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THE EFFECT OF WARM-UP SEQUENCE ON MUSCULAR STRENGTH AND CARDIORESPIRATORY PERFORMANCE AMONG FEMALE PENANG VOLLEYBALL TEAM



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THAM CHUNG YIP

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FEMALE PENANG VOLLEYBALL TEAM

THAM CHUNG YIP

THESIS PRESENTED TO QUALIFY FOR A BACHELOR OF SPORT
SCIENCE (COACHING SCIENCE) WITH HONOUR

FACULTY OF SPORT SCIENCE AND COACHING
SULTAN IDRIS EDUCATION UNIVERSITY
2021



DECLARATION OF AUTHENTIC WRITING

I hereby declare that this thesis entitled The Effect of Warm-Up Sequence in Muscular Strength and Cardiorespiratory Performance among Female Penang Volleyball Team is based on my original work except for citations which have been duly acknowledged. I also declare that it has not been previously submitted for any other degree or award at Sultan Idris Education University or other institutions.




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APPROVAL FOR SUBMISSION

This thesis entitled The Effect of Warm-Up Sequence on Muscular Strength and Cardiorespiratory Performance among Female Penang Volleyball Team prepared by Tham Chung Yip was certified to meet the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Sport Science (Coaching Science) with honor at Sultan Idris Education University.



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THE EFFECT OF WARM-UP SEQUENCE ON MUSCULAR STRENGTH AND CARDIORESPIRATORY PERFORMANCE AMONG FEMALE PENANG VOLLEYBALL TEAM

ABSTRACT

We all know that warming up is to let the athletes be ready for the upcoming sports competition. This research is purposed to investigate the effect of warm-up sequence on muscular strength and cardiorespiratory performance among female Penang volleyball team. The research is also to find out which warm-up sequence will improve the muscular strength and cardiorespiratory performance. A total of 10 female volleyball athletes from Penang volleyball team (<21 years old) participated in this study. They were separated into two groups (Warmup-Stretching, N=5; Stretching-Warmup, N=5). All the participants undergone 6 weeks duration of intervention, and 3 tests (pre-test, mid-test, post-test) were taken. The dependent variables included the test results of 1-minute push-up test, vertical jump test, beep test and blood lactate threshold test. In this study, all of the data were collected manually and then insert into Microsoft Excel. Statistical significance was set at $p = .05$, and the SPSS Ver.23 program was used for all statistical calculations. The findings of the study showed improvement in muscular strength and cardiorespiratory performance for Stretching-Warmup group is higher than Warmup-Stretching group. In general, it can be concluded that warm-up sequence which is stretching followed by warm-up can help athletes to improve their muscular strength and cardiorespiratory performance. Hence, it can be offered as a new method of warm-up in the different sports to athletes and coaches. Therefore, the combination of stretching and warm-up increases blood flow to active muscles and nerve receptors, and increases the speed of nerve impulses.





KESAN URUTAN PEMANASAN TERHADAP KEKUATAN OTOT DAN PRESTASI KARDIORESPIRATORI TERHADAP ATLET PASUKAN BOLA TAMPAR WANITA PULAU PINANG

ABSTRAK

Pemanasan adalah memberikan atlet bersedia untuk pertandingan sukan yang akan datang. Penyelidikan ini bertujuan untuk mengkaji kesan urutan pemanasan terhadap kekuatan otot dan prestasi kardiorespirasi di kalangan pasukan bola tampar wanita Pulau Pinang. Penyelidikan ini mengetahui urutan pemanasan mana yang akan meningkatkan kekuatan otot dan prestasi kardiorespirasi. Seramai 10 atlet bola tampar wanita dari pasukan bola tampar Pulau Pinang (<21 tahun) mengambil bahagian dalam kajian ini. Mereka dipisahkan menjadi dua kumpulan (Warmup-Stretching, N = 5; Stretching-Warmup, N = 5). Semua peserta menjalani intervensi selama 6 minggu, dan 3 ujian (ujian pra, ujian pertengahan, ujian pasca) telah diambil. Pemboleh ubah bersandar merangkumi hasil ujian push-up 1 minit, ujian lompat menegak, ujian bip dan ujian ambang laktat darah. Dalam kajian ini, semua data dikumpulkan secara manual dan kemudian dimasukkan ke dalam Microsoft Excel. Kepentingan statistik ditetapkan pada $p = .05$, dan program SPSS Ver.23 digunakan untuk semua pengiraan statistik. Hasil kajian menunjukkan peningkatan kekuatan otot dan prestasi kardiorespirasi bagi kumpulan Stretching-Warmup lebih tinggi daripada kumpulan Warmup-Stretching. Secara amnya, dapat disimpulkan bahawa urutan pemanasan yang diregangkan diikuti dengan pemanasan dapat membantu atlet meningkatkan kekuatan otot dan prestasi kardiorespirasi. Oleh itu, ia boleh ditawarkan sebagai kaedah pemanasan baru dalam sukan yang berbeza kepada atlet dan jurulatih. Oleh itu, gabungan regangan dan pemanasan meningkatkan aliran darah ke otot aktif dan reseptor saraf, dan meningkatkan kelajuan impuls saraf.



