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THE EFFECTS OF DYNAMIC WARM-UP PROTOCOL WITH THREE DIFFERENT LOADING SCHEMES ON SPEED AND POWER PERFORMANCE AMONG FEMALE VARSITY ATHLETES

NAJWA NAJIHAH BINTI MOHD ALUAI @ MOHD ALUWI

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DISSERTATION SUBMITTED IN FULLFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF EDUCATION (SPORT SCIENCE) (MIXED MODE)

FACULTY OF SPORTS SCIENCE AND COACHING
SULTAN IDRIS EDUCATION UNIVERSITY

2020

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ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah s.w.t for the strengths and His blessings in completing this thesis. This study will not be completed without the guidance of the lecturer, helps by friends and supported by my family.

1 would like to express my sincere appreciation and gratitude to my research supervisor, Dr Zulezwan Ab Malik for his guide, support, helpful advices and patience, and also provide knowledge about this topic. Thank you Dr Zulezwan Ab Malik for your time and kindness regarding this research although you was busy but manage to reschedule you time to me.

I want to thank the faculty of sport science and coaching for assisting me in some way throughout this process. Special thanks to the person that in charge for the equipment at Sport Science lab (UPSI).I want to thank all the lecturer for assisting me with the administrative tasks and knowledge that allowed me to complete this study, and the program. Thank you for those year teaching me in the class.

I would also like to thank those who have helped me in completing this research, either directly or directly. Especially thanks to my research team who always there when I need although they were busy with their class but still manage to cooperate with me.

Special thanks to my mom, Noor Hasimah Binti Abdul Majid @ Sidek, for supporting and loving me through this process, and encouraging me from an early age to pursue an education. You may not have fully understood this endeavour, but you knew I was attempting something important, and I appreciate your enthusiasm and excitement especially when I called and told you that I had finally completed my dissertation. Thank you for the financial support that you gave me to persuade this master study. Love you mom.

Also a big special thanks to my late father, Almarhum Mohd Aluai @ Mohd Aluwi Bin Daud. For those memories you gave me while i'm studying here in UPSI it will never vanish from my mind. Al-fatihah Mohd Aluai @ Mohd Aluwi Bin Daud. You will always in my heart.

Thank you to my husband Ahmad Khazmin Faiqal for his kindness and whose vision for life's possibilities kept me motivated down the stretch. Thank you for your endless love, prayers and encouragement. .

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Immense gratitude to Muhammad Arif Faiz and Muhammad Ammar Syukri, my brother both of you are the most supportive, loving, and intelligent human being I have ever met, and I am blessed to be able to celebrate this journey with you. My sister Husna Hazirah and Nur Alyaa Amirah, your clarity of spirit shined like a diamond through this process, and provided the light I needed to see this endeavor through to the end. Thank you for celebrating life with me. Sincere gratitude to my sister in law. I now have a better appreciation for well-written text.

Thank you to all my family members for the encouragement, nurturing, and good hearted ribbing about how long it has taken me to complete this process. You all showed your support at some point on this journey and I am grateful for that.

Last but not least, my sincere thanks to my beloved friend, you know who you are. Without their encouragement and support, I would not have to complete this research paper. And also my special thanks to all student UPSI athletes who involved as my respondents because their cooperation in this research study especially answering the lengthy questionnaires and exhausting fitness test. I would never been able to reach my goal without their continuous support. Thank you to all and May Allah SWT bless all of us.

