he successfully lead the Malaysian Paralympics team through numerous tours of the ASEAN Para Games, Far East and South Pacific Games (FESPIC), Asia Para Games, World Para Athletics Championship, the Commonwealth Games and Paralympic Games. He has won many accolades, including the Best Coach Award in 2014 and again in 2016. In honor of his many contributions, he was awarded an honorary doctorate from the California Public University in 2019. After retiring as head coach, he is currently an Associate Professor at the Faculty of Sports Science at the Malaysian Chapter of the Wilmington Metropolitan University.

Mr. Arul Anthoni Selvaraj

National Hockey Head Coach

Email: arul.anthoni@gmail.com

Title :

Making a success in elite team sports

Schedule : 25 August 2022 / Thursday / 1400 – 1500

Chair : **Mr. Mohd Zaid Bin Mohd Ghazali**

Coach Arul started his career in hockey as a player and achieved excellent performance over 81 international caps before retiring in 1998. He extended his service in coaching to hockey fraternities over the world winning international titles with his extraordinary coaching philosophy and beliefs. He is now leading the national hockey team and excelling in international games.

Mr. Louis Pang Min Kain

Sabah Cycling Coach

Title :

Unorthodox. Inquisitive.

Schedule : 25 August 2022 / Tuesday / 1400 – 1500

Chair : **Mr. Mohd Zaid Bin Mohd Ghazali**

Unorthodox. Inquisitive. That would be the two words to describe Louis, the Sabah state track cycling coach. Despite having zero competitive cycling experience, Louis guided Sabah to 4 consecutive national championship titles in 4 years. A keen student of the sport, Louis employed the latest technology in aerodynamics, physiology, recovery, to advance the performance of his athletes.

Extended Abstracts

Frontier Hotspots and Development Trend of Sports Medicine

Yu Xiao[1*], Kim Geok Soh[2], and Tengku Fadilah Tengku Kamalden[3]

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Keywords: Development Trend, Frontier Hot Spots, Sports Medicine

I. Introduction

With the improvement of material living standards, people are more and more concerned about physical health and delaying aging, and the outbreak of new coronary epidemics has brought a huge medical burden, while promoting the further development of sports medicine. The study published in The Lancet Global Health [1] in 2020 showed that at least 3.9 million people worldwide avoid premature death every year by being physically active, validating the concept that “exercise is good medicine”Modern sports medicine is an interdisciplinary subject that combines sports science and medical science, and focuses on physical activities, sports training, changes in human function caused by lack of exercise and excessive exercise, and the management of sports injuries and diseases. Sports medicine enhances people’s physical fitness and prevents injuries and diseases through scientific guidance, and enhances athletic ability via prescribing reasonable training protocols, thus preventing, treating and rehabilitating sports-related injuries and diseases. Therefore, systematically sorting out the relevant literature of sports medicine research, exploring the research hotspots in the dimensions of time and space, and forming a visualized knowledge network structure will highlight the important references and developments of sports medicine research.

II. Methods

For this study, the database sources were SCI-E, SSCI and A&HCI of the “Web of Science Core Collection”, and the advanced search was set to TS=(Sports* Medicine) after repeated comparison and analysis to make the search more accurate. The search period was set from Jan. 01, 2003 to Dec. 31, 2022, and “Article” and “Review” were selected as “Document Type”. 9884 documents were retrieved. The mapping knowledge domains is based on the visual analysis method [2], which aims to show the development of knowledge and structural relationships, and to present the relevant research in a certain field in a graphical image . The bibliometric analysis was carried out using CiteSpace 6.1.R2 [3] visualization software to comprehensively analyze the theoretical development trend and practice frontier dynamics of sports medicine research with national cooperative institution mapping, keyword clustering mapping, and mutation word detection mapping .

III. Results and Discussion

In the Web of science database, the number of literature on the topic of “sports medicine” has been increasing in a wave pattern. From 2003 to 2012, the number of publications was negative compared with the previous year, and the average number of publications was 303 per year; from 2013 to 2016, the number of publications increased, and the average number of publications was 551 per year; from 2017 to 2022, the number of publications increased, and the average number of publications exceeded 1000 in 2021, and the average number of publications was 774 per year. 1000 or more articles, with a volume of 774 articles per year on average. This shows that the attention of sports medicine is increasing year by year, which proves that the field gradually catches an eyes cite of international scholars.

To summarize the distribution of the top 10 countries in the field of sports medicine, the United States was ranked in first place, with 3822 articles. Australia was ranked second place with 1716 articles and followed by England with 1071 articles. Malaysia has 24 articles, which is still a bit different from other countries. The United States and Spain have the highest intermediary

centrality with 0.18, indicating that the United States not only has a high volume of publications in the field of sports medicine research, but also maintains strong collaborative relationships with other countries. Although Spain is in the middle to upper level of publication volume, it can be seen from the fact that it actively maintains cooperative relationships with other countries, and the field of sports medicine is very much valued by Spain.

Using the advantage of citespace in keyword co-occurrence, 834 keywords in 9884 sports medicine literature were analyzed, which can visually reflect the thematic hotspots and development trends in the field of sports medicine. In this study, keywords with co-occurrence frequencies greater than 400 were identified as hot words: sports medicine(2315), exercise(1128), physical activity (1082), performance (870), and injury (792), reliability(624), risk(539), sport(513), children(496), riskfactor(463), strength(426), these keywords together form the research hotspots in the past 20 years.

The distribution of emergent words reflects the research frontier and development trend of the field. 2003-2012 emergent words are: statistical method(19.68), instability(14.08), knee(13.86), assessing agreement(13.16), joint(13.15), shoulder(13.14), patellar(13.15), patellar tendon(13.14), fracture(11.81), injury(10.91), athlete(10.56), sudden death(14.34), cardiovascular disease(11.32), stress fracture(11.08), human(12.9), the emergent words that appeared in 2008-2013 were: public health(33.7), american college(31.19), recommendation(24.52), of sports medicine(20.09), growth factor(11.01), 2010-2018 emergent words are: science(11.21), randomized controlled trial(11. 37), 2019-2022 emergent words were: return(15.07), pediatric sports medicine(12.26), history(9.9), rehabilitation medicine(22.63), preventive medicine(14.63), musculoskeletal disorder(10.19).

The keyword clustering mapping showed that the clustering module value (Modularity) Q value was 0.3592, indicating significant structure, and the clustering mean profile value (Men Silhouette) S value was 0.7108, indicating convincing results. The sports medicine keywords were co-clustered in 6 dimensions, in order from #0 to #5, namely “#0 platelet-rich plasma”, “#1 athletic performance”, “#2 physical activity”, “#3 concussion”, “#4 rehabilitation medicine “, “#5 bone mineral density”.

IV. Conclusions

Based on the analysis of the Web of Science core set database, sports medicine research has shown a wave upward trend year by year, with a surge in the number of publications in recent years, probably due to the epidemic, which has attracted the attention of the public and scholars in general. The main forces of sports medicine research are the United States, Australia, England, Canada, Germany and other countries, with the United States and Spain maintaining the closest ties with other countries. The frontier hotspots mainly revolve around the five dimensions of platelet-rich plasma, athletic performance, physical activity, concussion, rehabilitation medicine, and bone mineral density, and in different periods show the characteristics of crossover, integration, differentiation, renewal and transformation.

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Analysis of Knee Injuries in Taijiquan Athletes Based on Selective Functional Movement Assessment Perspective

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Keywords: FMS, Injuries, Joint, Knee, Taijiquan

I. Introduction

Taijiquan is a traditional Chinese form of fitness. The practice of Taijiquan is beneficial to the respiratory, cardiovascular and skeletal systems, as well as boosting metabolism, and is loved by millions of people. According to 'available data', people in more than 150 countries and regions around the world, including China, practice Taijiquan, with a total of more than 300 million people. However, in recent years, many Taijiquan athletes have reported knee pain when practising Taijiquan. Some scholars have suggested that knee pain in Taijiquan athletes is related to irregular movements, low center of gravity, and excessive exercise, hardly studies have been conducted to assess the physical function of Taijiquan athletes. Because this study looked at the physical functional movement aspects of the athletes themselves, further research is needed on how to improve the practice of knee injuries in taijiquan athletes through effective exercises. So using the Selective Functional Movement Assessment (SFMA) [1]to test and assess Taijiquan athletes with knee pain, The results were analyzed to gain a deeper understanding of the causes of knee pain in taijiquan athletes and provide guidance on targeted d-stability exercises.

II. Methods

The SFMA includes: necks movement pattern, upper extremity movement pattern, multi-site flexion, multi-site extension, multi-site rotation, single legs stance, and drop arms squat [2].The SFMA was administered to those who met the requirements and were screened through a questionnaire. They only tested and broke down the movements involving the knee and the adjacent joints of the hip and ankle.

SFMA test method and its scoring criteria.

(i) Multi-Part Flexion
Purpose: To assess the normal flexion of the hip joint and spine. Movement method: The initial movement requires the test subject to stand straight with the feet together and the toes facing forward. The test subject is then asked to bend the hip to complete the forward bending movement [3], reach towards the toes with the hand, and try to touch the toes without bending the knee joint, look at the toes during the movement and hold for 2s for observation.

Functional criteria: able to touch the toes, weight shifted back, the sacral angle at least 70°, no excessive force, and/or excessive motor control.

(ii) Multi-part extension
Purpose: To assess the normal extension of the hip and spine during the full range of shoulder flexion.

Pist in rating the pain and dysfunction of the underlying movement pattern. Patterns are broken down step by step to the endpoint [4], or until no pain or dysfunction is observed. This system allows the user to rate movement behaviours before testing for strength.

(iii) Multi-part rotation
Purpose of the movement: Normal rotational flexibility of the trunk, pelvis, hip, knee and ankle is assessed.

(iv) Single-leg stance
Purpose of the movement: To assess the ability to stabilize the unilateral leg in a static position. The main focus is on ankle flexibility (ability to fine-tune), vestibular function, proprioception, stability of the supporting hip, and spinal stability under weight-bearing support.

(v) Vertical arm squat
Purpose of the movement: To assess hip flexion and rotation and symmetrical knee and ankle flexibility.

Each movement is abbreviated as F for Function, Dysfunction, P for Pain, and N for No Pain. Each SFMA assessment must be recorded as one of the following four options.

(1) Normal function without pain (FN), (2) Normal function with pain (FP), (3) Dysfunction with pain (DP), and (4) Dysfunction without pain (DN) [5].

When doing the test, do not warm up, do not wear shoes, be picky and strict, and you can give a quick demonstration, but do not teach the key points. For movement patterns where the test results are DN, FP and DP, perform further movement breakdown until the most fundamental cause is found.

III. Results and Discussion

"Swinging the foot and falling fork" and "turning the body and swinging the lotus", require a high level of body function; during the step change, hip rotation, foot abduction, and foot inward buckling are required. When Taijiquan athletes have hip and ankle joint dysfunction, to complete the movement, knee joint compensatory behaviour will occur, causing knee joint injury. For those who have left knee pain, the hip and ankle dysfunction is mainly in the left leg; for those who have right knee pain, the hip and ankle dysfunction is mainly in the right leg; for those who have both left and right knee pain, the dysfunction is generally in both left and right. Female athletes outperformed male athletes in hip and ankle flexibility; 13.15% lower than male athletes in ankle stability. In the SFMA's premier tier test, male athletes were D Not a lower rate than female athletes in the single-leg stance movement. In the four movements of multi-part flexion, multi-part extension, multi-part rotation, arms drop, and deep squat, the percentage of male athletes who were DN was higher than the percentage of female athletes. The main dysfunctions of those who practised Taijiquan with knee pain were concentrated on hip stability and ankle flexibility.

IV. Conclusions

Taijiquan athletes with knee pain all have ipsilateral hip and ankle joint dysfunction. For example, left knee pain was mainly due to dysfunction in the athletes' left hip and ankle joints. Female subjects had better hip and ankle flexibility than male test subjects and weaker ankle stability than male test subjects. The flexibility of the hip and ankle joints became less stable as the test subjects got older. The proportion of hip and ankle joint dysfunction decreased as the number of years of Taijiquan practice increased. Through hip-swinging, ankle dorsiflexion on one knee, etc., we can improve the flexibility and stability of hip and ankle joints, reduce the risk of sports injury and keep away from knee pain.

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Examining Post-injury Depression Symptoms Among Competitive Collegiate Athletes in Malaysia

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Keywords: Athletes, Competitive, Centre for Epidemiologic Studies Depression Scale Post-injury, Depression

I. Introduction

Numerous studies have suggested that injuries are one of the common reasons for termination from the sport. Moreover, sports injuries have been found to be associated with cognitive and emotional reactions which could affect athletes' well-being. While previous researchers in Malaysia have investigated the psychological predictors of injury and how mental health leads to sports injuries, no empirical studies to date have examined the psychological response, especially the depressive symptoms of injured athletes in Malaysia. Thus, this study investigates the post-injury depressive symptoms among competitive collegiate athletes in Malaysia and examines the relationship between post-injury and depressive symptoms.

II. Methods

Online survey was conducted to assess sports injury and depressive symptoms among 161 collegiate athletes (Age: 18-24 years old). Self-report depressive symptoms status was measured using a single scale 20-item Centre of Epidemiologic Studies Depression (CES-D) (α = 0.740 [pilot]). While injuries sustained in training and competition for the past 12 months were measured in terms of a most recent injury, injury location, types of injury, severity of the injury, treatment of injury, duration of treatment, and duration of returning to sports. The duration for data collection was from 24th January 2022 to 13th March 2022. Descriptive and inferential statistics were used to analyse the data. Descriptive statistics such as means, standard deviations, and percentages were used to report the demographic data and data from the inventory. Inferential statistics such as independent sample t-test and one-way ANOVA were used to compare CES-D mean scores according to the demographic data. Spearman correlation was used to assess the relationship between CES-D mean scores and demographic data.

III. Results and Discussion

Most athletes were males (61%) and they were involved in individual sport (n=6), team sport (n=91), mixed sport (n=51), and martial art (n=13). The sample revealed that almost 50% of athletes sustained skin and ligament injuries. Almost 65% of the injuries were mild with 13% sustaining severe injuries. Analysis of depressive symptoms showed that 46% of athletes suffered from depressive episodes with 25% in the Mild/Moderate, and 17% in the Moderate/Severe. However, insignificant CES-D depressive symptom mean scores were found according to gender, age group, type of injury, the severity of the injury, return to sports participation, and treatment of the injury. In terms of gender, our finding is contrary to that of [1], where female athletes experienced more depressive symptoms than males, and [2] female athletes exhibited 1.8 greater depressive symptoms. As for age, our finding was supported by [3-5], where athletes displayed different levels of depressive symptoms but no significant differences were reported. The depressive symptom was not affected by the degree of injury. The finding was supported by [1,6] and opposed by [7,8]. Our insignificant findings of depressive symptoms according to a type of injury were contrary to that of [5,9] where depressive episodes of athletes with concussion peaked at 1-week post-injury and decreased over the next 3 months, while athletes with musculoskeletal injuries showed increased depressive symptoms and continued to be high over the next three months. Our results revealed that among injured athletes who were assessed to be having depressive symptoms through Rosser Disability Category, older

athletes suffered more depressive episodes than younger athletes while those who sustained muscle and ligament injuries experienced more depressive symptoms. In addition, depressive symptoms were found to have a significant low correlation to the degree of injury. Previous research reported that freshman athletes are 3.3 times more likely to experience depressive episodes than senior athletes [10]. The low correlation of depressive symptoms to the degree of injury was supported by [1,11] where depressive symptom severity was not related to the athletes' degree of injury.

