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A SURVEY OF THE PHYSICAL FITNESS OF THE MALE TAEKWONDO ATHLETES OF THE IRANIAN NATIONAL TEAM

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Abstract. *Performing exercises at a satisfactory level depends on physiological, anthropometric, psychological factors. These factors are found in many of the models which are used to analyze the performance in different exercises. The precondition for any progress is having physical abilities. Knowing the anthropometric and physiological characteristics of players in each type of exercise is the most important and effective factor in their performance.*
The purpose of this study is to survey the physical fitness of male Taekwondo athletes of the Iranian national team during the period from 2001 to 2005. This research is of the descriptive type. For this purpose we have examined members of the national team during the period from 2001 to 2005, as a static society. The national team is composed of 10 member each year (N=10, M age=21 SD=1.78, M height= 172.06 SD= 4.68). Different factors of physical fitness and anthropometric characteristics were studied. Our findings show that the best records were registered during the year 2001 and 2002, while the worst ones were registered in 2005. Despite these facts, the fitness of the national team during these years has decreased.

Key words: *physical fitness, male Taekwondo athletes, national team*

INTRODUCTION

Understanding the anthropometric and physiological characteristics in every field is an important, determining and influential factor in the performance of athletes. Being aware of these characteristics is important for comparing an athlete's results to his previous results and to the results of other athletes, in addition to finding weaknesses and their

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removal, and finally deciding on the correct design of exercise programs. Achieving the optimum athletic performance and best position in sport requires athletes who possess special anthropometric and physiological characteristics, as well as using scientific exercise programs and having access to sport sciences experts and to enough facilities.

On the other hand, a lack of a deeper understanding of the education of elite athletes, in addition to not paying attention to their personal differences, may lead them to choose sports which are not compatible with their physical characteristics and abilities. Theoretically speaking, being aware of the anthropometric and physiological characteristics of an elite athlete will pave the way for his success. Of course, there are several factors which influence the achievement of the best athletic performance, including, without doubt, physical and physiological abilities. Although every athlete, for his optimum performance, needs to be in possession, to a certain degree, of features such as explosive power, agility, speed and other physical and physiological abilities. A sport which requires each of these features is certainly Taekwondo, which demands special physical characteristics for success. Taekwondo at an advanced level requires that an athlete have certain abilities. The origins of the Korean martial art of Taekwondo go back 1500 years. Originally, Taekwondo was taught for warfare, self-defense, and physical fitness. Over the centuries, the martial art forms have spread throughout the world. Today, an estimated 75-120 million children and adults worldwide participate in martial arts with an estimated annual growth rate of 20-25% (Birrer, 1996). Taekwondo is practiced in over 140 countries around the world and 120 nations are official members of its major organization, the World Taekwondo Federation (WTF). Taekwondo reached the Olympic stage as a demonstration sport in the 1988 Seoul Olympics and the 1992 Barcelona Olympics. It became an official Olympic sport in the 2000 Sydney Olympic Games. Taekwondo, renowned for its high and fast kicks, was developed as a technique used by Korean peasants to dismount their attackers who rode on horseback. In a competition, kicks and punches score points when contact is made with the torso (by punches and kicks) or the head (only by kicks), which is sufficient to displace that particular part of the body. A match can be won by a knockout or by points. While punches to the head are not permitted, kicks to the head and face are allowed. Research studies related to Taekwondo have tended to concentrate on injury rates (Beis et al., 2001; Chuang and Lieu, 1992; Philips et al., 2001; Pieter et al., 1998a; Pieter and Lufting, 1994; Serina and Lieu, 1991; Zemper and Pieter, 1989). Studies have been conducted on the epidemiology of trauma, which is supposed to be related to skill level, gender, weight, age, technique, the body part, situation, and years of experience (Beis et al., 2001; Philips et al., 2001; Pieter et al., 1998b; Pieter and Lufting, 1994; Zemper and Pieter, 1989). However, very little research has been conducted in the area of performance in the martial arts, and how it might relate to anthropological variables such as body weight. Kules (1996) examined the impact of anthropometric variables on the judo performance of female judokas. Kules (1996) established that body weight, the circumference of the extremities, skin folds on the upper arm and back and height were identified as important determinants of performance. Anthropological studies have also been carried out in other sports, including gymnastics, volleyball, basketball, rock climbing, swimming, freestyle wrestling, and ten-pin bowling to mention a few (Callan et al., 2000; Cleassens et al., 1999; Khosla, 1984; Tan et al., 2000; Toriola et al., 1987; Watts et al., 1993; Yamamura, 1999). The majority of these studies have found that, in each sport, elite athletes fit a certain physical or anthropometric profile. One study concluded that the lack of 'proper physique' (which was not defined by the authors) could

hinder successful sport performances at the Olympic level (Toriola et al., 1987). Toriola et al. (1987) found that the differences they observed between their groups of athletes were related to morphological factors that influenced the basic components of a competitive sports performance.