Thank you,

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ABSTRACT

Dynamic warm-up is pre-exercise event which helps to prevent muscle cramp or injury due to over extension. However, the intensities used during dynamic warm up session can be manipulated using weighted vest. Hence, this study was conducted to determine the effects of dynamic warm-up protocol with three different loading schemes on speed and power performance among female varsity athletes. Forty female university athletes, age between 20-21 years old were recruited randomly. Participants were asked to perform general warm up before dynamic warm up with three different loadings; i) wearing weighted vest with 6% body weight (DV6), ii) wearing weighted vest with 12% body weight (DV12) and iii) not wearing weighted vest (D) in random order. Then participant were asked to perform vertical jump (VJ), standing broad jump (SBJ), and seated medicine ball toss (SMBT) and 20m sprint to measure the speed and power performance. The score were recorded and the data were analyzed using One-Way Repeated Measure Analysis of Variances (ANOVA). The result showed that there were significant difference of speed and power performance score when performing dynamic warm up with and without weighted vest (p<0.05). VJ, SBJ, 20m sprint test and SMBT showed a significant difference when compare DV12 and DV6 to D, with F(2,38)=18.39; F(2,38)=24.2; F(1.03,40.32)=1.83, and F (2, 38) =51.25,when p<0.05. There were no significant difference between DV6 and DV12 in all test except SMBT where p>0.05. As a conclusion, manipulating the intensity during dynamic warm up helps to improve speed and power performance especially when weighted vest with 12% body weight were used. In this research, vertical jump (VJ), standing broad jump (SBJ), seated medicine ball toss (SMBT) and 20m sprint performance enhanced about 8% , 6%, 10% and 5% after DV12, as compared with D. As implication of the study, weighted vest was proved to help the athletes and coaches as a part of their strategies to improve power and speed performance as the result showed the improvement beyond the intensity load.

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MENGKAJI KESAN PROTOKOL PEMANASAN BADAN SECARA DINAMIK DENGAN TIGA BEBAN YANG BERBEZA KE ATAS PRESTASI KELAJUAN DAN KUASA DALAM KALANGAN ATLET WANITA UNIVERSITI

ABSTRAK

Pemanasan badan dinamik merupakan pra-senaman untuk mengelakkan kejang otot atau kecederaan akibat lebih lanjutan persediaan fizikal sebelum melakukan aktiviti fizikal termasuk bersenam. Namun demikian, intensiti yang digunakan ketika pemanasan badan dinamik boleh dimanipulasi dengan menggunakan jaket bebanan. Justeru, kajian ini telah dijalankan untuk mengenalpasti kesan protokol pemanasan badan dinamik dengan tiga skema bebanan terhadap prestasi kelajuan dan kuasa dikalangan atlit universiti wanita. Empat puluh atlit universiti wanita telah terlibat secara sukarela berumur antara 20 dan 21 tahun. Para peserta diminta untuk melakukan pemanasan badan sebelum melakukan pemanasan badan dinamik dengan tiga bebanan yang berbeza i) memakai jaket bebanan dengan 6% berat badan; ii) memakai jaket bebanan dengan 12 % berat badan dan iii) tidak memakai jaket bebanan, secara rawak. Seterusnya peserta diminta untuk melakukan ujian lompat menegak (VJ), lompat mendatar (SBJ), lontaran *medicine* ball sambil duduk (SMBT) dan ujian lari pecut 20m untuk mengukur prestasi kelajuan dan kuasa. Skor ujian telah direkodkan dan data telah dianalisis menggunakan *One-Way Repeated Measure Analysis of Variances* (ANOVA). Hasil kajian menunjukkan terdapat perbezaan yang ketara pada prestasi kelajuan dan kuasa apabila peserta melakukan pemanasan badan dinamik dengan menggunakan jaket bebanan dan tidak menggunakan jaket bebanan (p>0.05). VJ, SBJ, lari pecut 20m dan SMBT menunjukkan perbezaan yang ketara apabila perbandingan dibuat antara DV12 dan DV6 dengan D, $F(2,38)=18.39$; $F(2,38)=24.2$; $F(1.03,40.32)=1.83$, *dan* $F(2, 38) =51.25$ (p>0.05). Tiada perbezaan yang ketara antara DV6 dan DV12 pada setiap ujian yang dijalankan kecuali SMBT apabila p>0.05. Kesimpulannya, dengan memanipulasiakan intensiti ketika melakukan pemanasan badan dinamik dapat membantu meningkatkan prestasi kelajuan dan kuasa terutamanya apabila jaket bebanan 12% berat badan digunakan. Dalam kajian ini, prestasi ujian lompat menegak (VJ), lompat mendatar (SBJ), lontaran medicine ball sambil duduk (SMBT) dan ujian lari pecut 20m melompat meningkat kira-kira 8%, 6%, 10% dan 5% selepas DV12, berbanding dengan D. Sebagai implikasi kajian, penggunaan jaket bebanan terbukti membantu atlit dan jurulatih sebagai sebahagian strategi untuk meningkat prestasi kuasa dan kelajuan kerana hasilnya menunjukkan peningkatan selari dengan bebanan yang ditambah.