IV. Conclusions

Sports injuries could affect collegiate athletes psychologically which consequently lead to post-injury depressive episodes. Within the limits of self-reported measures and the possibility of a biased response, our results indicated that depressive symptoms were not related to gender, age and injury-related variables. However, Rosser Disability Category assessment revealed that older athletes displayed more depressive symptoms than younger athletes and higher depressive symptoms were shown in athletes with muscle and ligament injuries. Further, the degree of injury was lowly correlated to depressive symptoms. Future research should apply a longitudinal study design and involve a bigger sample size to provide better information on the relationship between sports injury and depressive symptoms.

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Chronic Loading of Sodium Bicarbonate Supplementation Improved Endurance Performances Under Hot Conditions in Trained Runners

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Keywords: Abdominal Discomfort and Fullness, Core Temperature, Heart Rate, Lactate Removal, Prolonged Running Performance

I. Introduction

Sodium bicarbonate (NaHCO3 or SB) ingestion has been shown to improve performance in high-intensity exercises of short duration, such as swimming [1-3], sprinting [4], and cycling [5,6]. In addition, chronic supplementation of SB should reduce the side effects of SB ingestion, e.g. GI distress, stomach pain and vomiting because of consuming small doses over several days before the competition [7,8]. Chronic NaHCO3 ingestion is provided daily for several days before exercise testing and it was not ingested on the day of the exercise test [9]. Previous studies showed that chronic SB ingestion (5-6 days) with a dosage 0.5 g.kg-1 BW might allow subjects to perform more work during brief high-intensity exercise compared with acute supplementation [10,11]. To our knowledge, no study has examined the effects of multiple-day protocols of NaHCO3 ingestion on endurance sport performance under hot conditions. Therefore, the purpose of this study was to investigate whether 5-day protocols of NaHCO3 ingestion would improve endurance performance under hot conditions in trained runners.

II. Methods

This was a crossover, randomized order, double-blind research design study. Ten male middle-distance runners (Mean ± SD: age: 21.3 ± 1.3 years; 59.4 ± 5.2 kg; VO2max 57.2 ± 5.3 mL.kg.min-1) were recruited for this study. Subjects were informed of the nature of the study and the possible benefits and risks associated with the experimental procedures before giving their written informed consent to participate. For preliminary testing, each of the subjects was required to run through 1 preliminary test, which comprised a submaximal exercise test and a maximal oxygen (VO2max) test to determine the running speed at 65% VO2max during the experimental trials. During experimentation trials, subjects were required to run a prolonged exercise test (PET) consisting of a 30-min of constant speed run at 65 % of VO2max followed by a 5 km self-selected speed time trial under hot conditions (32°C; 45-47% rh): (i) NaHCO3 (0.5 g.kg-1 BW) for 5-days (0.1 g.kg-1 per day) prior to the trial; or (ii) PLA (0.050 g.kg-1 BW) of NaCl for 5-days (0.01 g.kg-1 per day) prior to the trial in randomised order. The experimental trials were separated at least 7 days apart; both experimental trials were conducted at the same time of the day.

III. Results and Discussion

A. 5 km Time Trial (min:sec)

Fig 1 showed that the 5 km time trial was significantly faster during the NaHCO3 trial as compared to PLA trial (21:46 ± 2:41 vs. 22:22 ± 2:86 min:sec; p = 0.021).

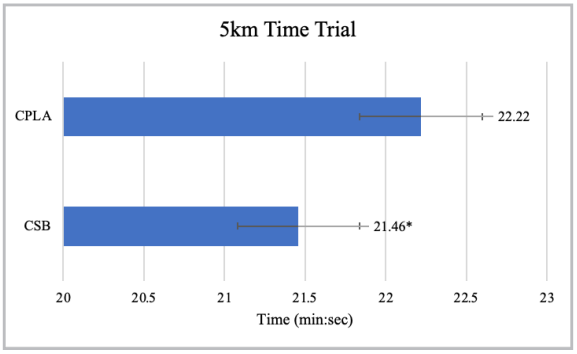

Fig. 1 *Mean ± SD values for 5km self-selected speed time trial between NaHCO3 and PLA trials.*

B. Blood Glucose and Blood Lactate Concentration

Blood glucose levels remained similar in all trials during PET and 5 km time trials ($p > 0.05$). No difference was found between trials in blood lactate levels during pre-exercise ($NaHCO_3$ trial: 2.12 ± 0.27 mmol.L-1; PLA trial: 2.07 ± 0.45 mmol.L-1; $p > 0.05$) and after the 5 km time trial ($NaHCO_3$ trial: 10.83 ± 2.56 mmol.L-1; PLA trial: 10.78 ± 1.64 mmol.L-1; $p > 0.05$).

C. Heart Rate

After the completion of the 5 km time trial, heart rate was shown to be lower in the $NaHCO_3$ trial (192 ± 11 beats.min-1) than in the PLA trial (193 ± 11 beats.min-1) ($p = 0.69$).

D. Ratings of Abdominal Discomfort (AD) and GUT Fullness (GF)

Subjects did not perceive any abdominal discomfort and GUT fullness during the 5-days ingestion of $NaHCO_3$ and PLA ($p > 0.05$). The rating was adopted from a previous research [12].

E. Core Temperature (℃)

Core temperatures were similar during the 30-minute constant speed run ($NaHCO_3$ trial: 37.91 ± 0.23 ℃ ; PLA trial: 37.98 ± 0.42 ℃) and 5 km time trial run ($NaHCO_3$ trial: 38.80 ± 0.72℃ ; PLA trial: 38.94 ± 0.69 ℃ ; $p > 0.05$).

IV. Conclusions

In conclusion, 5-day protocols of 0.5 g.kg-1 BW $NaHCO_3$ ingestion improved endurance performance under hot conditions in trained runners. It's noteworthy to mention that 5-days protocols of 0.5 g.kg-1 BW $NaHCO_3$ did not result in any gastrointestinal discomfort before exercise.

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Comparing Physical Activity and Stress between Genders Among TAR UC Students during Transition to Covid-19 Endemic Phase

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Keywords: COVID-19, Physical Activity, Stress, University Student

I. Introduction

Individuals faced emotional disturbance due to stress of living, stress of coping with online learning, and stress on the new normal which mental health deterioration issues rose alongside the Covid-19 positive cases during the Covid-19 pandemic [1]. Mental health issues in Malaysia were not concerned well during the Covid-19 pandemic, as well as during the endemic [2]. There was an average of 4 suicide cases in the first three months of 2021, with a total of 336 cases reported which was more than half of the reported cases throughout 2020 as mentioned by Dr Noor Hisham [3]. As of May 2021, the total suicide cases had added up to 468 cases in the first five months of the year [4]. Physical activity is proven to help improve mental health such as stress and anxiety [5]. However, there is limited research showing how well physical activity impacts mental health, especially stress.

II. Methods

The study was conducted through an online survey. Ethical approval was obtained before the start of the study from the TAR UC ethical committee. A total of 187 subjects (Male, n=89; Female, n=95) were recruited to complete 2 sets of the questionnaire which includes Student Stress Inventory (SSI) for assessing stress level and International Physical Activity Questionnaire (IPAQ) for assessing physical activity level. The subscales of SSI, which are physical, interpersonal relationship, academic, and environmental factors were assessed as well. The reliability and validity of the SSI were tested by local research [6]. The reliability value of SSI as a whole is .857, .680 for physical, .620 for interpersonal relationships, .842 for academic, and .806 for environmental [6]. The validity value for SSI as a whole is 8.05, 8.07 for physical, 7.89 for interpersonal relationships, 8.22 for academic, and 8.02 for environmental [6]. IBM SPSS statistics software (ver 25.0) was used to analyze the data. Descriptive statistics including frequency, mean, and standard deviation were used to analyze the demographic data. Inferential statistics which include Independent T-Test, One-way Anova, and Pearson's Correlation Coefficient were used to analyze the results.

	Gender	
	Male (M ± SD)	Female (M ± SD)
Total IPAQ Score (MET-min/week)	2270.01 ± 31118.57	2446.14 ± 3327.90
Total SSI Score	81.56 ± 17.73	80.59 ± 17.67
	SSI Subscales	
Physical	19.43 ± 5.22	19.71 ± 4.84
Interpersonal Relationship	17.31 ± 5.31	16.13 ± 4.56
Academic	24.03 ± 6.71	23.99 ± 6.69
Environmental	20.79 ± 5.74	20.77 ± 6.30

III. Results and Discussion

The results showed that both male and female subjects were categorized as moderate stress for physical, academic, and environmental factors. This indicates that the subjects that were involved in this study were most likely to have the moderate vulnerability of sickness and have a medium level of resiliency. Both genders were categorized as having mild stress for interpersonal relationship factors. The results suggest that the subjects have good social connectedness and they are better at getting along with people [6].

Out of the 89 male subjects, 48% of the subjects were found to have mild stress while the remaining 52% were categorized as moderate stress. 57% of the female subjects were recorded to have mild

stress and 43% as moderate stress. 43% of the male subjects and 38% of the female subjects were found to have low physical activity levels. 30% of the male and female subjects were categorized as having moderate physical activity levels. The remaining 27% male subjects and 32% female subjects were recorded to have high physical activity levels.

The stress level was found to have no significant differences between gender. Our finding is in contrast to that of [7 - 9] where women (28%) reported a higher percentage of stress compared to males (20%). [8] reported that there are significant differences in perceived stress levels, female subjects were found to show more moderate stress levels compared to men and it was explained that females experienced more stressors than males and showed more negative emotional outcomes. [10] suggested that females have stronger and more unstable emotions compared to males and males are better at adjusting their emotional functioning when dealing with stress.

Based on the findings, individuals who experience stress should consider getting involved in physical activity to decrease their stress levels. The limitation of this study is the small sample size. Future research should involve a bigger sample size to provide better information on the relationship between stress and physical activity.

IV. Conclusions

The current findings suggest that male subjects have higher levels of stress compared to females. Male subjects were also found to have higher physical activity levels based on their IPAQ scores. In the subscales of SSI, the results indicate that both genders were recorded as moderate stress for physical, academic, and environmental factors. For the interpersonal relationship factors, both genders were recorded as mild stress. The findings of this study suggest that females showed a higher stress level when compared to males. In addition, individuals with higher physical activity levels showed lower stress levels. Therefore, involving in physical activity may help decrease stress levels.

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Initial Comparison of Blood Flow Restriction Modalities for Post Activation Performance Enhancement of Sprint Performance

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Keywords: Blood Flow Restriction, Post Activation Performance Enhancement, Sports Performance, Floss-band, Sprint.

I. Introduction

Blood flow restriction (BFR) training at ~30%1RM has been shown to improve sprint performance acutely following a brief rest period [1]. BFR has been postulated to improve sports performance acutely by way of post activation performance enhancement (PAPE), through (1) earlier onset of higher threshold motor units with a conditioning stimulus (CS) at low mechanical tension and (2) managing of the fitness-fatigue model (ie. stimulation vs. fatigue) [2,3], thereby augmenting more sustained, mechanical power output as typically required from high speed sprinting. Presently, BFR is administered non-invasively using tourniquets, pressure cuffs [3] or floss bands [5], with the latter two options typically providing a wider cuff width (e.g. 5-13cm) of occlusion which minimizes risk for localized tissue damage and discomfort [6]. Floss bands as a training modality is gaining traction in research for training and injury rehabilitation but remain wanting for PAPE. The current study compares the BFR modalities' (pressure cuffs vs flossbands) efficacy in inducing PAPE on acceleration speed (0-20meters) over multiple time intervals.

II. Methods

Twelve athletes (age: 16 ± 2 years; height: 168.2 ± 9.0cm; body mass: 59.9 ± 8.8kg) from the Bukit Jalil Sport School track and field team (combined events) were recruited for the present study. Subjects were randomized in a crossover design to two conditions: pressure cuffs (AneticAid AT4™ Tourniquet System: United Kingdom) and floss bands (CompreFloss™, Malaysia). Pressure cuffs were inflated to an individualized pressure of 130% systolic blood pressure [2], while floss bands were applied with 50% flossing tension and overlap as per standard [5]. Both modalities were applied on the most proximal end of the thigh. All conditions consisted of a standardized warmup especially for major joints of lower limbs and a CS protocol of bodyweight rear-foot elevated split squat (RFESS: load = 3 set x 8 repetitions for each leg) [3] which has been used in similar studies due to proximity of movement patterns to sprinting. To observe for performance differences (speed), 5m and 20m sprint time were measured by timing gates (SmartSpeed Pro, Australia) across several instances: pre-CS baseline, post-CS 2 mins, 4mins, 8mins and 12mins. Performance enhancement is determined by this formula: fastest time÷baseline time. Data were expressed in mean and standard deviation. Between-subjects T-test was used to determine differences between groups, with Cohen's d calculation included to determine effect size.

III. Results and Discussion

Overall, RFESS with blood flow restriction modalities observed improvements in 5m (4.75% ± 5.19%) and 20m (2.56% ± 3.14%) sprint time within 2-12 minutes post CS. Pressure cuffs observed positive changes in 5m (2.18% ± 2.87, d = 0.55) and 20m (0.63% ± 1.97%, d = 0.63) sprint time across all trials except for four instances (5m: Athletes 2 & 4; 20m: Athletes 1 & 6). Similarly, floss bands observed positive changes in 5m (7.31% ± 5.70%, d = 1.55) and 20m sprint time (4.48% ± 2.90%, d = 1.66) across all trials. However, all athletes in the pressure cuffs group observed improvements in either 5m or 20m sprint time, with decrements only present in one condition.

A. Figure

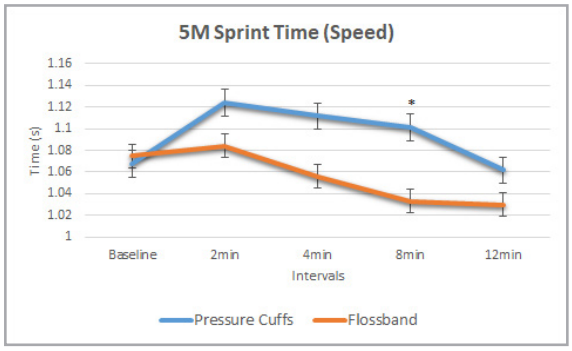

Fig. 1 Comparison of 5 meter sprint time across all time intervals between pressure cuffs and flossband groups.

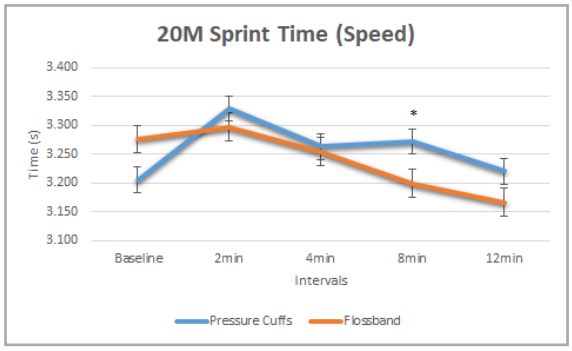

Fig. 2 Comparison of 20 meter sprint time across all time intervals between pressure cuffs and flossband groups.