The researchers found that the percentage of body fat in five elite athletes was relatively low compared to average athletes (Gao et al., 1998). Gao et al. (1998) concluded that because aerobic ability is very important in Taekwondo, reducing the percentage of body fat and increasing lean body mass are needed to gain the highest possible VO2max. In contrast, Melhim (2001) found no significant differences in either resting heart rate or aerobic power after training; however, significant differences were observed in anaerobic power and anaerobic capacity. Marković et al. (2005) examined the differences between successful and less successful Croatian national Taekwondo champions and found that successful athletes achieved significantly higher maximum running speed, a significantly higher ventilator anaerobic threshold at a significantly lower heart rate, significantly higher explosive power, anaerobic alactic power and lateral agility, a somewhat lower percentage of body fat (2.3%), and were slightly taller (by 5.8 cm) than less successful athletes. On the other hand, other researchers (Callan et al., 2000; Cleassens et al., 1999; Gao, 2001; Gao et al., 1998; Heller et al., 1998; Khosla, 1984; Tan et al., 2000; Toriola et al., 1987; Watts et al., 1993; Yamamura, 1999) agree that the possession of specific anthropometric qualities alone cannot guarantee a gold medal. Success in competition is indeed the result of a combination of physical attributes, talent, skill, technique, determination, strategy and psychological preparation. Many of these qualities have not been investigated among elite WTF Taekwondo athletes.

Clearly, physical fitness is one of the main factors for an athlete's success. It has been shown that a high level of the elements of physical fitness such as cardiovascular endurance, muscular strength and endurance, flexibility and speed is useful and effective in achieving success in different sports. Nowadays, before being sent to competitions, teams are given a test for the evaluation of the physical status of their members. The Iranian National Taekwondo Team follows the same rules and the Center of Physical Capability Assessment of the National Academy is responsible for this evaluation. In this sport, movement speed, reaction speed, jumping power and anaerobic power plus some anthropometric characteristics play an important role in performance. In recent decades, our athletes' performances have improved remarkably.

Sportsmen are eager to discover the relationship between his characteristics and performance abilities so that he can find the strengths and weaknesses which affect their performance. One of the important factors in making Taekwondo competitors successful is suitable static and dynamic balance. Given that, during many kicks, a Taekwondo competitor should put his center of balance on one foot; the lack of suitable balance will make him fall down. In their research, Heler et al. (1995) showed that the anaerobic power and capability of successful Taekwondo athletes are, if not more, then as great as those of professional anaerobic athletes. Bompa (1999) argued that the start of a certain technique by one competitor will make any effective movement of his opponent impossible. Therefore, Taekwondo competitors should be able to react quickly and powerfully against the attacks of the opponent. According to Bomp, this kind of behavior should last throughout the entire competition. Both aerobic and anaerobic systems should be used (Bompa, 1999). Cho (1988) investigated the physical performance of 3 - 8 children of 5 or 6, 6 months before and after Taekwondo exercises and found that muscular and explo-

sive power, flexibility, muscular endurance, reaction time and the amount of skin fold fat play an important role in success in Taekwondo. Heler (1989) mentioned that elite martial art requires excellent physical ability, speed and power. Discovering anthropometric and physiological characteristics plus the proper planning of exercises and discovering talents, strengths and weaknesses are some of the important factors in preventing the waste of resources, as well as in studying the fields where these factors seem to be necessary.

The ever-increasing progress of science and also the particular importance of physical fitness, as emphasized by sports experts, have an effect on the optimum performance of Taekwondo skills. We have decided to investigate the status of physical and anthropometric characteristics of the fitness of Iranian male Taekwondo competitors so that coaches, by taking this fundamental information into account, in addition to the personal differences among athletes as well as the differences in their performances, can prepare and calculate specific plans for the selection and preparation of athletes. Unlike most sports in which much investigation has been done to determine the relationship between these characteristics, Taekwondo has been the subject of very few studies. Regarding the importance of the factors mentioned above and their effect on the performance of Taekwondo skills, in addition to the lack of a comprehensive study in this field, the present study seems to be necessary.

METHODS

In this descriptive study, we compared the results of practical tests done by athletes who, from 2001 to 2006, were invited to the Taekwondo National Team Camp. We then specified any possible changes in the status of their physical fitness. All the results were written on some registration cards, each of the members being assigned a card. The data collected was based on the tests done by all of the male Taekwondo athletes invited to National Team Camp from 2001 to 2006. Here, all male Taekwondo athletes, members of the National Team from 2001 to 2006 were studied, and it was decided that they would be the research population. Each year, our Taekwondo team is made up of 10 people.