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LIST OF ABBREVIATIONS

D	Dynamic warm-up
DV6	Dynamic warm-up with vest load 6% of body weight
DV12	Dynamic warm-up with vest load 12% of body weight
SBJ	Standing broad jump
SMBT	Seated medicine ball toss
UPSI	Universiti Pendidikan Sultan Idris
VJ	Vertical jump

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CHAPTER 1

INTRODUCTION

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1.1 Background of study

Physical abilities are the most fundamental aspects that are important to be developed among athletes. Currently, a lot of sources can be referred to search for the training methods to enhance physical abilities. Physical abilities includes components such as muscular strength, speed, power and muscular endurance. Various protocols of training exists through a lot of researches that had been conducted over the decades. Physical abilities can be improved for a specific, shorter of time (acute) or long lasting, longer time (chronic).

Warm up as pre-exercise event have been introduced to acutely increase physical/sports performance. There are many benefits of warm up activities such as may

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help to prepare the body for exercise, increase core temperature and blood flow (Erkut, Gelen, & Sunar, 2017). Meanwhile, according to Sampaio-Jorge et al. (2014), warm-up is effective to avoid injuries while at the same time can stretch the muscle. Young (2007) argued that 0.5 to 2.0 minutes is the total duration per muscle group for a typical warm-up before performing any physical training. Thus, by doing warm-up before main activities will drive them getting virtuous performance during training or competition while reduce risk of injuries (Harmanci, 2014; Sotiropoulos et al., 2010). In sport, the body need to be physically and mentally prepared for the core activity after the warm-up to enhance the performance of the activity that going to be done and reduce the risk of injuries while doing those activities.

Warm-up with dynamic movement might generate an optimum condition for power production by increasing neuromuscular function (Faigenbaum et al., 2006). Inefficient muscle movement and overstretch the inflexible muscle are most common case that happen during intense activities because of an unreadily muscle to contract immediately in fast tempo (Witvrouw, Danneels, Asselman, D'Have, & Cambier, 2003). Dynamic methods can be made up of numerous forms of exercises. Recently dynamic warm up has been an attention, because numerous research have shown that it increase the performance of fitness components such as jumps event, sprints either short or long, muscle endurance, muscle strength, time reaction and flexibility (McMillian, Moore, Hatler, & Taylor, 2006). Dynamic warm-up consists of exercise and it is prone toward stimulating countless cardiovascular and metabolic changes compared to static stretching (Bishop, 2003). According to Samson, Button, Chaouachi, and Behm (2012), by implementing

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dynamic warm up as part of pre-exercise event, power, sprint and jump performance were reported to be improved.

Intensity is a component of any activities or exercise. Intensity during training depend on the training objective. Load, frequency or duration can influence or be influenced by the intensity of training (Bompa & Buzzichelli, 2015). For instance, using some load to increase the intensity of warm up. Studies displayed that there is serious advantage over either no activity, no stretching and sub maximal exercise by adding loaded vest that consist of 10% of body mass while exercising. This showed the advantage of using load as the intensity of warm up. By doing 5-30 minutes warm up session are enough because the session doesn't take too long to avoid fatigue and boredom (Harmanci, 2014). The probability of a weighted resistance with dynamic warm-up protocol might give better outcome in power improvements and might ensure significant effects for capable physical instructors with other specialists which usually inspire undeveloped sport person to participate in variation of warm-up activities before the pre-event or event (Faigenbaum & McFarland Jr, 2007; Faigenbaum et al., 2006). In warming-up protocol the efficiency come in variation of mechanisms and post activation potentiation (PAP) is one of the well-known mechanism in the warm-up protocol. Sport or activity that involve endurance, speed and power usually can be improved by the PAP stimulation (Tahayori, 2009). By performing active stretching either in short duration, it can help to manipulate the activation of PAP mechanisms because of the muscle history dependent on increasing the muscle activation. To manipulate load for warm-up, weighted vest can be one of equipment. The intensity of warm-up can be increased by increasing the load of weighted vest. By using weighted vest,