CONTENTS

	Page
DECLARATION OF AUTHENTIC WRITING	ii
APPROVAL FOR SUBMISSION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
ABSTRAK	vi
CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDICES	xii

CHAPTER 1 INTRODUCTION

1.1 Research background	1
1.2 Problem statement	3
1.3 Objective	3
1.4 Hypothesis	4
1.5 Research question	4
1.6 Operational definition	4
1.7 Research limitation	6
1.8 Research delimitation	7
1.9 Significant of study	7

CHAPTER 2 LITERATURE REVIEW

2.1 Physiological response towards exercise	9
2.1.1 Cardiorespiratory performance	9
2.1.2 Energy metabolism	10
2.1.3 How lactate affect performance	12
2.2 Muscle activation	13
2.2.1 Muscular strength	15
2.3 Warm up	16
2.4 Stretching	17

CHAPTER 3 METHODOLOGY

3.1 Research design	19
3.2 Participants	19
3.3 Intrument	20
3.3.1 Heart rate	20
3.3.2 1-minute push-up test	20
3.3.3 Vertical jump test	21
3.3.4 Beep test	21
3.3.5 Blood lactate concentration test	22
3.4 Procedure	23
3.5 Data collection	23
3.6 Data analysis	24

CHAPTER 4 RESULTS

4.1 Demographic characteristics of participants	25
4.2 Data collection on heart rate	26
4.3 Data collection on 1-minute push-up test	29
4.4 Data collection on vertical jump test	30
4.5 Data collection on VO ₂ max	31
4.6 Data collection on blood lactate threshold	32

CHAPTER 5 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion	33
5.2 Effect of warm-up on muscular strength	34
5.3 Effect of warm-up on cardiorespiratory performance	35
5.4 Conclusion	36
5.5 Recommendation	36

REFERENCES	38
------------	----

APPENDICES	42
------------	----

LIST OF TABLES

Table	Page
3.1 6 weeks of intervention and the test day of this study	23
4.1 Demographic characteristics of participants	25



LIST OF FIGURES

Figure		Page
2.1	Chemical energy from ATP converted into mechanical energy during muscle contraction.	11
2.2	Lactic acid fermentation cori cycle muscle glycogen	12
2.3	Contraction of a muscle fiber	14
4.1 A	Average heart rate before and after warm-up session for Warmup-Stretching group	26
4.1 B	Average heart rate before and after warm-up session for Stretching-Warmup group	27
4.1 C	Heart rate after training	28
4.2	1-minute push-up test result	29
4.3	Vertical jump test result	30
4.4	Vo ₂ max result	31
4.5	Blood lactate concentration result	32





LIST OF APPENDICES

- A Participants biodata form
- B Norms of resting heart rate
- C Norms of $VO_{2\max}$ performance
- D Norms of 1-minute push-up test
- E Norms of vertical jump test
- F Norms of blood lactate threshold test





CHAPTER 1

INTRODUCTION

1.1 Research background

Training and sports participation is purposely to increase the athletes' performance. Performance is multifactorial, depending on several parameters, including warm-up practices. The term warm-up in sports is defined as a preparatory exercise to improve subsequent competition or training performance (Fradkin et al., 2010). The purpose of warming up is to let the athletes to be ready for the upcoming sports event in a physiological view point, making the transition from the resting state to the state of preparedness needed for sports training and competition.

The traditional warm-up paradigm usually includes a short period of low-intensity aerobic exercise, followed by stretching exercises and specific exercises (Safran et al, 1989). Recently, it is better to use dynamic stretching rather than static stretching. Stretching exercises are considered a pivotal effector of joint flexibility, adding biomechanical precision to an athlete's movement while offering the opportunity to perform at maximum force throughout the range of motion (Alipasali et al., 2019).

The development of performance improvement training programs for women's volleyball players requires the cooperation between volleyball coaches, strength and conditioning coaches and other professionals who work with the volleyball player, such





as athletic trainers, physiotherapists and physicians. Use their empirical and practical knowledge from various sport-related domains who are being exercise physiology and sports medicine. Information on sports-related issues, such as physical attributes like height, body mass, fat-free weight, physiological attributes like aerobic profile, strength, vertical jump ability, agility and speed, and on-court data like heart rate and blood lactate level can be effectively implemented in volleyball events, especially in strength and conditioning programs which specifically developed for the female volleyball player (Lidor et al., 2010).

Volleyball is a sport that often incorporates stretching into the warm-up routine. In volleyball matches, high vertical jumps and explosive sports to cover the court space are considered the most important and highly correlated (Barnes et al., 2007). During the game, the distances of volleyball players often range from 4.5m to 9m (Gabbett and Georgieff, 2007). Athletes, coaches and researchers in the field of sports are very interested in monitoring and measuring the physical fitness generated from training. They use the methods that provide reliable information about athletes' performance during competition or training, intensive training is used to achieve the metabolic, cardiovascular, and neuromuscular adjustments needed to improve their physical abilities (Hughson and Shoemaker, 2015).