As observed, sprint speed was slower at the 2-min mark for both modalities, but reversed in differing intensity 4-min onwards. Presently, both pressure cuffs and floss bands has been shown to enhance 20m sprint performance, with floss band yielding significantly better performance enhancement than pressure cuffs ($p < 0.05$) for 20m sprint time at the 8-minute mark, signifying viability for application during pre-event warm-up periods. As observed, floss bands may yield better performance enhancement outcomes than pressure cuffs.

IV. Conclusions

RFESS with BFR modalities improved subsequent sprint performance of high school athletics athletes within 2-12 minutes of the conditioning stimulus. Apt use of pressure cuffs and floss band may yield improvements in acute sprint performance, with consideration of individualized time intervals for performance enhancement to occur due to the fitness-fatigue model. The current study supports BFR as a viable alternative to pre-event performance enhancements in the place of conventional resistance training protocols.

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The Effect of Fast Stretch-Shortening Cycle Plyometric Training on Lower Limb Strength Qualities Among Rhythmic Gymnasts

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Keywords: Fast Stretch-Shortening Cycle, Plyometric training, Reactive Strength Index, Rhythmic Gymnastics, Slow Stretch-Shortening Cycle

I. Introduction

Rhythmic gymnasts required sufficient explosive strength in the musculature of the lower limbs to carry out the multitude of skills needed for jumping while maintaining bodily control [5]. The reactive strength index (RSI) is commonly used to determine the lower limb strength qualities by measuring the reactive jump capacity. The Stretch Shortening Cycle (SSC) is a natural muscle function when active muscle lengthening is immediately followed by active muscle shortening. It can be classified as either slow or fast, where the fast SSC characterized by short contraction time or ground contact time (<0.25s), and smaller angular displacement at the hips, knees, and ankles.

On top of regular plyometric training in RG, the effect of extra plyometric training that focuses on Fast SSC alone has remained unclear as no study regarding this issue has been found up to this point. Moreover, many sport practitioners emphasized the principle of training specificity. However, it is unclear whether adaptation can happen concurrently with either fast or slow SSC. In addition, it was found that SSC may not be transferable to improve the fast SSC capability [2]. Therefore, this study may want to clarify whether training on fast SSC exercises is transferable to improve the strength qualities of slow SSC components.

Therefore, this study aimed to examine the effect of plyometric training that focuses on the Fast SSC exercises alone on Reactive Strength Index (RSI) and the transferability of adaptations from Fast SSC exercise to Slow SSC capability in pre-teen rhythmic gymnasts.

II. Methods

Twenty-two pre-teen female gymnasts, aged 10.77 ± 1.15 years, were divided into an experimental group (EG, n=11) and a control group (CG, n= 11) by using the systematic counterbalancing method. Both groups underwent 2 tests, the 10/5 repeated jump and countermovement jump before and after the 6-week intervention by using a force-plate (Bertec, 3D Portable Force Platform). All subjects remained in their regular rhythmic gymnastics training during the intervention period and only EG was supplemented with plyometric training. The study has gotten ethical approval from the Faculty of Applied Science (FOAS/EC/2022/2-31). The plyometric training consists of three exercises by using a box height of 45cm (Drop Box Jump Continuous, Lateral Box Jump + Lateral Depth Jump and Lateral Drop Step-Bounce to Box Jump) focused on achieving a ground contact time of less than 0.25s. Based on the ground contact point, the investigator visually monitored the level of explosiveness. The explosiveness is associated with a quick rebound. Hence, an instruction such as “jump to maximal height as quick as possible” was given to subjects and the explosiveness of the rebound was monitored during training to ensure proper effort was being executed [3]. The volume of foot contact was increased after 3-weeks, from 125 to 200, with a 30s rest between sets and 2 minutes rest between exercises two times per week for six weeks. The reactive Strength Index is calculated by using the following formula:

RSI (cm/s) = Jump height (cm) / Ground contact time (s).

The Statistical Package for Social Science (SPSS) IBM Statistics for Window, Version 20 was used to calculate the mean and Standard Deviation of the demographic data (age, gender, body weight, body height and years of training). Paired Sample T-test was used to determine the mean difference for both of the tests (10/5 Repeated Jump Test and Countermovement Jump Test) before and after the training intervention for both the EG and CG. Independent T-test was used to determine the mean difference between EG and CG for both the test before and after the intervention. A significant level was set at 95% interval ($p<0.05$).

III. Results and Discussion

Results (Table 1) showed that EG has an improvement of 53.50% ($p<0.001$) on RSI and jump height (JH) (8.33%, $p= 0.018$), but not for CG. Also, significant differences were found in RSI ($p = 0.015$) and JH ($p = 0.194$) between EG and CG for post-test. According to the RSI result, Fast SSC plyometric training is able to bring adaptations to the Fast SSC component which can be seen by the increment of RSI after the 6-week training.

The SSC mechanism accounts for the enhancement in RSI, the pre-stretch in the SSC enhances the concentric contraction through neural contractile machinery during the eccentric phase, this allows a greater number of motor unit recruitment during the concentric contraction. Besides, as the speed of the eccentric action increases with a decrease in the amount of transition time between eccentric and concentric phases lead to a consequence of increase in the neural potentiation effect [1]. Regarding to the potentiation, the SSC increases the excitability of proprioceptors (Golgi tendon organ (GTO) and muscle spindle), allowing the neuromuscular system to react optimally [7]. The GTO inhibit the agonist muscles and facilitate the antagonist muscles, it is vital that the inhibitory effects are minimized and countered by the muscle spindles' contributions. The muscle spindles as a facilitatory mechanoreceptor react to the rapid changes in a muscle's length to protect the muscle-tendon complex [5]. The neuromuscular coordination of muscle spindles and GTO play important roles in enhancing neural efficiency while performing explosive plyometric exercises [4].

When the muscle spindle is stretched, afferent nerve firing increases; the faster the stretch, the stronger the neurological signal sent from the muscle, and thus the greater the efferent muscle contraction [4]. In short, the Fast SSC plyometric training increased the excitability of muscle spindles for improved reactivity of the neuromuscular system while desensitizing the GTO allowed neuromuscular coordination to become more impulsively [5-6].

Moreover, the improved jump height in the CMJ result in this study indicates that training adaptations of Fast SSC plyometric training happened concurrently in both Fast and Slow SSC components, thus, the adaptation of Fast SSC training is not only occurred in Fast SSC capability but also transferable in the adaptations of Slow SSC capability. In brief, by executing Fast SSC plyometric training can improved both the capability of Fast and Slow SSC.

IV. Conclusions

The study concluded that plyometric training that focuses on Fast SSC implemented for six weeks on pre-teen gymnasts improves the RSI and JH, which shows that Fast SSC exercises enhance the reactive strength and suggest that fast SSC adaptations are transferable in slow SSC capability. In a nutshell, Fast SSC plyometric training enhanced both fast and slow strength qualities.

TABLE I

Six weeks Fast stretch shortening cycle plyometric training on reactive Strength Index

Group	RSI (cm/s)		
	Pre-test	Post-test	Sig.
Control Group	59.66 ± 14.76	69.52 ± 19.17	0.055
Experimental Group	62.94 ± 18.98	96.61 ± 27.72	0.001

TABLE II

Six weeks Fast stretch shortening cycle plyometric training on jump height

Group	Jump Height (cm)		
	Pre-test	Post-test	Sig.
Control Group	0.20± 0.04	0.20 ± 0.03	0.520
Experimental Group	0.22 ± 0.03	0.24 ± 0.04	0.018

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Relationship of Personality Traits with Worry, Somatic Anxiety and Concentration Disruption in Individual Event Sports

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Keywords: Competitive Anxiety, Personality Traits, Recreational Athletes, Somatic Anxiety

I. Introduction

Sports psychologists generally differentiate state anxiety and trait anxiety which relates to a more stable aspect of personality and state anxiety which is temporary feelings in a particular situation. Nevertheless, both types of anxiety severely impair sports performance [1]. Reports show that university athletes in individual sports such as badminton, swimming and squash exhibited higher levels of physiological and cognitive anxiety than other categories of athletes which may be linked with their personality traits [2]. Some studies reported specific personality traits that might have an influence on the development of anxiety symptoms. Neuroticism is strongly linked to negative emotions, indicating a higher tendency to experience anxiety [3]. Extraversion and conscientiousness are found to be negative predictors of sports anxiety [4]. Personality is defined as "the characteristic patterns of thoughts, feelings and behaviour over time and according to different situations and is relatively permanent characteristics that are consistent [5].

In general, personality traits can be divided into five major types, which are neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness [8]. Most studies were conducted to determine the influence of personality traits on competition anxiety, but there is a lack of research looking further into the subdimensions of competitive anxiety (somatic anxiety, worry and concentration disruption). Therefore, this study was conducted to determine the relationship between personality traits and the subdimensions of competitive anxiety in individual event sports athletes.

II. Methods

This was a non-experimental study using the correlational technique to determine the relationship between personality traits and competitive trait anxiety. A total of 243 participants from recreational college students participating in required college co-curriculum programs for individual sports (badminton, squash, swimming, tennis and taekwondo) responded to this study. Two instruments were employed to study the relationship between personality traits and competitive trait anxiety. The Big Five Inventory (BFI) developed by John and Srivastava (1999) [9] was adapted to measure personality traits and Sports Anxiety Scale-2 (SAS-2) [10] was adopted to measure the competitive trait anxiety of the participants.

SPSS Version 20.00 was used for the data analysis. Cronbach alpha reliability test was conducted to test the reliability of the items in the BFI and SAS-2 questionnaires. [WU1] Pearson's correlation coefficient was used to determine the relationship between personality traits with the dimensions of competitive trait anxiety (somatic anxiety, worry and concentration disruption). A pilot study was administered showed that the BFI and SAS-2 had good reliability (α >0.70)

TABLE I

Table 10 Summary of the Pearson product-moment correlation coefficient analysis

	EX	AG	CS	NT	OP
Competitive Anxiety	-.212*	-.094	-.099	.486*	-.099
Somatic Anxiety	-.112	-.167	-.017	.397*	-.102
Worry	-.216*	-.044	-.073	.458*	-.069
Concentration Disruption	-.209*	-.138	-.202*	.378*	-.083

* Correlation is significant at the 0.05 level (2-tailed).

EX = Extraversion, AG = Agreeableness, CS = Conscientiousness, NT = Neuroticism, OP = Openness

III. Results and Discussion

Based on Table 1, the subscales within the BFI and SAS-2 displayed certain significant correlations with one another. Out of the five personality subscales,only extraversion [r (241) = -.212, p = .001] and neuroticism [r (241) = .486, p < .001] had significant correlations with competitive trait anxiety. Meanwhile, agreeableness, conscientiousness and openness did not significantly correlate to competitive trait anxiety.

When examining further into the sub-dimensions of competitive trait anxiety, conscientiousness was negatively correlated with concentration disruption [r (241) = -.202, p = .001]. [WU1] Meanwhile, extraversion displayed significant negative relationships with the worry dimension [r (241) = -.216, p < .001] and concentration disruption dimension [r (241) = -.209, p = .001]. However, neuroticism personality trait was strongly and positively correlated to the somatic anxiety [r (241) = .397, p < .001], worry [r (241) = .458, p < .001] and concentration disruption [r (241) = .378, p < .001] dimensions. Nonetheless, openness and agreeableness had no significant correlations with competitive anxiety.

Personality Traits of Individual Sports Athletes

Based on the results, individual athletes scored higher in conscientiousness and neuroticism personality traits. These findings were in line with previous studies [7,8]. Their study explained that conscientious individual athletes are more disciplined and self-motivated due to the absence of interference in team sports (e.g., conflicts between teammates). This forces them to be more independent and autonomous because they do not have teammates to rely upon. On the other hand, individual sports athletes were more neurotic due to individual athletes having a greater sense of accountability which leads to increased stress, shame and guilt [9]. The higher anxiety and stress levels experienced in individual athletes may negatively impair performance.

Relationship between Personality Traits and Somatic Anxiety, Worry and Concentration Disruption

This study found negative correlations between conscientiousness and concentration disruption dimension, indicating that conscientious athletes are less likely to lose focus and maintain attention on their tasks when performing in competitive settings. Individuals who score high in conscientiousness are more hardworking, and self-disciplined, allowing them to focus their attention better at the task given without being easily distracted. Studies also identified concentration as one of the facets of conscientiousness, which means being able to concentrate better without getting distracted during sports performance [14]. Similarly, extraversion was also found to be negatively correlated with concentration disruption and worry. Extraverted individuals have higher quality social interactions, which allow them to experience more positive emotions. They are also equipped with good psychological coping skills in stressful situations [15,16]. More importantly, neuroticism was found to be strongly associated with somatic anxiety, worry and concentration disruption. This was expected as neuroticism is associated with the frequent experience of negative emotions such as anxiety, depression and anger [17]. Athletes that are more neurotic tend to have lower emotional stability and poorer concentration level, which deteriorates their sports performance [18].

IV. Conclusions

The findings suggest that consciousness and extraversion are negatively related to concentration disruption and worry. More importantly, neuroticism was found to be strongly associated with worry, concentration disruption and somatic anxiety. The findings in this study indicate coaches can manage their instructional strategies and stress-coping intervention for their athletes to reduce anxiety symptoms and improve performance.

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Compare the Eating Habits 'Before' and 'During' Movement Control Order and Perceived Healthy Eating Barriers on Health Maintenance Among College Athletes

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Keywords: College Athletes, Eating Habits, Health Maintenance, Movement Control Order, Perceived Healthy Eating Barriers

I. Introduction

Healthy eating habits (EH) are important and need to be concern for weight maintenance and fight with diseases. Dietary and nutritional also play an important role for athletes in maintaining sports performance by better adaptation, faster recovery and reduce the risk of getting injury [1]. The foundation of healthy eating patterns is based on the types, time, and amount of foods intake, fluids, and supplements. Across the participation in routine exercising or competitive sports training, the practice of healthy eating patterns can optimize the body health status and athletic performance [2].

Despite that EHs is important for health and performance of athletes; they still have the barriers on deciding food choices. Researchers had stated that personal (e.g., knowledge, motivation, cooking skills, and etc), social environmental (e.g., social, family support, and etc), and physical environmental (e.g., lack of money, limited exercise facilities, and etc) are the main sources of barriers to engage in healthy EHs of individuals in different populations (e.g., adolescent, women, athletes, and etc).

The pandemic of COVID-19 had influence the living life of people. Government in Malaysia had enforced movement control order (MCO) under the Prevention and Control of Infectious Disease Act 1988 and Police Act 1967 as mitigation strategy to prevent COVID-19 since 18th March 2020. MCO will have a great impact on the training routine , and performance of the athletes due to the closure of sports premises. Physical, technical, psychological and eating habits were inevitablely disturbed.

II. Methods

This study was conducted by using causal-comparative non-experimental quantitative research design. 70 college athletes (aged 18-25) were participated from Tunku Abdul Rahman University College were recruited in this study. All subjects were answered the questionnaires in the online Google Survey Form. Questionnaires included in this study were Eating Habits Questionnaire and Perceived Healthy Eating Barriers. There were four important data had been collected in the surveys which were descriptive data, eating habits "before" MCO, eating habits "during" MCO and perceived healthy eating barriers.