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the duration of warm-up can be reduced because of the manipulation of load can faster the stimulation for body to be prepared earlier. Therefore, with the short duration of time athletes can warm up with optimum intensity. This will give benefit to the athlete. In order to increase the intensity of warm-up activity, the weighted vest will be filled up by plate or other objects to increase the load.

Dynamic activity was known as the best warm-up protocol as it able to activate and increase most of the body needs such as the motor unit recruitment, kinesthetic changes and body core temperature (Tahayori, 2009). This will lead to the activation of PAP. The outsized dissimilarities of sport performance can be known in physical characteristics such as the age and type of athlete. Meanwhile the sport characteristics should also be emphasized such as the type of training because different sport has different need and training durations which mean different warm-up strategies could give different effect to the sport performance (McMaster, Gill, Cronin & McGuigan, 2014). Studies showed that dynamic warm-up has become the methods of choice due to its ability to cause increases in subsequent performance in sport (Behm & Chaouachi, 2010; Holt & Lambourne, 2008; McMillian, Moore, Halter, & Taylor, 2006).

The surge created a new era where the possibility of a dynamic warm-up protocol with load could upshot greater gains in power production and could have important implications for many individuals, sports bodies, physical trainers and other professional individuals.

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1.2 Statement of problem

Although many researches had supported the effectiveness of dynamic warm up, not much studies had compared the intensity to be used during the dynamic warm up activities. The effectiveness of dynamic warm up will be thoroughly understood if a deeper study been conducted on comparing the intensities used. The effects of various intensities can be positive, negative or both and there might be influenced by other factors such as individual and intermittent sports. Warm up using weighted vest is one of the ways to manipulate the intensity of warm up. Fradkin et al., (2010) stated that the variance effect of warm up was related with unsuitable activity in warm up or intensity which lead to the unsuccessful result. A dynamic warming-up protocol with weighted vest as resistance may result in a better performance. However, more researches are needed to confirm this. Due to not much studies been conducted, this study will look into the effects of different intensity used during warm up by using weighted vest on physical performance.

1.3 Purpose of study

This research was conducted to determine the effect of dynamic warm-up protocol intensity among university female athletes. Dynamic warm-up protocol can be influenced by several external factors. For example type of sport, type of body part or intensity of sport which all have an impact on how dynamic warm-up protocol can be effective. The purpose of this

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study was to determine and compare the effects of different intensities of warm up with weighted vest on speed and power performance among female varsity athletes.

1.4 Research objective

Main objective:

The main objective of the study was to determine the effects of dynamic warm-up protocol intensity of university female students.

Specific objectives for the present study as follow:

i) to determine and compare the effects of dynamic warm-up protocol between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D) on vertical jump (VJ) performance.

ii) to determine and compare the effects of dynamic warm-up protocol between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D) on standing broad jump (SBJ) performance.

iii) to determine and compare the effects of dynamic warm-up protocol between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D) on seated medicine ball toss (SMBT) performance.

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iv) to determine and compare the effects of dynamic warm-up protocol between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D) on 20m sprint performance.

1.5 Research hypothesis

The following are the formulated null-hypothesis (HO).

i) There is significant differences of VJ performance between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D).

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ii) There is significant differences of SBJ performance between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D).

iii) There is significant differences of SMBT performance between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D).

iv) There is significant differences of 20m sprint performance between wearing weighted vest with 6% body weight (DV6), wearing weighted vest with 12% body weight (DV12) and not wearing weighted vest (D).