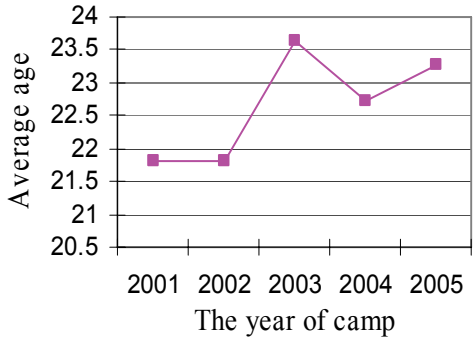
In order to carry out the research, coordination with the Assessment Center of the National Olympic Academy was necessary. Having provided them with the description and implications of the study, we received the necessary information to evaluate the competitors' physical fitness in terms of speed, flexibility, reaction and anthropometric characteristics such as age and height.

Using descriptive statistics, we measured the indexes of distribution and central tendency. Then, we compared the means to see whether or not there is any significant difference between them.

RESULTS

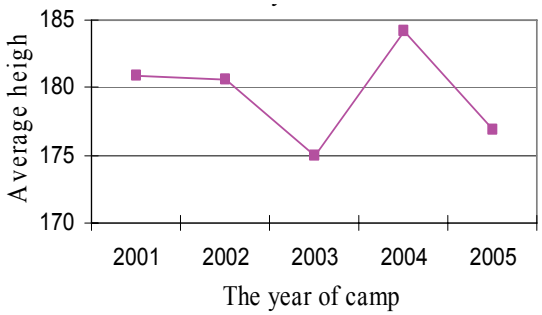
1 – According to Table 1, which shows the average age of the athletes who were invited to the National Team Camp, it can be said that the group in 2002 was the youngest and the one in 2003, the oldest.

Table 1. Average age of players at different years



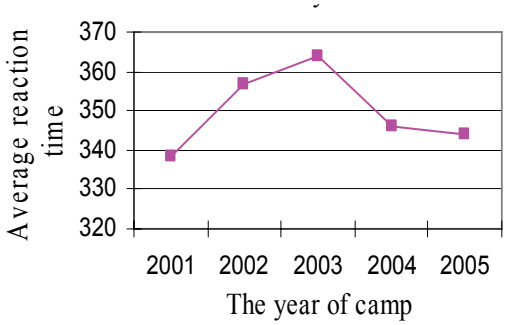
2 – According to Table 2, which shows the average height of the athletes, it is clear that the highest height average was in 2004, and the lowest one was in 2003.

Table 2. Average height of players at different years



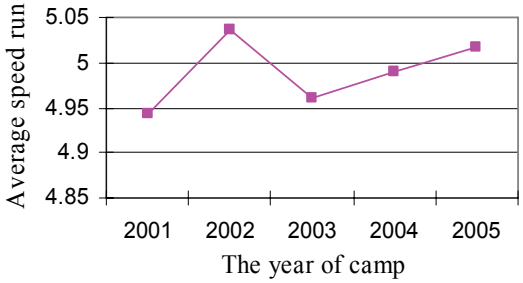
3 – According to Table 3, which shows the average reaction time of the athletes, it can be said that the highest score was in 2001 and the lowest in 2003. However, during 2003 and 2005, the scores improved.

Table 3. Average reaction time of players at different years



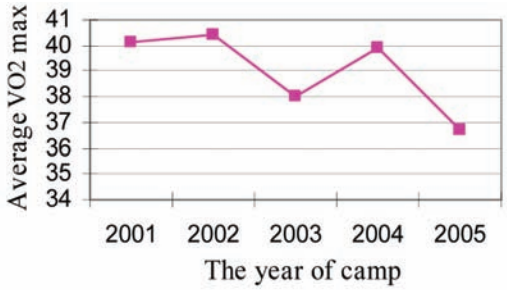
4 – According to Table 4, which shows the average time of the sprint of the athletes, we can say that the highest score was in 2001, and from 2003 on, the scores did not improve.

Table 4. Average speed run of players at different years



5 – According to Table 5, which shows the average amount of oxygen used by the athletes, it is clear that the highest amount used was in 2002, and the lowest in 2005.

Table 5. Average VO2 max of players at different years



DISCUSSION

Overall, both male and female winners tended to be somewhat below the average age in their respective average weight categories. This may be the result of the inclusion of Taekwondo in the Olympic Games, which may have broadened its exposure to younger athletes. In addition, the application of scientific training principles early in their development could be another reason for having younger winners. In all the weight categories, the average height of the male winners is greater than the category average.

Taekwondo is one of the most popular sports which have a lot of supporters in many countries. Moreover, recently it has become one of the Olympic Games. However, in Iran, in spite of the popularity of Taekwondo and our winning many medals at the international level, there are few studies related to the physical characteristics of the competitors in this sport.