III.Results and Discussion

Result showed that there was a significant difference of EHs "before" and "during" MCO on health maintenance among TARUC athletes with individual sports (p= .039). Individual sport had better EHs "during" MCO (mean=40.89 ± 3.37) compared to "before" MCO (mean=39.37 ± 3.71). During MCO, there was a significant difference of eating habits of athletes between contact and non-contact sports (p= .038) or individual and team sports (p= .000). Non-contact sport (mean=40.27 ± 3.83) had better EHs compared to contact sport (mean=38.02 ± 4.27). Individual sport (mean=40.89 ± 3.37) had better EHs compared to team sport (mean=37.37 ± 4.20). There was a significant difference of personal factor (e.g., lack of willpower) on health maintenance among TARUC athletes with contact and non-contact sports during MCO (p= .041). Contact sport had higher perceived personal barrier (e.g., lack of willpower) (mean=15.40 ± 3.64) compared to non-contact sport (mean=13.36 ± 4.12).

IV. Conclusions

In conclusion, TARUC athletes had better eating habits "during" MCO. Only perceived barrier such as lack of willpower showed difference between contact and non-contact sport.

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Peak Knee Moment and Extension Angle Changes During Simulated Soccer Match-Play

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Keywords: ACL Injury, Biomechanics, Joint Moments, Soccer, Landing

I. Introduction

Previous biomechanical studies on non-contact anterior cruciate ligament (ACL) injuries have studied the influence of soccer-specific exertions on the lower limb joint kinematics and ACL loading using the treadmill or overground running simulations matching running activity profiles of actual match-play [1-6]. Generally, joint kinematics and ACL loading were assessed in these studies via a selection of unilateral or bilateral landing of dynamic tasks. However, very few studies have fully incorporated the ball-handling component into their investigations. Fine, coordinative tasks such as dribbling, passing, shooting and repeated jump-landing movements (i.e., during ball heading) in soccer are seldom recreated up to scale in simulated soccer match-play to improve ecological validity in the existing literature. The aim of this study was to investigate the lower limb biomechanical changes following a Ball Oriented Soccer Simulation (BOSS) during unilateral and bilateral landing tasks.

II. Methods

Fifteen (n = 15) male, healthy and recreationally active participants volunteered for this study (age: 24.9 ± 3 years old; body mass: 65.9 ± 9.9 kg; height: 1.7 ± 0.05 m). This was a single-group study with a repeated measures design where participants completed a 90-minute BOSS protocol [7]. At selected time points throughout the study, participants completed three trials of a drop vertical jump task from a 0.3 m elevated platform placed at 50% of the participants' height from the designated landing area and three trials of a single leg hop task at 75% of the participants' height from the designated landing area. To limit inter-trial variability, a successful landing trial was defined as a landing where a participant is able to maintain his balance at least 2 seconds after initial contact.

24 optoelectronic cameras (OQUS 3, Qualisys AB, Gothenburg, Sweden) and two force plates (Kistler) sampling at 240Hz were used to collect motion and ground reaction force data in three-dimensional (3D) space. 44 spherical reflective markers were positioned according to the LJMU kinematic model [8]. Functional hip and knee joint centres were calculated for maximum error reduction of anatomical landmark placement over these joints [9]. Knee joint moments were calculated using inverse dynamics. Inverse kinematics were utilized to reduce errors deriving from surface movement and soft tissue artifacts.

Peak knee abduction moments and knee extension angles at initial contact (IC) were treated as dependent variables with time and limb side as independent variables. A two-way ANOVA was employed to identify significant differences with α set at 0.05. Limb dominance was defined as the side participants preferred to use when kicking a ball. All participants admitted to preferring the right limb for kicking a ball.

III. Results and Discussion

The results and discussions of this study were grouped as the following:

A.Results

Primary findings revealed that the peak knee abduction moments for the left limb were significantly higher than the right limb during the drop vertical jump trials throughout the entire BOSS protocol ($p < 0.05$).

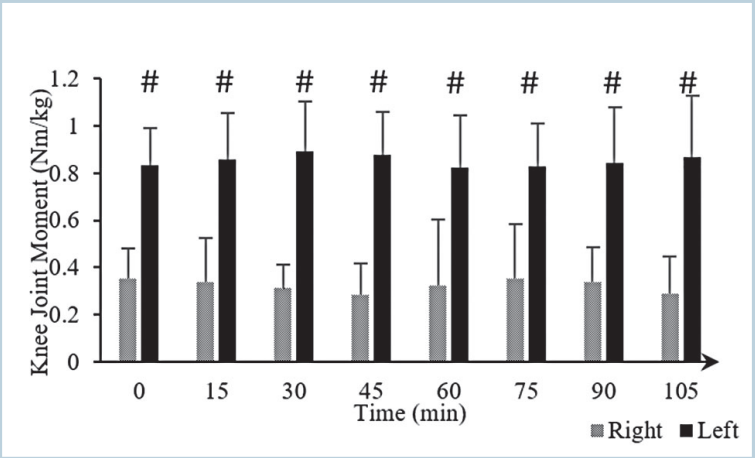

Figure 1:*Peak knee abduction moments during the contact phase in DVJ tasks. (#) Represents significant differences between limb sides.*

Another observation was that knee extension angles at IC had no significant main effect of time throughout the BOSS protocol ($p > 0.05$) during both drop vertical jump (DVJ) and single leg hop tasks.

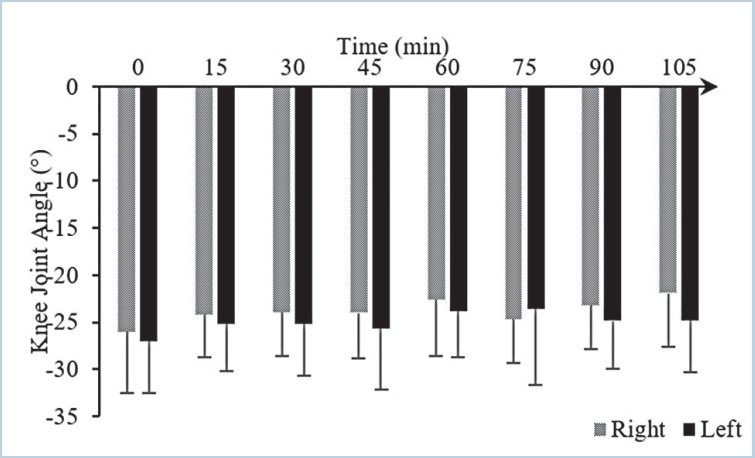

Figure 2:Knee extension angles at IC during DVJ tasks.

B. Landing Biomechanics

Despite the lack of observable differences in the left and right knee and hip kinematics during the drop vertical jump tasks, peak knee abduction moments in the left limb were significantly higher than the right limb. An interesting point to note in this observation is that the peak knee abduction moments during the single leg hop trials did not reveal any differences between the left and right limbs. This may indicate an asymmetrical landing strategy employed by participants for bilateral landing. This may raise concerns in soccer as the jump-landing in ball headings may cause alterations in the jump performance and biomechanics [10]. Specifically, knee joint moments significantly increase along with an improved jump performance with an overhead target. This may cause the landing mechanics and strategy to be compromised, thus exposing ACL towards higher injury risks.

ANOVA with post-hoc analyses revealed no differences at any time point compared to the beginning of the protocol (0 min). This may be explained by high variabilities recorded among the participants. However, we noted a 8 - 16% increasing knee extension at IC as the drop vertical jump trials approached the later stages of the BOSS. Similar increasing knee extension has also been observed in other studies that have incorporated more dynamic landing trials such as agility cutting or side-stepping manoeuvres [1-5].

No significant differences were observed in the single leg hop biomechanics throughout the BOSS protocol. However, it might be worth noting that up to 16.9 % greater knee extension was observed at IC towards the end of the BOSS protocol. The increased knee extension angle (~2°) matched with the observations in existing literature [11].

C. Practical Implications

This study observed a more extended knee orientation at IC during landings as soccer-specific exertions accumulated overtime. This may implicate a need to utilize intervention methods to offset the changes due to fatigue such as training for neuromuscular control in a fatigued state or incorporating injury prevention exercises into training regimes. Apart from that, movement kinematics and rigorous kinetics of various dynamic tasks should also be considered in clinical screening for injuries and return-to-play assessments in sports with bilateral symmetry included as one of the key assessment items.

D. Limitations

This study does not come with no limitations, and therefore some of the findings should be interpreted with caution. Previous studies into non-contact ACL injuries have been pursuing more aggressive interrogation of the ACL loading by using higher velocity movements with multidirectional components within the biomechanical trials such as the triple hop tasks and the side cutting tasks. These tests were less feasible for the laboratory layout in this study, and thus were not conducted. Thus, the utility of the drop vertical jump and single leg hop tasks in this study may reveal a smaller picture of the actual changes occurring in the lower limbs due to fatigue.

IV. Conclusions

A significant difference in peak knee abduction moments between the left and right limbs during the drop vertical jump trials, which was absent in the single leg hop trials, suggests that there may be an influence of limb dominance landing strategy during bilateral landing that may be detrimental to the risk of injury among soccer players. Further investigation should be warranted to address the bilateral differences in joint kinetics despite the symmetries in joint kinematics during the bilateral landing task. There was also a notably increased knee extension over time following the BOSS protocol. This indicates increased injury risk with fatigue development from soccer-specific exertion.

Acknowledgement

This study was conducted at the National Sports Institute, Bukit Jalil, Malaysia, following the approval of the ISN Research Ethics Committee (Human) (ISNRE: RE/A/004/2020-006/2019).

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The Effects of Static and Dynamic Stretching on Hamstring, Lumbar and Quadriceps Flexibility During Menstruation Among University Students

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Keywords: Flexibility, Menstruation, Stretching

I. Introduction

Female reproductive hormones fluctuate during menstruation and influence various physiological systems. Oestrogen and progesterone hormone levels during menstruation and post-menses affect the neuromuscular system such as the nervous system, bones, skeletal muscles and tendons which in turn affect muscle stiffness, passive torque [1] and flexibility [2]. While stretching has been shown to influence flexibility, this has not been established in the context of the menstrual cycle. A study [3] found that yoga, consisting of static stretching, improved flexibility in women, albeit without accounting for the menstrual cycle. In addition, dynamic stretching has been recommended to improve ROM without negatively affecting strength and power as with static stretching [4], which may be important for the athletic population or those who wish to preserve strength for daily activities. However, the research on the effect of stretching during menstruation on muscle flexibility is scant. Hence this study aimed to investigate the effects of static and dynamic stretching on flexibility during the menstruation and ovulation phases.

II. Methods

Ten (n=10, age = 22.40 ± 0.52 years; BMI = 21.79 ± 1.78 kg/m²,) healthy female participants[1] [EK2] with a regular menstrual cycle were recruited in this crossover experimental study. The participants underwent two stretching interventions consisting of static and dynamic stretches (duration matched, adopted from Zmijewski et al., 2020 [5]) in random order in two consecutive days, once during their menstruation phase and another 2-week after the first session. This was repeated for two menstrual cycles. Flexibility was measured using the Sit and Reach Test to measure hamstring and lumbar flexibility, while the Ely's Test was used for goniometer measurement of quadriceps flexibility. The highest score out of three trials was recorded. A two-way ANOVA was used to measure the mean differences in flexibility between static stretching and dynamic stretching and between menstruation and post-menses. A Tukey post hoc test was used for multiple comparisons. Significance was accepted at $p < 0.05$.

III. Results and Discussion

The two-way ANOVA showed significant time ($F_{1, 36} = 25.88$, $p=0.0142$) and stretching type ($F_{1, 36} = 73.15$, $p<0.0001$) effects. The dynamic stretch produced better sit-and-reach results during the menstruation phase, while Ely's test results are not affected by stretching and phase of the menstrual cycle. No differences between stretching were detected in the ovulation phase. While beneficial effects of static stretching have been reported [3 -5] and it does not seem to be affected by phases of the menstrual cycle [6], this study is the first to show that dynamic stretching is more effective than static stretching during the menstruation phase. This can be attributed to dynamic stretching being more effective in reducing muscle stiffness compared to static stretching [7]. Since oestrogen has been negatively correlated with muscle stiffness [1], it is likely that during the menstruation phase the muscle is very stiff, considering oestrogen concentration is lowest during this phase. A less stiff muscle would be able to produce better flexibility. In brief, women should carry out dynamic, rather than static stretching during the menstruation phase without fear of compromising performance.

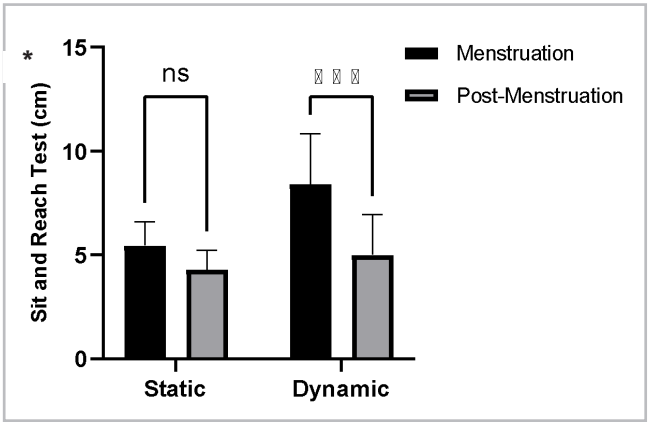

Fig I. Two-way ANOVA results of the sit-and-reach test. *Significantly different.

IV. Conclusions

In conclusion, dynamic stretching can produce better hamstring and lumbar flexibility compared to static stretching during the menstruation phase.

Acknowledgement

We thank En. Rahman and Pn. Hafidzatul, lab technicians from Centre for Sports and Exercise Sciences, Universiti Malaya for their help in preparing and maintaining the functional quality of the lab equipment.

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Relationship of Jump Asymmetry of Force Production and Leg Strength

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Keywords: Asymmetry, Force Production, Strength

I. Introduction

Jumping performance is typically tested using movements with bilateral symmetry such as the countermovement jump. However, total forces generated by each limb acting separately during single-leg and double-leg activity could be greater than the strength or energy production when both legs' muscles operate simultaneously [1]. This implies that the strength is usually not the same between the left and right limbs, as bilateral muscular imbalance is present in most people [2]. While the implication of muscular imbalance with injury is well studied [3], little is known about its benefits on performance. A computer model simulation showed that it does not have a significant effect on jump performance [3], but data from real world human performance is not available. Hence this study aimed to investigate the relationship between jump asymmetry on force production and leg strength.

II. Methods

A total of seventy (n = 70) healthy and active male participants (body mass: 61.7 ± 73.5 kg) were recruited for this study. Their dominant leg was identified using the Waterloo Footedness Questionnaire (WFQ-R). They attended two testing sessions, in the first they performed a strength test (leg press, leg extension and leg curl) - three trials for the left and right with the mean score taken. For the second session, a countermovement jump (CMJ) test was done. During the CMJ, markers were placed on the participant's left and right shoulders, as well as their iliac crest for motion capture using the Qualisys 3D Motion Capture. Vertical ground reaction force was measured using an AMTI platform. The Pearson correlation test was used to measure the relationship between strength and jump performance.

