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WELCOME

Dear colleagues and friend,

On behalf of the School of Sport Sciences, Surabaya State University, I have the honor to announce Surabaya as host city of the International Seminar of Sport and Exercise Science (ISSES), entitled "Sport and Exercise Science for Sport performance and Health Enhancement. Herewith I welcome academicians and Students of Physical Education and Sport Science from any regions in Indonesia on October 21st and 22nd, 2014. This is the first time the School of Sport Science Surabaya State University organizes an International Seminar, and I hope it will provide great opportunity to promote and develop Sport Science through networking, study, and research.

I hope in the future this kind of event would be under the patronage of the Ministry of Youth and Sport. I would like to express gratitude to the guest speakers of this seminar, namely: Prof Dr Supranee Kwanboonchan from Srinakharinwirot University, Thailand, Prof Dr Lim Boon Hooi from University of Malaya, Malaysia, Prof Dr Koh Koon Teck from Nanyang Technological University, Singapore, Prof Dr Chia Hua Kuo, Dean of Research, Taipei University, Taiwan, and Dr Gregory J Wilson, from The University of Western Australia, Sport Consultant of Indonesian Olympic Committee.

We are confident that you will enjoy the whole conference experience, sharing knowledge and ideas, and eventually make contributions to the advancement of Sport and Exercise Science.

Organizing Committee Chairman,

Prof Dr Soetanto Hartono, DDS, MSc

ANTHROPOMETRIC AND PHYSICAL FITNESS CHARACTERISTICS OF MALE JUNIOR TAEKWONDO ATHLETES

Nining Widyah Kusnanik

State University of Surabaya

ABSTRACT

Taekwondo is one of the martial art rooted from Korea. Taekwondo is also as one of the combat sport that has been competed in Olympic games. The purpose of this study was to analyze anthropometric and physical fitness characteristics of the male junior taekwondo athletes at the Centre of Training and Education for Students (PPLP) in Medan Indonesia. This research was conducted on 9 male junior athletes PPLP Medan North Sumatera. Data was collected by measuring some physical and testing some physical fitness components of the athletes. Those data were taken from height and body mass for anthropometrical measurements; vertical jump for explosive power testing, shuttle run for agility testing, VO2 max for capacity aerobic testing; stork stand test for balance testing, sit and reach for flexibility testing, push up for hand muscles strength testing of physical fitness. Data was analyzed by using mean and standard deviation. Results of this research showed that the average of anthropometrical measurement on height and body mass were $165,44 \pm 0,05$ cm and $51,22 \pm 9,13$ kg. Mean of vertical jump and shuttle run of the athletes were $48 \pm 5,22$ cm and $3,97 \pm 0,24$ seconds. Mean of VO2 max of the athletes in this study was $45,94 \pm 5,43$ ml/kg/min. Mean of stork stand test, sit and reach, and push up of the athletes were $30,67 \pm 22,96$ seconds for right leg, $35,90 \pm 16,06$ seconds for left leg, $21,17 \pm 5,87$ cm, and $24,0 \pm 4,85$, respectively. The conclusion of this research showed that the athletes tended to have slightly less proportional for their anthropometrical, high anaerobic power, less aerobic capacity, less in balance but they were good in flexibility and hand muscles strength for their physical fitness.

Keywords: , anthropometrical, physical fitness, male junior athletes, taekwondo

INTRODUCTION

Nowadays, Taekwondo has been competed in a modern Olympic Games. Actually, Taekwondo rooted in an old Korean martial art. Taekwondo has significant developed as a combat sport that it was started with the foundation of the World Taekwondo Federation (WTF) in 1973. Recently, this Korean martial art exists in two forms under the control of two organizing bodies, the World Taekwondo Federation, which accentuates sports competition and performance, and the International Taekwondo Federation (ITF), which advocates for a more traditional form of Taekwondo (Markovic G, et al, 2005).

Taekwondo athletes need to have a good not only on anthropometric but also physical fitness in order to support their performances during the competition. Bridge et al (2014) reported that the physical and physiological demands of modern day competition require athletes to be competent in several aspects of fitness. This review critically explores the physical and physiological characteristics of Taekwondo athletes and presents implications for training and research.

There are some research that have been conducted relating to anthropometric and physical fitness of Taekwondo athletes in many countries in the world. Cassolino et al (2012) have done research about physiological versus psychological evaluation in Taekwondo elite athletes. This research was conducted on 5 national Italian athletes and 20 elites Italian black belt athletes. They reported that session RPE and [La] seem to be more effective than psychological measures in discriminating between elite Taekwondo athletes. Evaluation of mood could be effective in monitoring athletes' response to national training.

In addition, Zen-Pin and Ryder (2008) conducted research about the study of physiological factors and performance in welterweight Taekwondo athletes. This study was conducted on 10 Taekwondo athletes from a Division 1 University. They stated that to recover the rest state more time and improve intensive training in the blood lactic acid system and power output.

Furthermore, Markovic et al (2005) conducted research about fitness profile of elite Croatian female Taekwondo athletes. This study was conducted on 13 national Taekwondo champions. They stated that the performance of Taekwondo female athletes primarily depends on the anaerobic alactic power, explosive power, expressed in the stretch-shortening cycle movements, agility and aerobic power.

Anthropometry is the study of measurement of the human body in terms of the dimensions of bones, muscles, and adipose tissue. The first two measurements taken in the anthropometric profile, that is height and body mass (Norton and Olds, 2000). Height is one of key determinant for success in some of sports including Taekwondo. In Taekwondo, small increases in body mass significantly impact on performance and categories of fighting.