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1.6 Theoretical Framework

This study utilized a crossover design that include three different war-up intensities; i) wearing weighted vest 6% of body mass (DV6), wearing weighted vest 12% of body mass (DV12) and without wearing weighted vest (D). All the independent variables were compared of their effects on physical performances that consist of speed, upper body power and lower body power. Figure 1.1 showed the conceptual framework of the research.

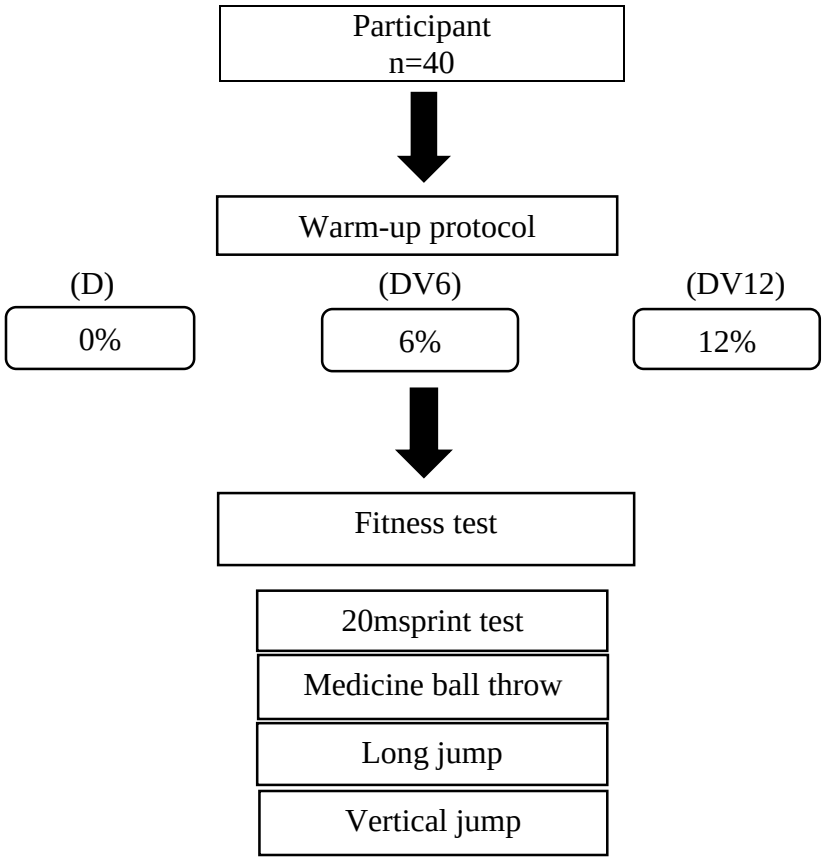

Figure 1.1: Conceptual framework of Research

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1.7 Importance of Research

The significance of the proposed study were as follows:

i. Participant in this study will gain knowledge on what effect of warm up that increase performance among university female student.

ii. Coaches can use this outcome as new guideline to prepare their athletes prior to perform their events.

iii. As athletes, every single aspect must be taken as importance thing in order to get better performance.

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iv. Fitness instructor can recommend to their client on which type of warm-up should they follow in order to increase performance.

v. This study may help coaches to implement an efficient warm-up on training and games. Also to determine the proper volume of weighted vest on warm-up to improve performance.

vi. Data obtained can be used to choose the right or the best volume for athletes in team sports and individual sport.

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vii. This study can provide knowledge and skills to the coach to design more effective training to improve athlete's performance in physical fitness, and also to determine the optimum weight to be used in order to increase performance.

1.8 Limitations

Limitation can be defined as an aspect of a research study that the researcher cannot control, also the weaknesses of the study and maybe give negative effects to the result. The faults in this study could be:

i. The motivation of the participant to do the test.

ii. Some of the subjects may not take the test seriously. This can affect the result of the study.

iii. Some of the subjects may not cooperate in the test as different individual possesses different attitude and behavior.