III. Results and Discussion

A strong correlation was found between lower body strength and CMJ hip height asymmetry ($r = 0.8$, $p<0.001$) as well as CMJ shoulder height asymmetry ($r = 0.8$; $p<0.001$). Meanwhile, the correlation between jumping force and asymmetry of shoulders and hips was weak ($r < 0.1$ in both). Results are presented in Table I. This is consistent with findings from the computer simulated study, suggesting that during CMJ, the stronger leg was able to compensate for the strength deficit of the weaker leg, most possibly by lateral movement of the body to distribute the load towards the stronger leg [3]. As in cited study, the strength asymmetry is less than 10% - it is still unknown if a bigger (>10%) asymmetry will produce similar results or another way of compensation, but it should be safe to say that at least in active, athletic population, the asymmetry should not exceed 10%. The strong correlation between lower body strength with hip was expected, but its strong correlation with shoulder suggests that even in sports that focus on upper body movements, lower body strength plays a role in maintaining symmetry. This is possibly due to the fact that if one has a weak lower body, they will need to shift the weight of their whole body, rather than only the legs, to compensate for it.

TABLE I

Pearson's Correlation between Shoulders and hips asymmetry, CMJ Force, and Lower Body Strength.

	Shoulder asymmetry	Hip asymmetry	CMJ Force	Lower body strength
CMJ Shoulder asymmetry	-	r=1.000	r=0.093	r=0.800
		p=0.000	p=0.521	p<0.001
CMJ Hip asymmetry	r=1.000		r=-0.093	r=0.787
	p=0.000	-	p=0.521	p<0.001
CMJ Force	r=0.093	r=-0.093	-	r=-0.147
	p=0.521	p=0.521	-	p=0.284
Lower body strength	r=0.800	r=0.787	r=-0.147	-
	p<0.001	p<0.001	p=0.284	-

IV. Conclusions

Lower body strength is strongly correlated with hip and shoulder asymmetry during jumps, while CMJ force was not correlated to both strength and asymmetry. This suggests the importance of lower body strength with muscular symmetry; while jumping force and performance is influenced by other factors.

Acknowledgement

We would like to thank the lab technicians at the Centre for Sports and Exercise Sciences, Universiti Malaya for their kind assistance in setting up the test venue and equipment.

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Comparison Between Traditional and Plyometric on Running Speed, Balance and Coordination Among Varsity Netball Players

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Keywords: Balance, Coordination, Netball, Plyometric, Running Speed

I. Introduction

The performance of netball is often attributed to components such as running speed, balance, and coordination [1,2]. Generally, a combination of strength-plyometrics training has been shown to improve these components. However, none has compared the benefits between strength and plyometric training exclusively [3]. This, despite the need to be specific to training objectives for each netball player – for example, should a player who seeks to improve speed focus on strength or plyometrics training? To avoid confusion and/or selecting the viable, albeit less efficient training methods, this study aimed to compare the effects of strength and plyometric training on running speed, balance, and coordination among varsity netball players.

II. Methods

Twenty-two (n=22, 22.09 ± 1.02 years old; 1.61 ± 0.07 m; 55.86 ± 8.34 kg) female varsity netball athletes participated in this study. They were randomly divided into strength (STG) or plyometric (PLT) training groups. They underwent the volume (45 min) matched training for 3 sessions/week for six weeks. The following tests were conducted before and after the training period: 20-m sprint test, wobble board balance, and 1-min proactive hand-eye coordination test using the Dynavision. An ANCOVA model was used to test for between-group differences (PLT vs. STG) at post-test using pre-test values as covariates. Statistical significance was accepted at $p<0.05$.

III. Results and Discussion

The results showed that both PLT and STG training improved running speed and balance while coordination was improved only in PLT. In addition, improvement in running speed and coordination was bigger in PLT, while improvement in balance was bigger in STG. The results are presented in Table I. In accordance with the concept of training specificity, short distance (20-m) sprint performance was improved more with PLT, while STG was the better choice to improve balance. While the relationship between plyometrics and hand-eye coordination has been less studied, significant interaction between the two has been reported in volleyball smash [4], and present study presents evidence that plyometrics can improve it. It should be noted that the present study used a general test to measure coordination rather than netball-specific test, and the transferability of the improvement seen to actual match performance warrants more investigation.

TABLE 1

Running speed, balance, and coordination before and after 6-week strength or plyometric training

PLT	Pre	Post
Running Speed (sec)	3.75 0.32	3.50 0.29*#
Balance Test (sec)	4.94 2.28	7.87 2.45*#
Coordination Test	70.05 8.50	79.36 8.20*#
STG		
Running Speed	3.54 0.13	3.35 0.20*
Balance Test	5.91 3.73	9.57 4.55*
Coordination Test	76.77 5.97	79.77 6.19

*Significantly different from Pre, #significantly different from STG with pre-test as covariance.

IV. Conclusions

In conclusion, plyometric training is better for improving speed and coordination, while strength training is better for improving balance. The findings of present study indicate that training prescription should be specified to the needs of each netball player in order to maximise gains.

Acknowledgement

We thank the lab technicians, En. Rahman and Pn. Hafidzatul from Centre for Sports and Exercise Sciences, University Malaya for their help in preparing the equipment needed for this study.

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The Effects of Ecological Sandals and Flip-Flop on Gait Kinematics Among Healthy Male University Students

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Keywords: Footwear, Gait, Kinematics

I. Introduction

Open-toe footwear such as sandals and flip-flops are commonly used due to their lightweight, convenience, and comfort. A few studies [1 - 3] have compared the gait kinematics between ecological footwears, where ankle dorsiflexion moment was found to differ between sandals and flip-flops. However, comparison of wearing footwear with barefoot walking is scarce in the context of stride length and joint movements. This despite the culture of being barefoot while being indoors such as at home - where the transition from footwear to barefoot and *vice versa* occurs frequently. Ideally, the differences in kinematics between wearing footwear and barefoot should be minimal for better dynamic balance [2]. Changes in gait kinematics might alter the natural gait which could cause falls or stumbles. In addition, most studies were not ecologically valid which may have confounded their findings. Wearing unfamiliar footwear may not allow participants to walk in their most natural form, therefore, the purpose of the present study was to investigate the effects of ecological sandals and flip-flops on gait kinematics.

II. Methods

A total of 30 healthy males (15 wearing sandals, 15 wearing flip-flops) performed three walking gait trials in two different conditions - wearing footwear and being barefoot at their natural walking speed. The type of footwear of the participants is one that they have been wearing for at least the last six months. Walking barefoot was assumed to be the criterion for the testing as it is a natural walking gait. Prior to the testing, the participants signed off a consent form and the Physical Activity Readiness Questionnaire (PAR-Q) form. Kinematic gait parameters were collected while participants walked through a 9-Camera Qualisys 3D Motion Capture System (120 Hz), equipped with an AMTI force (used for marking the foot contact phase). The lower limbs were identified using retro-reflective markers (IOR Lower Body). Angles were measured in two phases which are at heel strike phase and toe-off phase. Knee extension and dorsiflexion were taken at the heel strike phase while knee flexion and plantarflexion were taken at toe-off phase. Step length was taken from right heel to left heel consecutive heel strike phase. 2-way ANOVA was conducted for differences in mean, with Tukey *post hoc* test conducted for multiple comparisons.

III. Results and Discussion

The kinematics showed that the step length for flip-flop's wearers were higher than being barefooted, while such a difference was not found in sandal wearers. No changes in knee and ankle kinematics were found between the footwear and barefoot conditions. Results are presented in Table I. Reducing step length could cause the vasti and gluteus maximus muscles to operate at less favourable regions of their force-length relationships, which reduces vertical support during gait [4]. This may have caused the regular flip-flop wearers in the present study to have a less efficient gait in terms of balancing when going barefoot, while sandal wearers do not seem to face this issue. In other words, sandal wearers transition from footwear wearing to barefoot with minimal difference in their gait which may improve dynamic balance as the nature of the footwear itself is compatible with the foot.

TABLE I

Gait kinematics of open-toe footwear wearing and barefoot conditions

	Sandal	Sandal wearers' barefoot mean differences	Flip-Flop	Flip-flop wearers' barefoot mean differences
Knee flexion (°)		0.37 (6.21)		0.20 (3.81)
Knee extension (°)		1.88 (3.44)		-1.50 (2.71)
Ankle plantarflexion (°)		3.34 (3.56)		3.45 (5.86)
Ankle dorsiflexion (°)		1.73 (4.28)		-2.15 (5.82)
Step length (cm)		-0.88 (4.26)		-2.61* (4.59)

*Significantly different between footwear and barefoot conditions.

IV. Conclusions

In summary, based on the present study's findings, we recommend that sandals are preferred over flip-flops to avoid significant changes in gait kinematics upon transitioning to barefoot, especially stride length during daily activities.

Acknowledgement

We would like to thank the lab technicians at the Centre for Sports and Exercise Sciences, Universiti Malaya for their kind assistance in setting up the test venue and equipment.

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The Effects of Foam Rolling on Muscle Stiffness, Sprint Performance and Strength Performance

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Keywords: Foam Rolling, Stiffness, Sprint, Strength

I. Introduction

Foam rolling (FR) has been commonly used as a myofascial release tool to enhance ROM and muscle stiffness [1]. In addition, FR has also been shown to improve sprint performance [3 - 5]. It has been suggested that the effects of FR are dependent on the muscle that was being worked on, since the effect is likely localised [6]. In addition, prolonged FR intervention has been shown to exert greater improvements especially for sprint performance compared to acute, suggesting a dose-related effect [4,5]. To date, there is no study that has compared the effect of FR on different muscle groups that are actively involved during a sprint performance. Hence, the objective of this study was to investigate the acute and prolonged effects of FR on different muscle groups towards muscle stiffness, muscular strength, and sprint performance.

II. Methods

Thirty active male (n=19) and female (n=11) university athletes were recruited and randomly assigned into either quadriceps (QUAD), hamstring (HAMS), or control (CON) group, where the QUAD and HAMS foam rolled their respective muscle groups for a total of 12 sessions across four weeks. Muscle stiffness (Myoton, Tallinn, Estonia), maximal voluntary isometric contraction (MVIC) of knee flexion and extension (HUMAC NORM, Massachusetts, USA), and 20-m sprint performance (Swift Timing Gate System, Australia) were measured on three occasions: baseline, post-test 1, and post-test 2. Post-test 1 was measured immediately after the first FR session, and post-test 2 was measured after the four weeks of FR intervention. The intervention consists of 3 sets of 30s FR on quadriceps and hamstrings for QUAD and HAMS, respectively, with 30s rest between sets. All groups refrained from doing any other form of physical training during the whole study duration. The normality of the data was confirmed using the Shapiro-Wilk test. A two-way ANOVA test was conducted using a repeated measure 2 x 3 (group x time) to determine any significant effect and interaction between variables (GraphPad Prism Version 9.0). Bonferroni's *post hoc* was used to identify pairwise differences. The confidence level was set to 95%, and the value of p was set to $p<0.05$ for all statistical significance.

III. Results and Discussion

A significant group x time effect on MVIC peak torque ($F_{4, 54} = 7.830$, $P = < 0.001$) and average torque ($F_{4, 54} = 6.224$, $P = 0.0003$) during, where the 4-week FR training improved strength in QUAD group compared to the HAMS and CON groups. Post-hoc test shows that knee extension MVICpeak ($p = 0.0128$) and average torque ($p = 0.0304$) for the QUAD group only increased significantly after 4-week (T_2) of FR, though no acute (T_1) effect was detected (Figure I). This suggests greater adaptability in bigger muscle groups associated with mass and pressure distribution.

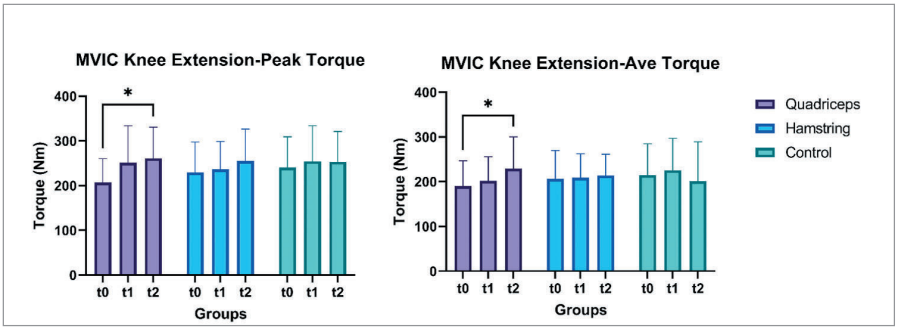

Fig. 1 MVIC peak and average torque after 1 session (T_1) and 4-week (T_2) of FR. *p < 0.05.

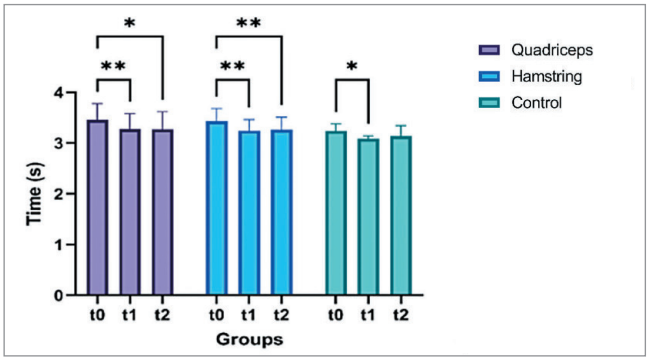

Fig. 2 20-m Sprint time after 1 session (T_1) and 4-week (T_2) of FR. *p < 0.05, **p<0.01.

Meanwhile, a time effect ($F_{1.733, 46.79}$ = 24.64, P < 0.0001) was reported in 20 m sprint time. Sprint performance (Figure II) showed significant improvement for the QUAD and HAMS group after 1 session and 4-week of FR, though the improvement is similar between the acute and prolonged effects. Sprint performance did not change in the CON group.

The increase in strength was found only in the knee extension. Improvement in strength is typically not reported in acute studies using FR, which indicates that FR training to improve strength needs a longer period. Usage of FR for sprint performance has mixed findings [6]. The present study found that running speed was improved acutely in both FR and CON groups, suggesting that there may be a learning effect considering that the participants are from various sports backgrounds, and not all are accustomed with the test. Importantly, the present study found that the 4-week intervention improved 20-m sprint performance in the experimental group while the CON group remained unchanged. In short, a longer period of FR usage may be beneficial to strength and sprint performance gain.

IV Conclusions

In summary, foam rolling affects strength and sprint performance but not muscle stiffness among actively competing athletes after four weeks of FR training. For strength, QUAD showed greater strength improvement compared to HAMS. Although HAMS lacks in strength improvement compared to QUAD, both groups showed lesser sprint time after 4-week training. A longer period of FR usage is proven to be more beneficial compared to a single session.

Acknowledgement

We thank the lab technicians, En. Rahman and Pn. Hafidzatul, for their assistance in preparing the lab equipment needed during the test.