Physical fitness is important for the Taekwondo athletes in order to have better performance. There are some components of physical fitness including strength, endurance, flexibility, speed, explosive power, agility, and balance. Strength is defined as the maximum muscular force which can be exerted in a single effort; flexibility is defined as the range of motion at a joint or series of joints (Roberts, 1991). Strength is required in Taekwondo especially in legs and hands muscles. The performance of Taekwondo athletes relies heavily on the adenosine triphosphate phosphocreatine pathways and glycolytic pathways, such as repetitions efforts of fast

attacks and/or counterattacks. Vertical jump one of the physical fitness test that is an established measured of explosive or anaerobic power of the lower limbs and hips. $VO_2\text{max}$ is generally agreed to be the best indicator of maximum aerobic power.

Although some research have been investigated in anthropometric and physical fitness of Taekwondo athletes in some countries, however, in Indonesia those details are rare. Therefore, the purpose of this research was to analyze anthropometric and physical fitness characteristics of the male junior taekwondo athletes at the Centre of Training and Education for Students (PPLP) in Medan Indonesia.

METHODS

The research was conducted on 9 males junior athletes PPLP in Medan North Sumatera Indonesia. Data of anthropometrical measurement and physical fitness have been collected at the indoor arena. Anthropometrical measurement were taken from height (cm) and body mass (kg) of the athletes using stadiometer. During the measurement, all athletes wore t-shirt and shorts with no shoes. Physical fitness characteristics were tested by using vertical jump for explosive power testing, shuttle run for agility testing, $VO_2\text{ max}$ for capacity aerobic testing; stork stand test for balance testing, sit and reach for flexibility testing, and push up for testing of hand muscles strength. Vertical jump was tested by using Sergeant Jump. $VO_2\text{ max}$ was tested by using 20m shuttle run test/multistage fitness test. Data was analyzed and reported as Mean $\pm$ Standard Deviation ($X\pm SD$).

RESULTS AND DISCUSSION

The results of the study showed that the mean value for height and body mass of the athletes in the present study were $165,44\pm 0,05$ cm and $51,22\pm 9,13$ kg,

respectively. The mean of vertical jump and shuttle run of the athletes were $48\pm5,22$ cm and $3,97\pm0,24$ seconds. The Mean of VO2 max of the athletes in this study was $45,94\pm5,43$ ml/kg/min. The mean of stork stand test, sit and reach, and push up of the athletes were $30,67\pm22,96$ seconds for the right leg, $35,90\pm16,06$ seconds for the left leg, $21,17\pm5,87$ cm, and $24,0\pm4,85$, respectively. Mean values for anthropometric and physical fitness of the study were presented in Table 1.

Table 1. Mean values for anthropometric and physical fitness of the study

Components	Mean $\pm$ SD
Anthropometric:	
- Height (cm)	$165,44\pm0,05$ cm
- Body Mass (kg)	$51,22\pm9,13$ kg
Physical Fitness:	
- Vertical Jump (cm)	$48\pm5,22$ cm
- Shuttle Run (seconds)	$3,97\pm0,24$ seconds
- VO2 max (ml/kg/min)	$45,94\pm5,43$ ml/kg/min
- Stork Stand Test (seconds):	
• Right Leg	
• Left Leg	
- Sit and Reach (cm)	$35,90\pm16,06$ seconds
- Push Up (times)	$35,90\pm16,06$ seconds
	$21,17\pm5,87$ cm
	$24,0\pm4,85$ times

From the Tabel 1 above, it can be seen that body size of the male junior Taekwondo athletes in the present study were slightly less proportional. These athletes need to increase their body mass for about 3-5 kg. This athletes were shorter and lighter compare to the Division 1 University (height $174,6\pm2,8$ cm; body mass

63,6±1,4 kg) reported by Zen-Pin and Ryder (2008). It might be because the athletes in the present study were approximately 4 years younger than reported on the literature review.

The male junior Taekwondo athletes in the study were found to have good anaerobic power. Bridge et al (2014) reported that Taekwondo athletes demonstrate high peak anaerobic power characteristics of the lower limbs and this attribute appears to be conducive to achieving success in international competition. The ability to generate and sustain power output using both concentric and 'stretch-shortening cycle' muscle actions of the lower limbs may be important to support the technical and tactical actions in combat.

The mean value of VO₂ max of the athletes in the present study needs to be improved to moderate to high level of cardiorespiratory fitness. VO₂ max is important to support the metabolic demands of fighting and to facilitate recovery between consecutive matches (Bridge et al, 2014). The hand muscles strength of the athletes in this study can be categorized good. Taekwondo athletes need to have high dynamic strength in order to support their performance especially kicking and punching. The flexibility of the athletes in the present study has a good flexibility. The dynamic nature of the technical and tactical actions in the sport demand high flexibility of the lower limbs (Bridge et al, 2014). Balance is important for Taekwondo athletes in order to support their ability to stand with one leg while they kicking their opponent. Therefore, Taekwondo athletes should have a better balance in order to have advantages during their performance. To be a champion in Taekwondo, athletes need to have not only good in technical, tactical, and psychological, but also anthropometric and physical fitness. It should be considered by Taekwondo coaches in order to give them into training program.

CONCLUSION

The conclusion of this research showed that the male junior Taekwondo athletes in this study tended to have slightly less proportional for their anthropometrical, high anaerobic power, less aerobic capacity, less in balance but they were good in flexibility and hand muscles strength for their physical fitness. Although there are some research have been done related in anthropometrical and physical fitness of Taekwondo athletes in some countries, there has been limited research that have been conducted and reported in Indonesia. Therefore, more extensive reserach is strongly recommended in anthropometrical and physical fitness of characteristics of Taekwondo athletes in Indonesia in order to extend existing knowledge as well as to dercribe the caharacteristics of strength and conditioning of Taekwondo athletes at different populations.

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