It is possible to determine the participation of different metabolic systems in the energy required by monitoring the level of blood lactic acid concentration to assess the physiological load and to generate the required load type. Blood lactate also provides the possibility to establish the relationship between blood lactate levels and load intensity. This relationship depends on the athlete's ability to perform in terms of aerobic and anaerobic energy (Navarro, 1998). During short-term maximum strength training,





lactic acid levels in the blood increase and hypoxia occurs during this period. As we all know, high blood lactate levels are the limiting factor during exercise.

1.2 Problem statement

Everyone knows the importance of warm up before sports events, but no one know which warm up sequence is the most effective for us to prepare well for next coming sports events. Should we warm up then stretching or stretching then warm up? Furthermore, there is no study that investigate the effect of warm up sequence on muscular strength and cardiorespiratory performance among female Penang volleyball team.



1.3 Objective

The objectives of this study are:

1.3.1 To investigate the effect of warm up sequence on muscular strength among female Penang volleyball team.

1.3.2 To investigate the effect of warm up sequence on cardiorespiratory performance among female Penang volleyball team.





1.4 Hypothesis

H_1 = Warm up sequence significantly affects the muscular strength among female Penang volleyball team.

H_2 = Warm up sequence significantly affects the cardiorespiratory performance among female Penang volleyball team.

1.5 Research question



1.5.1: Is there any significant difference on the effect of warm up sequence on muscular strength among female Penang volleyball team?

1.5.2: Is there any significant difference on the effect of warm up sequence on cardiorespiratory performance among female Penang volleyball team?

1.6 Operational definition

i) Heart Rate

Heartbeat is the most direct response to physiological cues after exercise and exercise. Maximum heart rate (MHR) refers to the fastest heartbeat rate in one minute, and is usually used in physical training and clinical practice for preventive





and diagnostic purposes. It can also be used to develop exercise prescription, it is estimated aerobic fitness level, and is generally the largest training standards to determine the maximum aerobic capacity (Cheng, 2019).

ii) Aerobic Capacity ($VO_2\text{max}$)

The aerobic capacity ($VO_2\text{max}$) provides the information about the athlete's health status, helps to evaluate the effectiveness of training and was found to play a role in the early athletes' selection. It is an indicator of the ability of body's circulatory and respiratory system to supply energy and oxygen during sustained physical activity (Kausar, 2015).



iii) Muscular Strength

Muscle strength has been defined as the ability to exert force or resistance to external objects. Given the needs of individual sports or events, you may need to perform higher antigravitation to manipulate your own weight, manipulate your own weight plus opponents, or manipulate tools or projectiles (Biomechanical foundations of strength and power training, 2001).

iv) Blood Lactate

Blood lactate is produced when there is insufficient oxygen at the cellular level or when the primary way of producing energy in the body's cells is disrupted. The



lactic acid can be defined as the intensity of work during exercises, in which the concentration of lactic acid in the blood increases exponentially, which coincides with the muscle fatigue level (Böning et al., 2007).

v) Body Mass Index (BMI)

Body mass index (BMI) is a person's weight in kilograms divided by their equal squares in meters. The BMI is a tool used by healthcare professionals to help estimate a person's risk for chronic disease. BMI uses height and weight to determine one's optimal health (Obese, 1998).

vi) Penang Female Volleyball Team

Penang Female Volleyball Team is undergoing the SUKMA program. Their volleyball experience was defined as the years they had been practicing volleyball as state players that involved 3 court training session and 1 weight training in gym weekly.

1.7 Research limitation

This study on the effect of warm-up sequence on muscular strength and cardiorespiratory performance among female Penang volleyball team has several limitations that cannot be controlled by the researcher:



- i) The participants' attitude such as not fully committed in training and test, no self-motivation to improve performance and not responsible in completing task were the factor that had affected the results.
- ii) The health factor of participants such as genetic, history of injury and diet were not considered in the study.
- iii) Researcher can only undergo all the tests in limited space and fully follow the standard of procedure of pandemic of Covid-19.

1.8 Research delimitation



This study was conducted on only 10 girl players from Penang volleyball team. The participants had to do the warm up sequence according to their own group for 6 weeks and do the physical tests at the end of the training.

1.9 Significant of study

This study is clearly to investigate the effect of warm up sequence on muscular strength and cardiorespiratory performance among female Penang volleyball team as an effectiveness warm up can stimulate the neuromuscular and increase the speed, agility and performance in athlete (Pasanen et al., 2009).





This study will provide insight idea whether the use of correct sequence of warm up can improve the muscular strength, cardiorespiratory performance and reduce fatigue level in general in short term. And, this can benefit the coaches, trainers and athletes in the volleyball team.