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Effects of Lower Body Plyometric Exercises on Endurance and Power Performances in Vertical Running

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Keywords: Endurance Performance, Plyometrics, Power Performance, Vertical Running

I. Introduction

Vertical running, or tower running, is a highly specialised type of running in which a runner must run upstairs in the shortest period. Like middle-distance running events, it calls for strong cardiorespiratory capacity, but unlike road running, running vertically also demands more power [1]. In tower running races, the elite skyscraper runners must possess not only excellent cardiorespiratory fitness, but also sufficient muscular endurance and explosive ability to sustain a consistent vertical pace [1]. Hence, a vertical runner needs power training in addition to cardiovascular training that most traditional runners are accustomed to. Considering the novelty of this sport however, no study has been conducted to investigate whether typical plyometric training can improve vertical running performance. This study aimed to investigate the effects of lower body plyometrics training on endurance and power performances in vertical running.

II. Methods

Twenty-four (n = 24) healthy and active participants were recruited. They underwent three tests: tower running (TR) test where the participants must complete a standardised vertical run course (20 floors, 640 m) as fast as possible, Queen's College step test (QCST), & Vertec vertical jump test (VJT). After obtaining the baseline data for all the tests, the participants were randomly assigned to either intervention (INT) or control (CON) group. A six-week intervention program was then designed for INT consisting of lower body plyometric exercises (LBPE) countermovement jumps with arms, standing long jump, two-foot ankle-hops, squat jump, alternate leg bounding, and depth jump. A separate alternative task was given to CON which consisted of static stretches. Both groups were made to undergo their exercises twice a week for six weeks. All tests were repeated at the end of the intervention. A two-way ANOVA was used to identify the significance of the relationship between the variables, while Bonferroni's post hoc test was used for multiple comparisons. The levels of statistical significance were set at 95% $p < 0.05$.

III. Results and Discussion

.Significant improvements in TR time, VO_{2max}, and vertical power were found in the INT group (Table I). The improvement in TR time did not coincide with changes in average HR during the run, but a lower average heart rate was recorded during the QCST at post-test. This suggests that there was an improved ability to work at a similar heart rate, despite no statistical improvement in VO_{2max}. It would seem that LBPE improved TR performance by increasing the efficiency of tower running via improvement in power, rather than by increasing the endurance capacity. The results also indicated that power output seems to be a more important factor in affecting TR time and performance compared to cardiovascular systems, as no difference in the average heart rate in both groups was recorded. It should be noted that HR alone is not a strong indicator of cardiovascular performance. Future study should also measure an *in situ* VO_2 during the run.

TABLE I

Test results

Test	Pre-test		Post-test	
	INT	CON	INT	CON
Tower running time (sec)	202.50 ± 43.12	230.10 ± 74.07	172.10 ± 30.27*	239.70 ± 72.45
Tower running average heart rate (BPM)	172.10 ± 12.42	161.00 ± 13.86	166.30 ± 10.321	162.70 ± 14.14
Queen's College Step Test (ml/kg/min)	47.59 ± 8.50	50.56 ± 8.22	51.75 ± 7.70*	49.86 ± 8.44
Queen's College Step Test average heart rate (bpm)	143.80 ± 14.41	139.10 ± 14.90	131.30 ± 8.29*	140.50 ± 16.53
Vertec Vertical Jump Test (cm)	57.28 ± 12.80	52.96 ± 13.74	62.05 ± 10.93*	52.58 ± 13.34
Vertec Vertical Jump Test (W)	4301.86 ± 1228.40	4839.23 ± 1201.21	4350.61 ± 855.75*	4874.41 ± 1038.10

*Significant differences compared to Pre-test.

IV. Conclusions

A six-week lower body plyometric training program was able to improve tower running performance, with HR recorded during the tower run trials indicating power may be a more important influencer of performance, rather than endurance capacity. We recommend that tower runners include plyometrics in their training program.

Acknowledgement

We thank the lab technicians, En. Rahman and Pn. Hafidzatul from Centre for Sports and Exercise Sciences, Universiti Malaya for their help in preparing the equipment needed for this study.

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The Effect of Sleeping Time on Reaction Time Among Esports Athletes

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Keywords: Esports, Hand-eye Coordination, Reaction time, Sleep

I. Introduction

Esports involve a frequent and vigorous coordinated use of the keyboard and mouse, where players may need to complete 400-500 actions per minute [1]. The sport requires a wide range of mental functions, most notably perceptual-cognitive abilities (e.g., selective attention, inhibition, and working memory) to react to the rapidly and often random changes during a match, as well as fine motor ability to input commands via mouse and keyboard precisely [2]. Sleep deprivation has been demonstrated to impair cognitive function [2]. Ability to react quickly and move precisely is vital for Esports performance, and when sleep is not consistently prioritised, the cognitive functions involved in quick decision-making is impaired, resulting in frequent basic overall performance penalties [2]. Therefore, an adequate amount of sleeping time should be vital to ensure their cognitive skill to perform. Since research on Esport-related performance parameters has yet to be researched thoroughly as concluded by a systematic review [3], this study aims to investigate the effect of sleep duration on reaction time and hand-eye coordination among Esports athletes.

II. Methods

Eighteen males (n=18, 19-25 years old) participated in this study. Participants were considered eligible if they had engaged in Esports and or/gaming at university level tournaments, actively played video games and had a habitual sleeping duration of less than 8 hours a day. The participants were randomly assigned to the sleep (SLP) or control (CON) groups. For 4 weeks, the participants were required to record their sleeping hours every day. The 9 participants in SLP all reported that they got at least 8 hours of sleep everyday. During the 4-week period, those in SLP were required to sleep for 8-10 hours per day (by 11.00 PM), without compromising their daily gaming duration, while CON maintained their usual routine. The Dynavision D2 Visuomotor Training System (West Chester, OH) was used to test the participants' reaction time and hand-eye coordination using the proactive mode. The tests were conducted before and after the completion of the intervention period. A two-way ANOVA was used to measure mean differences for group and time effects for the variables measured. Significance was accepted at $p < 0.05$.

III. Results and Discussion

The SLP group showed significant improvements in both reaction time and hand-eye coordination after the 4-week intervention. It was clear that sufficient (at least 8 hours) sleep was vital in improving performance level, which is in accord with studies on other cognitive games such as chess [4], or sports skills that require good reaction time and hand-eye coordination such as baseball batting [5]. Esports athletes tend to have very poor sleeping habits due to various reasons including sleep disorder, high dependence on caffeine and energy products, and extensive use of light emitting devices [3]. Habits must be changed for sufficient sleep to be achievable in their lifestyle.

TABLE I

Reaction time and hand eye coordination and after 4-week intervention

			Pre-test	Post-test
Proactive Mode	Number of hits	SLP	78.0±7.07	84.0±8.62*
		CON	83.0±4.27	80.0± 9.45
	Average reaction time (sec)	SLP	0.77±0.06	0.71±0.08*
		CON	0.71±0.04	0.75±0.08

*Significantly different from Pre

IV. Conclusions

In conclusion, more than 8-hour a day of sleep for 4-week improved the reaction time and hand-eye coordination of Esports athletes. From the practical perspective, these findings have implications for the management of training and competition schedule of Esports athletes.

Acknowledgement

We thank En. Rahman and Pn. Hafidzatul, lab technicians from Center for Sports and Exercise Sciences, Universiti Malaya for their help in preparing and maintaining the functional quality of the lab equipment.

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The Impact of Covid-19 Pandemic Induced Restrictions on Physical Activity and Food Intake Habits Among University Students.

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Keywords: COVID-19, Food Intake Habits, Lifestyle, Physical Activity

Introduction

Coronavirus-2019 (COVID-19) pandemic and the subsequent lockdown is a global issue that has caused lifestyle changes. The World Health Organisation (WHO) recommended preventive strategies designed to minimize coronavirus transmission by stay-at-home order and social distancing. Malaysia is no exception, with a total lockdown ordered from March 18 till May 3, 2020; while a partial lockdown was continued thereafter until March 31, 2021, before another outbreak caused a second total lockdown from 1-28 June 2021. This has led to an increased constraint to carry out the physical activity (PA) [1], while economic constraints and food supply and demand imbalances caused changes in food intake habits [2]. Many university students in Europe, America, and Australia were affected by the lockdown, as classes switched to full online mode where students were robbed of the environment to walk to classes, conduct physical practical classes, and conduct sports activities [3]. However, despite having moved into an endemic phase from October 2021 onwards, such investigation has not been done on Malaysian university students, where studies have been focusing on the psychological impact and learning experience instead [4,5]. Hence, this study aims to investigate the pandemic's effects on PA and food intake habits among Malaysian university students.

Methods

A survey design was adapted [6] consisting of a questionnaire administered retrospectively for pre-COVID-19 and then after the COVID-19 pandemic (during the endemic) was used to examine university students' food intake and PA before and after COVID-19 pandemic. The International Physical Activity Questionnaire – Short Form (IPAQ - SF) [7] was used to assess physical activity and the Mediterranean Diet Adherence Screener (MEDAS) [8] was used to analyze food intake habits. A total of 538 participants from universities across Malaysia (age 21.57 ± 1.45 years, 329 females and 209 males, bachelor's degree students) responded to the survey. A two-way ANOVA was used to compare the PA before and after pandemic, and between males and females. A Bonferroni post hoc test was used for multiple comparisons. Meanwhile, McNemar test was used to assess differences in food intake habits before and after the pandemic. The statistical significance is set to $p<0.05$ and the confidence level is set to 95%.

Results and Discussion

The results showed that there was a significant time effect for PA ($F_{1, 1072} = 73.41$, $p<0.0001$), with post-hoc showing a significant decrease in PA after the COVID-19 pandemic in both genders equally ($p<0.0001$). The results are presented in Figure I. It was clear that PA was reduced since the pandemic began, despite the increase in available time and commercialized online exercise sessions. The low to non-existent income among students could have deterred them from participating in online exercise sessions since it is costly (the class itself may charge a monetary fee, a relatively fast internet connection and a laptop/ mobile device with relatively good specs are needed), or from purchasing home exercise equipment. In addition, the reduction in walking and practical classes due to online university courses have also taken away their pre-existing PA [1].

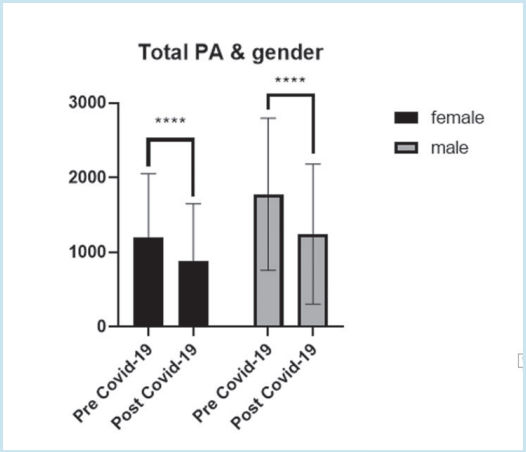

Fig I. Total PA pre and post-pandemic. ****p < 0.0001.

In terms of food intake habits, there were 4 significant differences (McNemar's $p<0.05$) in food intake between pre- and post-COVID-19. Consumption of (i) red meat, hamburger, and meat product, (ii) sweet or carbonated beverages, and (iii) commercial sweets or pastries dropped compared to pre-pandemic. Meanwhile, consumption of vegetables, pasta, and rice increased compared to pre-pandemic. This trend may be caused by the need to ration economically, rendering a reduction in intake of the more expensive meat products and snacks, while increasing in the consumption of satiating grain food [6]. In addition, the logistical constraints especially during the peak global lockdown may have slowed down the production of processed food, leading to less market availability of sweet beverages and commercial sweets or pastries [2]. It should be noted that the MEDAS was used without any modification, and there is some limitation in its application as certain food item such as olive oil is not commonly consumed locally. A version adapted for local use should be designed and validated in future for similar studies.

Conclusions

In summary, inevitably PA was reduced due to the COVID-19 pandemic, and food intake habits changed where consumption of meat and snack products decreased, while vegetables and grains increased. Based on the findings, university students should be encouraged to increase their physical activity and be assessed whether their current nutritional intake is nourishing.

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Transfer of VO2max Gain between Upper and Lower Body

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Keywords: HIIT, Transfer effect, VO2max,

I. Introduction

There are various factors that are directly associated with VO_2max improvement, including local muscle and cardiovascular adaptations. Any form of training should improve cardiovascular capacity regardless of the body part. Generally, there is a cross-transfer of VO_2max gain in the untrained limb when the other limb is trained [1]. And this cross-transfer phenomenon has been reported between running and cycling/ swimming exercises [1]. However, a transfer from upper to lower body exercises and vice versa has not been fully investigated. This study aimed to investigate the effect of cross-transfer in VO_2max between the upper and lower body.

II. Methods

A total of twenty (n=20, age 21.95 ± 1.23 years old; height 1.66 ± 0.09 m; weight 57.3 ± 8.97 kg; BMI 21 ± 2.37 kg/m^2, ten females and ten males) physically active individuals participated in this randomized experimental design completing a 6-weeks HIIT for upper body (UBG) (n=10) or lower body (LBG) (n = 10) for twice a week at an intensity of 85% HR max. The sessions for both groups were 30 mins each including warm-up, and consisted of 3 sets of 5 upper body/lower body exercises for 30 seconds each with a 1:2 work:rest ratio. The participants performed cycle ergometer and arm crank VO_2max tests before and after the 6-week HIIT. A two-way ANOVA was used to determine the significant interaction within and between the variables ($p = 0.05$). Effect size (Cohen's d) was used to measure differences between the transfer of the upper body to lower body and *vice versa*.

III. Results and Discussion

The improvement in VO_2max tested using a cycle ergometer and arm crank are by 4.4 ± 5.6 and 47.0 ± 18.2% respectively for UBG; and by 32.0 ± 0.8% and 4.1 ± 19.1% respectively for LBG. Two-way ANOVA showed significant time effect in both cycle ergometer ($F_{1,9} = 50.19$, $p < 0.05$) and arm crank ergometer tests ($F_{1,9} = 113.5$, $p < 0.05$). There was no significant cross-transfer from UBG and LBG HIIT exercises. VO_2max tested before and after the 6-week intervention is presented in Table I. Although no significance was reported in the arm crank test following lower body training in LBG, there was a strong effect size ($d = 1.44$) when comparing changes in LBG's arm crank relative to UBG's cycle ergometer. This suggests that there may be a better transfer of VO_2max gain when training the lower body compared to the upper body. Logically the bigger muscle groups trained in LBG have a higher demand on the cardiovascular system compared to UBG, causing it to possibly increase its variables such as stroke volume and decrease arteriovenous oxygen differences in a bigger degree, hence a bigger transfer of VO_2max gain when the LBG group is tested on the arm crank.

TABLE I

VO_2max Pre and Post 6-week HIIT Training

	VO_2max (ml/kg/min)	
	UBG	**LBG**
Cycle Ergometer Test		
Pre	33.29 ± 2.95	29.92 ± 6.91
Post	34.60 ± 4.84	43.98 ± 9.91*
Arm Crank Ergometer Test		
Pre	29.50 ± 6.77	34.51 ± 9.81
Post	38.94 ± 9.88*	38.88 ± 7.56

*Significantly different from Pre

IV. Conclusions

In conclusion, following HIIT both UBG and LBG have a significant gain in VO_2max when using the arm-crank test and cycle ergometer respectively. A strong effect size shows that cross transfer VO_2max gain may be present from training the lower body. Future studies with more measurements of VO_2 variables and a bigger sample size may provide a clearer picture of this phenomenon, while comparison between male and female participants may identify gender differences in the transfer of VO_2max gain.