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1.9 Delimitations

Delimitation can be defined as characteristics specified by the researcher that define the scope of the research study, effecting "fencing it in". The characteristics that involve in this study;

i. This investigation focus on the female athlete in Universiti Pendidikan Sultan Idris, Perak.

ii. All respondent are between 18-26 years old.

iii. Subject must be have normal BMI.

iv. Subjects should not have any injury either from upper and lower extremity 6 months prior to data collection.The researcher also assumes that commitments will be given by them during the test.

v. The load for the warm up are delimited 0%, 6% and 12% of body weight.

vi. Subjects who were taking part regularly in a strength and conditioning program should not increase the intensity, volume, or frequency of their program during the protocol period.

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vii. Subject who participate should not take any of dietary supplements either caffeine or creatine in past month and subject should not dehydrate as it can affect the performance.

1.10 Operational Definition

1.10.1 Dynamic warm-up

Warm up that was done in a dynamic or in motion. It is done before performing main activities. Warm up help to prevent muscle soreness and injury. Another benefit of dynamic warm-up is enhanced physical performance (Herbert & Gabriel, 2002)

1.10.2 Physical performance

Level of physical ability to do certain task or activities. It consists of power performances in lower and upper body. Physical performance currently used in individual's characteristics such as size, shape, sex, age while for fitness component has five elements such as strength, speed, endurance, flexibility, and skill. The different between sport and level of participant affecting the training time. Moreover, by delaying the onset of fatigue a certain extent skill can compensate for poor fitness, yet will improved fitness which allows skilful athletes to extend their performance (Williams, 1994).

1.10.3 Weighted vest

Equipment that used to manipulate intensity of warm up that consist of 0%, 6%, and 12% of body weight.

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1.10.4 Dynamic stretching

The active range of motion for a joint that involves controlled movement (Fletcher, 2010).

1.10.5 Standing broad jump

The standing broad jump is used to characterizes an explosive type of movement, that will associates well with other varieties of explosive movement it measure the explosive power of the legs (Koch et al., 2003)

1.10.6 Vertical Jump Performance

The maximal height an athlete can achieve, in inches, on a double-leg takeoff vertical jump. Vertec is used to measure the jump, or jump mat, which is to measure vertical jump height in specifically (Knudson, Bennett, Corn, Leick, and Smith, 2000).

1.10.7 Seated Medicine Ball Toss

The seated medicine ball toss test is an effective and consistent test for assessing explosive power of upper body (Harris et al., 2011).

1.10.8 20m Sprint

The 20m sprint test is to assess the athlete's sprint acceleration (Zacharogiannis, Paradisis, & Tziortzis, 2004).

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1.11 Summary

The intention of the research is to know the effect of dynamic warm-up protocol with different intensities using weighted vest on fitness performance among varsity female athletes. Appropriate and prime effect of warm up can be the compensations on fitness and sports performance but lack of study that clearly stated the suitable intensity of warm up in order to get better performance.

The research objective were regarding the intensity of the warm-up that manipulated by the load of the weighted vest. While, the hypothesis were either there were significant between those intensity or no significant. The framework clearly stated the weighted vest has different load that consist of 0% of body weight, 6% of body weight and 12% of body weight. Using 40 female athlete that underwent 3 sessions based on the intensity that were set by utilize a crossover design and perform 4 instruments to measure the sport performance which is vertical jump, standing broad jump, seated medicine ball and 20 meter sprint.

Yet, the usage of weighted vest can be one of the ways to make warm up as the positive factor to performances as the weighted vest can manipulated intensity of warm-up while shorter the duration of warm-up session.

While doing the exercise such as running, walking, agility and quickness drill the purpose of a weighted vest with added extra weight for body will be the main reason to

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improve the performance. So that, the performance for these exercise can be increased by adding extra weight. When it comes to performance, to generate more force against the ground, and can lead to improvements in strength, power, and acceleration during running, as well as increased strength and efficiency during speed, power, and agility drills. The result from this study can be useful for many persons such as coaches, athletes and same goes to the participant. So, from this study, they will know whether the additional resistance in warm-up can contribute to better result and improve performances. When all of this aspect is taken care, sports performances can be improved.

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