Generally, in order to select the athletes for a special sport, a profile of their basic fitness and an exercise program should be made. In this selection, emphasis should be put

on those characteristics and abilities that have a noticeable effect on performance and also on those that are influenced by genetic factors. Some researchers have found that aerobic power is not important for performance in Taekwondo (Duris, 2004, Heler et al., 1998, Toriola et al., 1987). Also, some others have argued that improving aerobic power may be of importance in achieving success in Taekwondo.

Generally speaking, male and female athletes are on average rather younger than other competitors in the same weight category. That can be because younger competitors are preferred for the Olympic Games. Moreover, paying attention to the basic principles of special exercises for growth and improvement can be another reason for success. Also, the athletes who won were found to be taller than other competitors of the same weight. The average BMI of the winners in general was lower than that of non-winners, but it did not achieve statistical significance (Gao, 2001). Gao et al. (1998) also concluded that in order to gain the highest possible VO2max (aerobic ability) in Taekwondo, it is necessary to reduce the percentage of body fat and increase the lean body mass. The nature of a Taekwondo performance mainly requires bursts of sudden, fast and powerful kicks. That means that what is needed is a speed and power athletic profile and not an endurance athletic physiological profile, as suggested by Gao et al. (1998). A suitable VO_2 max will enable the Taekwondo competitor to have a fast recovery between random and sudden activities (Marković et al., 2005). Claessens et al (1999) discovered a relationship between the decrease in sport performance and the increase in skinfold fat among elite Taekwondo athletes. Overall, 98% of all of the techniques used to score were kicks. This was expected since the major focus in Taekwondo was placed on kicking skills. Douris (2004) studied the balance, flexibility, power and muscular endurance of male and female Taekwondo athletes and found that, at all age levels and for both sexes, the average of measurement indicators were higher than those for ordinary people. It was the same for both young and old athletes in other martial arts (Young et al., 1999). Reaction time, speed and agility have all had a significant influence on the success of Taekwondo athletes. Many experts believe that reaction time is more related to hereditary factors than to exercise. In their opinion, exercise can improve movement time but it cannot improve reaction time (Guilford, 1958).

However, Cho (1988) believed that exercise can contribute to an improvement in reaction time. Heler (1998) found a connection between reaction time and the competitive performance of each competitor. Similarly, Bompa (1999) reported that high speeds increase the score of Taekwondo competitors. Melhim (2001) also observed that after a period of Taekwondo exercises, anaerobic power increased as much as 24 percent. According to the findings of this study, and also those of the studies mentioned above, it can be said that factors such as speed, flexibility, reaction, weight and to a lesser degree, age, are very important for success and gaining better scores in most of the martial arts. Therefore, appropriate physical fitness is important in every sport like Taekwondo. Therefore, those who are responsible for the National Team should take this into account while preparing the team, and should try to improve the fitness of the athletes to a higher degree. Based on the results of this study, it is clear that success in Taekwondo depends on many factors. Successful Taekwondo athletes, therefore, need remarkable anthropometric and physiological characteristics. Also, they should have a low percentage of body fat, high speed in performing skills, perfect agility for rapid movements which would, thus, help them to prevent their opponents from scoring, and would allow good and suitable reaction time against the opponent's attacks.

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PREGLED (ISPITIVANJE) FIZIČKOG FITNESA MUŠKIH TEKVONDO SPORTISTA IRANSKOG NACIONALNOG TIMA

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Vešto izvođenje vežbi na zadovoljavajućem nivou zavisi od fizioloških, antropometrijskih i psiholoških faktora. Ove faktore koriste se u mnogim modelima za analizu izvođenja različitih vežbi. Preduslov za svaki progres je posedovanje fizičkih sposobnosti. Poznavanje antropometrijskih i fizioloških karakteristika igrača u svakoj oblasti vežbanja je najvažniji i najefektivniji faktor njihovog izvođenja.

Svrha ove studije je pregled (ispitivanje) fizičkog fitnesa muških tekvondo atleta koji su bili u nacionalnom timu od 2001-2005 godine. Ovo istraživanje je opisno. U ovu svrhu mi smo posmatrali članove nacionalnog tima tokom 2001-2005, kao statičko društvo. Nacionalni tim se sastoji svake godine od 10 članova (N =10, M age = 21 SD = 1.78, M visina= 172.06 SD=4.68). Različiti faktori fizičkog fitnesa i antropometrijskih karakteristika su bili predmet istraživanja. Nalazi ovog istraživanja su pokazali da su najbolji rezultati ostvareni tokom 2001 i 2002 godine, dok su najgori ostvareni tokom 2005 godine. Bez obzira na ove činjenice, fitnes status nacionalnog tima tokom godina istraživanja je imao silaznu putanju.

Ključne reči: *fizički fitnes, muški tekvondo sportisti, nacionalni tim*