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Effects of Caffeine Mouth Rinse on Power and Endurance Performance, and Fatigue

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Keywords: Caffeine, Endurance Performance, Fatigue, Mouth Rinse

I. Introduction

Caffeine (CAF) is a substance used by athletes to enhance endurance performance and reduce fatigue [1]. However, ingestion of CAF has been reported to cause indigestion and stomach discomfort during exercise in some individuals [2]. In addition, CAF ingestion can also cause dehydration due to its diuretic effect [3]. An alternative way of using CAF to enhance performance while minimizing the undesirable effects of ingesting CAF is to use as mouth rinse. The aim of this study was to investigate the effects of CAF mouth rinse on power endurance performance and fatigue in recreationally active females, as the current literature consists of male participants, who have been reported to be less fatigue resistant than females [4]. It would be of interest to female exercisers and athletes to understand the effectiveness of CAF mouth rinse on performance and fatigue.

II. Methods

Sixteen recreationally active females (n = 16, mean ± SD: age, 22.31 ± 1.41 years) participated in this study. In a single-blind, counter-balance randomized order, they completed two sessions of the experimental trial consisting of a Wingate cycle test followed by 1.5 km time trial, after mouth rinsing for 10s with caffeine (CAF; 25 mL of a solution containing 1.2% anhydrous caffeine concentration in white, powdered form and pandan essence) or placebo (PLA; 25 mL of a solution containing pandan essence). These concentration and masking methods were adopted from a study that found improved time to exhaustion in males [5], with the masking changed from non-caloric mint essence to non-caloric pandan essence since locally and commercially available mint essence has a minor amount of alcohol added into it, which is not consumable by some participants who were Muslims. After both sessions, the participants were asked if they could identify the content of the mouth rinse given or if they tasted vastly different. No one was able to identify the presence of caffeine nor did any participants feel that the mouth rinses given taste vastly different. The mouth rinses were given before and at the end of the Wingate test. Peak power (PP), fatigue index (FI), heart rate (HR), time trial distance (TT), average speed (AVS), and ratings of perceived exertion (RPE) were recorded throughout the test protocol.

III. Results and Discussion

Paired t-test showed no significant differences in PP, TT, HR, AVS, RPE, and FI ($p > 0.5$) between CAF and PLA mouth rinse, with a small effect size (Cohen's d) between groups for all measurements. It seems that CAF mouth rinse does not elicit any changes in power endurance performances and fatigue. It was reported in a review that CAF mouth rinse is beneficial towards cognitive performance but evidence towards physical performance is weak to mixed [6], and the present study supports the fact that CAF mouth rinse does not contribute to any changes in the related physical performance. In addition, women have been reported to have higher relative strength post endurance exercise [7], suggesting that they are more fatigue resistant, which could suggest the lack of effects from CAF. Also, unlike carbohydrate receptors, CAF receptors are mostly located in the brain rather than the oral cavity, hence a beneficial physical effect as seen in carbohydrate mouth rinse is not observed when CAF was used in a mouth rinse.

TABLE I

results between caffeine and placebo groups

Variables	Caffeine	Placebo	Cohen's d	*P value*
Peak Power (W)	628.9 ±106.8	600.4 ±100.3	0.27	0.19
Time trial (sec)	117.2 ±21.5	117.9 ±24.6	0.02	0.95
Average Speed (km/h)	42.8 ±6.8	42.4 ±8.1	0.03	0.75
Heart rate (bpm)	133 ±12.8	125.5 ±21.2	0.39	0.20
Fatigue Index	69.7 ±7.6	72.1 ±12.5	0.23	0.40
RPE	11.5 ±1.9	11.7 ±2.3	0.09	0.74

IV. Conclusions

The present study concludes that CAF mouth rinse (CAF; 25 mL of a solution containing 1.2% anhydrous caffeine concentration and pandan essence) does not significantly enhance power endurance performance or attenuate fatigue in females.

Acknowledgement

We thank the members of Exercise Physiology Lab and Analytical Lab, Centre for Sports and Exercise Sciences, Universiti Malaya, for their assistance in preparing the equipment we needed for our study.

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Effect of Visual Light Pacer on 200m Breaststroke Time Trial of Sub-elite Swimmers: A Case Study

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Keywords: Breaststroker, Middle Distance, Pacing, Young Swimmer

I. Introduction

Positive pacing is a commonly observed pacing profile for 200m breaststroke. It is due to more significant stroke velocity fluctuation and lower mechanical efficiency during breatstroke swimming [1]. However, it is pretty stable for most world-class swimmers and challenging to alter in the latter part of their career [2]. Meanwhile fast start even or parabolic pacing profile may offer a better strategy to maintain high velocity throughout the course in middle- and long-distance swimming [3]."

In practical reality, most of the developmental swimmers are insensitive in spatial displacement. During swimming, the swimmers were straggling with swim technique, stroke frequency or stroke count and stroke length may be the most neglected variable. It is ideal solution for guiding swimmers to swim even pace throughout the course with a visual light pacer installed at the bottom of the pool. However, the effects of this method on middle-stance sub-elite swimmers' performance were unknown. Therefore, the objective of this study was to investigate the effect of visual light pacer on the sub-elite swimmers' 200m breaststroke time trial.

II. Methods

Two sub-elite male swimmers (age = 18 and 20 years old, weight = 68 and 71kg, height = 1.74 and 1.76m) from the Malaysian national backup program were recruited with informed consent. The swimmers were given at least three familiarization sessions with self-selected pacing during formal training sessions a week before time trial day. The time trial sessions were separated one day apart after undergoing a usual tapering program for competition participation. On the time trial day, the swimmers were required to perform a one-bout-all-out 200m breaststroke time trial with non-pacer on day 1 and a visual light pacer on day 2. The visual light pacer (Beijing ReadyGo Technology, China) time trial pacing was duplicated based on the day 1 record.

Time trial performances were captured using a hand-held stopwatch and video footage was recorded by a 50fps video camcorder (Panasonic HDC-HS900, Japan) placed perpendicular to the middle of the swimming pool (25m) and approximately 50m from the spectators' stand away from the pool deck. This allows the camcorder to cover the total length of the 50m swimming pool. Video data were then coded using Kinovea 0.9.5v with self-established test-retest reliability of r>0.9.

The average velocity (distance travelled per time taken, ms^{-1}) of the non-swim phase (AV15, dive start or turn to 15m) and the swim phase (AV25, swim from 15m to 25m; AV35, swim from 25m to 35m; AV50, swim from 35m to 50m) were computed. Descriptive data analysis was applied to describe the changes between the pacer and non-pacer time trials by laps.

III. Results and Discussion

The swimmers performed better during swimming with a pacer (1.3-2.9%) than in the non-pacer time trial (table 1).

TABLE I

200m Breaststroke Time Trial

	Personal Best (s)	Non-Pacer Trial (s)	Pacer Trial (s)
Swimmer A	140.89	144.71	140.57
Swimmer B	137.34	142.71	140.87

With referring to figure 1, we noticed that the pacer swimmers were performed better at AV15 (1.7%) and swam slower at all split distances (AV25, -1.6%; AV35, -5.2%; and AV50, -2.6%) during the first lap than the non-pacer swimmers. The reduced average velocity at all swim phase split distances (-0.4% to -8%) continued until the breaking point at AV35 of third lap. This results in a better performance of pacer swimmers at AV15 (5.6% to 7.6%) due to delayed lower limb fatigue. In comparison with the non-pacer swimmers at the final lap of swim phase, the pacer swimmers were able to swam at higher average velocity (8.8% to 13.2%). The pacer swimmers were successfully demonstrated the parabolic pacing profile with the assistance of light pacer system.

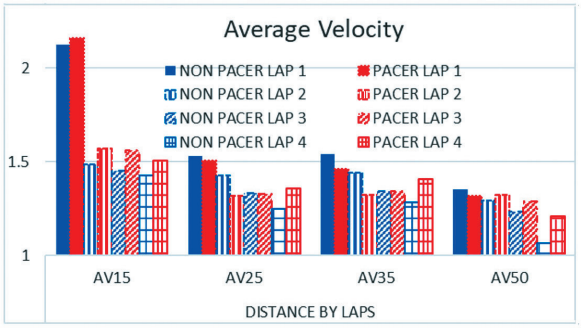

Fig. 1: Comparison average velocity by laps between the pacer and non-pacer time trials

IV. Conclusions

In short, the findings revealed that 200m breaststroke of the sub-elite swimmers may be optimized with a parabolic pacing strategy with visual light pacer guidance. Visual light pacer facilitated the swimmers to delayed fatigue via better energy distribution efficiency in swim performance optimization. Even though the gain is marginal, it is worth exploring further.

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Acute Effect of Tissue Flossing on Muscle Stiffness and Perceptive Rating in Middle Distance Runners: A Pilot Study

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Keywords: Fascia Release, Flossband, Perception, Stretching, Stiffness

I. Introduction

Posterior muscle tightness in the lower extremity is commonly observed in runners, and it could be a predisposing factor closely related to lower limb injuries [1]. There are several modalities to decrease muscle stiffness, and stretching is one of modality to effectively increase soft tissue length and reduce muscle stiffness [2].

In recent years, tissue flossing, as a novel technique, is wrapping a flossband on the soft tissues by passive twisting or active movement to produce the shear force to release the tight myofascial [3] and improve the flexibility of the lower limbs [4]. It is worth noticing whether tissue flossing will perform better in reducing muscle stiffness than regular stretching, but the evidence is limited. Therefore, this study aimed to investigate the acute effect of tissue flossing on the gastrocnemius muscle stiffness and perception rating of middle distance runners compared with regular stretching.

II. Methods

Thirteen middle distance runners were recruited from the National Sports School Bukit Jalil and randomly assigned to the flossing group (FG) (n=7, age, 16.14 ± 1.57, height, 1.68 ± 0.12m, weight, 61.89 ± 11.30kg) and the control group (CG) (n=6, age, 16.17± 1.60, height, 1.66 ± 0.04m, weight, 57.03 ± 7.01kg). Stiffness of the lateral and the medial gastrocnemius of both legs was measured by using the MyotonPRO device (Myoton AS, Tallinn, Estonia) in the pre and immediately post-test. A five-question survey instrument rated how well the runners perceived the band wrap allows them to move their leg following the application of this band and concurrent stretching with a 5-point Likert scale with responses ranging from item 1 (strongly disagree) to item 5 (strongly agree) [5]. Both groups performed two sets of the 30s of static standing calf stretch, ten repetitions of deep squats and eight hips-complex stretches. FG was wrapped with a medium-level flossing band (dimension, 2m [L] x 5cm [W], (COMPREFlossTM, Sanctband, Malaysia)) from medial to lateral on gastrocnemius, knee joints and quadriceps, respectively, at 50% stretch-length, to perform the stretching, while the CG did stretch without wrapping.

Statistical analysis was carried out using SPSS (v26.0; CED, Cambridge, United Kingdom). Descriptive statistic was used to describe the demography data. Kolmogorov-Smirnov and Shapiro-wilk were used to check the normality of the data. An Independent t-test was run to compare the muscle stiffness changes between the two groups, and the significance level was set at $p < 0.05$. Mann-Whitney U test was used to analyse the intervention perception and mean rank was reported in both groups. All runners voluntarily signed an informed consent form before formal enrolment in this study. This study was approved by the National Sports Institute of Malaysia Research Ethics Committee (RE/A/005/2022-003/2022).

III. Results and Discussion

There were no significant changes in gastrocnemius stiffness between the CG and the FG ($p > 0.05$). CG presented a potential trend to decrease gastrocnemius stiffness (2.5%). However, FG showed a potential trend to increase gastrocnemius stiffness (4.6%) (**Figure 1**). There were no significant difference between the CG and FG in the perception ($p > 0.05$). FG showed a better perception (4.5%) than the CG (**Figure 2**).

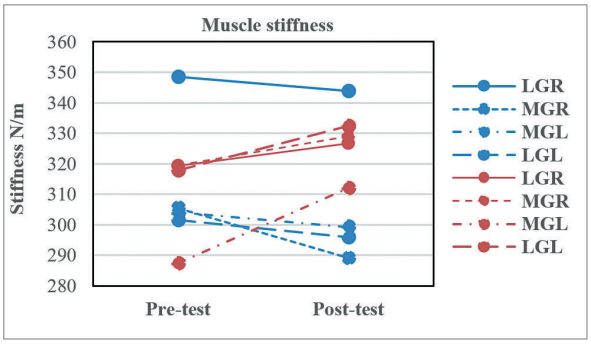

Fig. 1 Muscle stiffness of the CG and the FG. LGR (right lateral gastrocnemius), MGR (right medial gastrocnemius), MGL (left medial gastrocnemius) and LGL (left lateral gastrocnemius). The blue colour indicates the mean muscle stiffness of the CG, and red colour indicates the mean muscle stiffness of the FG.

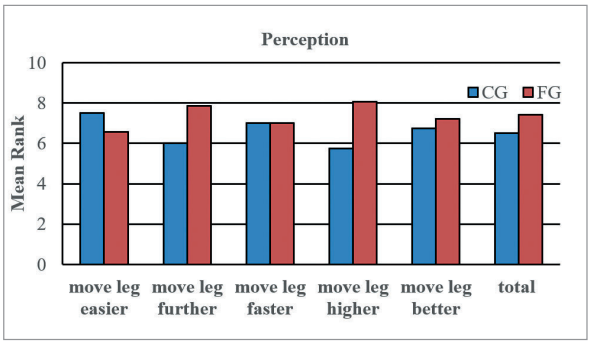

Fig. 2 The intervention perception of CG and FG.

Muscle stiffness and movement perception did not show significant improvement. However, there is an increasing trend of muscle stiffness and better perception of leg movement in FG. A previous study showed that muscle stiffness was positively related to strength generation and muscle activation [4], and this could explain why runners perceived that tissue flossing combined with stretching exercises made them move more easily. In line with previous observations [6], muscle stiffness seemed to decrease after stretching (CG) in this study.

IV. Conclusions

The findings revealed that 50% stretch length of tissue flossing technique combined with low limb stretching might not reduce the gastrocnemius stiffness compared with the control group. The flossband group demonstrated a potential trend toward improving movement perception, which might be recommended to apply this technique in the early phase of warm-up session for middle distance runners. Future research should look into the potential mechanisms of tissue flossing combined with stretching in sports performance.

Acknowledgement

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Relationship Between Psychological Distress and Ankle Instability Among Collegiate Basketball Players

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Keywords: Ankle Instability, Basketball Players, Psychological Distress

I. Introduction

Ankle injuries are common among basketball players, accounting for the highest prevalence (21.9 % from 2832 cases) in the lower limbs [1]. Psychological distress was suggested as one of the contributing factor that leading to ankle instability. The maladaptive pain responses would mediate acute to chronic injuries leading to disability [2]. The aim of this study were to i. examine the relationship between psychological distress and ankle instability and ii. compare ankle instability between left and right leg among collegiate basketball players.

II. Methods

This study included 136 collegiate basketball players (108 males and 28 females), with mean and standard deviations of age, height, and weight of 21.36 ± 1.39 years, 174 ± 9.17cm, and 67.52 ± 14.28kg, respectively. Participants completed two sets of questionnaires: the General Health Questionnaire (GHQ-12) and the Identification Functional of Ankle Instability (IdFAI) for left and right ankles. The GHQ-12 was used to assess psychological distress whereas the IdFAI examines ankle instability.

III. Results and Discussion

The results showed that no significant relationship was found between the psychological distress (Positive and Negative) and ankles instability ($p>0.05$). Amidst this, there is a significant difference in ankle instability between the left and right legs ($Z: -3.59$, $p: 0.0003$), with the left leg having a higher mean (10.50 ± 7.45) than the right leg (8.88 ± 8.05).

The non-significant relationship between psychological distress and ankle instability is most likely due to participants' low physical activity levels during the COVID-19 pandemic [3], which affected training frequency and recovery period. The significant findings on limb-comparison was contradicted with previous findings which indicated limb dominance was unrelated to the risk of ankle injury in soccer and lacrosse athletes [4]. However, it is important to note that the different nature of the sports in the current study compared to previous studies may have contributed to these findings. It is reasonable to believe that the use of the non-dominant leg in jumps and rapid changing of direction in basketball players may have contributed to this finding [5]. Practical implications include basketball players and coaches should implement preventive measures such as wearing ankle guard on the non-dominant leg to reduce risk of ankle injury.

IV. Conclusions

In summary, psychological distress (both positive and negative) is not associated with ankle instability in collegiate basketball players. Collegiate basketball players' left ankle is more prone to instability than the right ankle.

Acknowledgement

The authors would like to thank to all participants who participated in this study.

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The Readiness of Sports Dietitians and Nutritionists to Integrate Mobile App Technology in Nutrition Care: Online Survey in Three ASEAN Countries

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Keywords: Athletes, mhealth, Mobile App, Nutritionists, Nutrition Care, Sports Dietitians

I. Introduction

Recent studies indicate that dietetics and nutrition profession are increasingly using mobile app technology in their practices [1-4]. Doing so has the advantage of making personalized nutrition intervention available anytime and anywhere. However, no study has been conducted of how dietitians and nutritionists (SD/Ns) in Malaysia and other Asian countries perceive and use mobile app technology in their practices. It is important to do so as their exposure to the technology may be different from those of SD/Ns in other countries. Therefore, this study aims to identify the perceptions and usage of mHealth technology in nutrition practice among Southeast Asian SD/Ns.

II. Methods

This study was conducted using an online cross-sectional study among SD/SNs in Malaysia, Singapore and Indonesia. The questionnaire was adapted from [5]no studies have examined their use as tools for dietary assessment and tracking in sports nutrition.\\n\\nOBJECTIVE: The aim is to examine the prevalence and perceptions of using smartphone diet apps for dietary assessment and tracking among sports dietitians.\\n\\nMETHODS: A cross-sectional online survey to examine the use and perception of diet apps was developed and distributed to sports dietitians in Australia, Canada, New Zealand, the United Kingdom, and the United States (US study and literature review from [6] and [7]. Purposive sampling was used to recruit SD/Ns from Malaysia's National Sports Institute (NSI), Bukit Jalil, Kuala Lumpur, and Malaysian sports schools in Kuala Lumpur, Pahang, Terengganu, Johor and Sabah. Snowball sampling was used to recruit participants from Singapore and Indonesia's sports institutes and nutrition and dietetic associations.

Descriptive statistics, including the frequency and percentage of use, were presented. Open-ended responses from the questionnaires were analysed using thematic analysis.

III. Results and Discussion

The present study provides insights into the use of the nutrition-related mobile app by sports dietitians and nutritionists (SD/Ns) in Malaysia, Singapore, and Indonesia (Table 1). This study found that almost 46% of SD/SNs from Malaysia and Singapore use nutrition-related mobile apps in their sports nutrition practices, mainly as information resources such as energy calculators and identified calories by meal (Figure 1). Moreover, nine out of ten SD/Ns who used nutrition-related mobile apps in their practices advise their athletes or clients to use the app. Next, Figure 2 shows that Fitness pal was the popular app used by 73% of participants.

The SD/Ns who used mobile apps in their practice had positive perceptions that the apps added value to their sports nutrition practices and could be effectively used by athletes in monitoring their own dietary. However, SD/N emphasized on the need of specific and personalised sport nutrition mobile app for athletes. This is because the general principle of energy balance in weight management mobile app might not exclusively cover athletes' requirements, depending on their training and competition schedule. Furthermore, the SD/Ns emphasized the insufficient and inaccurate country-specific food nutrition database. Therefore, the current study highlights the need of sports nutrition mobile apps with country-specific food database and unique features such as the nutrient timing that includes pre, during and post-exercise, energy balance and ability to manipulate nutrient goal based on a current situation (such as training and competition) [8].

TABLE I

Demographic information and usage of mobile app among participants

Country	Malaysia (*n*=17) [c]	Singapore (*n*=3) [c]	Indonesia (*n*=4) [c]	Total (*n*=24) [c]
	n (%)	*n* (%)	*n* (%)	*n* (%)
Age [c]				
21-29	10 (58.8)	0	1(25)	11 (45.8)
30-39	7(41.2)	2(66.7)	2(50)	11 (45.8)
40-49	0	1(33.3)	1(25)	2 (8.3)
Gender [c]				
Female	11(64.7)	2(66.7)	3(75)	16 (66.7)
Male	6 (35.3)	1(33.3)	1(25)	8 (33.3)
Years of experience [c]				
< 1	1 (5.9)	0	4 (100)	5 (20.8)
1-5	11 (64.7)	1 (33.3)	0	12 (50.0)
6-10	2 (11.8)	1 (33.3)	0	3 (12.5)
11-15	3 (17.6)	1 (33.3)	0	4 (16.7)
Use mobile apps in practice [c]				
No	8(47.1)	1(33.3)	4(100)	13 (54.2)
Yes	9(52.9)	2(66.7)	0	11 (45.8)
Recommend mobile app to athletes [a]				
No	0	1(50)	0	1 (9.1)
Yes	9(100)	1(50)	0	10 (90.9)
Will use mobile apps in practice (in future) [b]				
No	1(12.5)	0	1(25)	2 (15.4)
Yes	7(87.5)	1(100)	3(75)	11 (84.6)
Will recommend mobile apps to athletes (in future) [b]				
No	0	0	0	0
Yes	8 (100)	1(100)	4(100)	13(100)

[a] Answered by users of nutrition-related mobile app
[b] Answered by non-users of nutrition-related mobile app
[c] Answered by all participants

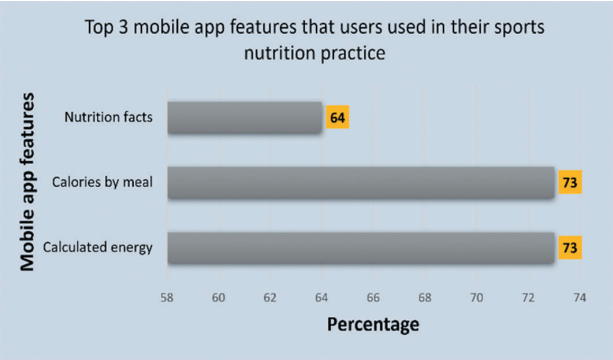

Fig. 1 Top three mobile app features used in by participants in their sports nutrition practices

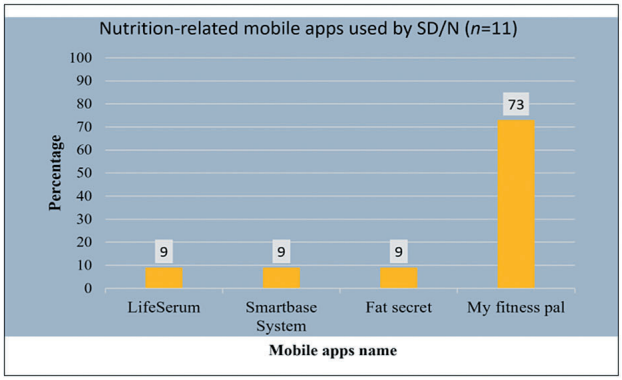

Fig. 2 Nutrition-related mobile apps used by sports dietitians and nutritionists

Validity of mobile app content through expert engagement in development process is necessary for SD/N to have confidence in prescribing the mobile app to their athletes. Moreover, usability issues such as ease of use and usefulness was emphasized as important parts of getting people to accept new technology [9].

Another important finding was that most SD/Ns were not using nutrition-related mobile apps in their practices because they were unaware of the current apps available in the market. This might be the reason why SD/Ns from Indonesia did not use sports nutrition mobile apps in their practices. The current study's findings are consistent with [1]'s, which found that lack of knowledge about apps affected dietitian use and recommendation. Therefore, reference [2] provided a few recommendations to increase the knowledge or awareness of dietitians such as reviews of new health apps in member newsletters regarding accuracy and quality and the development of a framework to guide dietitians to select scientifically accurate health apps. Thus, in addition to collaborating with health professionals, it is also important to engage with established professional associations such as the Malaysian Dietetics Association (MDA) or the Nutrition Society of Malaysia (NSM) to disseminate information about newly developed nutrition apps.

Nevertheless, SD/Ns who were not currently using mobile apps seemed enthusiastic about using the mobile apps in the future. Thus, the findings reveal there is potential to promote the use of sports nutrition mobile apps among SD/Ns and athletes.

IV. Conclusions

Mobile apps were generally seen by SD/N as useful in sports setting and favorable to suggest them to athletes and active individuals. However, SD/N emphasized on the need of specific and personalised sports nutrition mobile app for athletes. The development of new technology should include domain experts to improve the content quality and validity, increase the availability of country specific food databases to improve the user satisfaction, and integrate advanced technology into meal recommendation features. Future studies should investigate the perception and usage of nutrition related mobile app among athletes and explore which features of the apps help to improve their nutritional status. The result would provide an interesting comparison group.

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Motivation Towards Sports Participation in Competitive Endurance Athletes During Covid-19 Lockdown

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Keywords: Competitive Endurance Athletes, COVID-19, Motivation Level, Self-isolation

I. Introduction

The COVID-19 pandemic has now been a major global issue not only for health but also in the sports context [3] which is affecting the worldwide population and high-performance athletes [1]. This virus has brought unprecedented time which led to a pandemic that caused sporting events to cancel and participation of athletes in outdoor training is being prevented due to restricted movement control order. Social distancing, self-isolation, and travel bans have been imposed by the government during the pandemic to reduce the number of infected COVID-19 individuals [2]. In addition, this pandemic has caused outdoor training schedules for athletes and competitions to be canceled. Consequently, due to the government regulations, the usual training routine of athletes has been altered which in turn harms athletes' motivation in sporting activities and training.

Sports participation is reduced during the lockdown in comparison to pre-lockdown [3]. This is due to the new recommended guidelines by the government where they imposed restrictive measures such as the closure of sports facilities, self-isolation, and social distancing. Consequently, changes in the training routine of athletes cause their daily training routine and competition schedule to be affected. This, in return, may affect athletes' motivation for their sporting activities.

II. Methods

Study Design

This is a questionnaire research design that was conducted to identify the effects of COVID-19 lockdown on motivation level towards sports participation among competitive endurance athletes in Malaysia. Before signing the consent form, participants were informed about the study procedures and potential risks.

Participants

Purposive sampling was used to determine the sample size. The participants were ages ranging from 18 - 45 years old, male and female competitive endurance athlete.

Procedures

The researcher briefed the participants regarding the purpose and potential risks of this study before distributing the survey questionnaire online. Every participant was needed to complete their responses individually with honesty. Before answering the questionnaire, a demographic data form, consent form, and information sheet were filled out by the respondents. Sports Motivation Scale-II (SMS-II) was used to measure the motivation level of participation in sport.

III. Results and Discussion

Table I

Frequency of Training Sessions in a Week Before and After Lockdown

Number of training session per week	Before		After	
	N	Percentage (%)	N	Percentage (%)
1 to 7	40	46.5	50	58.1
8 to 14	45	52.3	32	37.2
15 and above	1	1.2	4	4.7

Generally, most of the athletes seemed to have a reduction in the frequency of training sessions per week. For 8 to 14 sessions per week between before and after COVID-19 lockdown, the frequency decreases from before COVID-19 lockdown to after COVID-19 lockdown with the frequency of 45% and 32% respectively.

Table II

One-way ANOVA on Sports Motivation Scale-II on Level of Participation in Sports

	Level of Participation in Sports	Sum of Squares	df	Mean Square	F	Sig.
Amoti-vation	Between Groups	26.08	2.00	13.04	5.44	.006
		3.00				
	Within Groups	198.90	83.00	2.39		
	Total	225.05	85.00			

One-way ANOVA was conducted to compare the Sports Motivation Scale-II among the level of participation in sports (State, National and International). There was a significant difference between the level of participation in sports as determined by one-way ANOVA and amotivation ($F(2,83) = 5.440$, $p = 0.006$. Post hoc test revealed that there is a significant difference in amotivation between state and international levels of participation in sports with $p = 0.018$ and national and state with $p = 0.018$.

The possible cause of this could be due to the participants experiencing a negative emotion, possessing a behavioral inhibition system, and having a high avoidance temperament in neuroticism [3]. This will eventually lead to a decrease in motivation to exercise and participate in sports during the COVID-19 lockdown. In addition, cancellation of competitions or sporting events and postponement of sporting goals are said to harm athletes' motivation level to continue training [7]. However, the decrease in motivation level can be curbed as motivation can be controlled. This can be done by sports psychologists who can provide support in managing those cases [8].

It is found that elite athletes were frustrated due to physical, psychological, social and economic loss where they faced challenges such as reduced number of sponsorships, bonuses based on performance, and financial support from associations and federations [5]. Another reason behind this finding is that most athletes were affected physically and psychologically due to the COVID-19 lockdown where they were having sleeping and nutrition issues, stress, anxiety, grief, lack of motivation and anger [5]. Therefore, to counter the effects of the COVID-19 lockdown, mental well-being follow-ups should be provided to the athletes where an emotional contingency plan and psychological intervention program should be included [5].

However, a study conducted by [1] found that athletes who have participated in Olympic and Paralympic Games showed a lower anxiety level in comparison to the general population. This could be due to experienced athletes having higher cognitive and emotional resources [2]. Therefore, they are capable of facing the COVID-19 lockdown with less stress.

Moving on, there was no significant difference between sports motivation and age, gender, year of sports participation and BMI level.

IV. Conclusions

To sum up, COVID-19 has caused the individual to have an adverse effect on their stress and anxiety level which have affected their motivation for sports participation. External circumstances such as anxiety, stress, and financial issues are the causes that contribute to poor motivation level towards sports participation among competitive endurance athletes in Malaysia. Therefore, we should acknowledge the social change is happening in the world, so that some measures cn be drafted to ensure the athletes will be able to adapt to the uncertainties.

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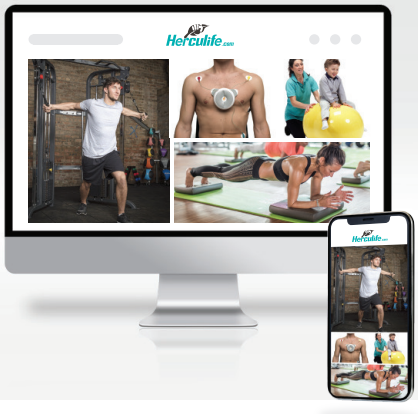

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