ORIGINAL ARTICLE

SURVEYING PHYSICAL FITNESS OF THE ADOLESCENT MALE TAEKWONDO ATHLETES OF IRAN NATIONAL TEAM

Zar Abdossaleh

ABSTRACT

Objectives: To survey the physical fitness (anthropometrics and physiological characteristics) of the adolescent male Taekwando athletes of Iran national team during 2002-2005 years.

Study design: Descriptive study.

Subjects and Methods: Members of adolescent national team during 2002-2005 were examined as a static society composed of 10 members each year. Different factors of physical fitness and anthropometric characteristics (i.e. age, weight, height, vertical jump, sit ups, agility, flexibility and reaction time) were experimented. All the results were written on individuals' registration cards. The data collected was based on the practical test done by all male Taekwondo athletes invited to National Team Camp during 2002 and 2005.

Results: The best record in vertical jump (score= 53/9), sit ups (score=69), agility (score=16/69), flexibility (score=42) and reaction time (score=356/9) registered was during the year 2004. The worst ones registered included vertical jump (score=49/2 in 2005), sit ups (score=55/7 in 2003), agility (score=17/36 in 2002), flexibility (score=36/9 in 2005) and reaction time (score=464/4 in 2002).

Conclusion: The best record registered was during year 2004 with 25 score, while the worst ones were registered in 2003 with 16 score. Successful Taekwondo athletes, therefore, had remarkable anthropometric and physiological characteristics.They also had a low amount of body fat, high speed in performing skills, and perfect agility for rapid movements.

Keywords: physical fitness; male, taekwan-do athletes; Iran.

INTRODUCTION

In Beiging 2008, Taekwondo became recognized as an official sport at the Olympics.

Understanding the anthropometric and physiological characteristics is an important, determinant and influential factor in the performance of athletes. The athletes are aware of these important characteristics and they compare themselves with other athletes to overcome their weaknesses and to design their exercise programs. Achieving the optimum athletic performance and best position in sport requires special anthropometric and physiological characteristics besides scientific exercise program and having access to experts of sport sciences to enough facilities.[1,2]

On the other hand, lack of deep understanding of the education of elite athletes and also not paying attention to personal differences may lead atheletes to the sports which are not compatible with their physical characteristics and abilities. Most studies on taekwondo have been

Department of Physical Education and Sports Science, Jahrom University , Iran.
Correspondence : Zar Abdossaleh, PhD Student, Department of Physical Education and Sports Science, Jahrom University, Iran.
E-mail : Salehzar@gmail.com
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conducted on adults. Few studies are available on young taekwondo participants and most were done in the West. Research studies related to Taekwondo have tended to concentrate on injury rates.[3,4] Studies have been conducted on the epidemiology of trauma which is proposed to be related to skill level, gender, weight, age, mechanism, body part, situation, and years of experience.[5, 6]

There are several factors influencing the achievement of the best athletic performance among which is, for sure, physical and physiological abilities. Although every athlete, needs a certain degree of feature to perform optimally such as explosive power, agility, speed and other physical and physiological abilities, the need of each athlete to each of these feature sport is Taekwondo the success in which demands special physical characteristics.

Melhim 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.[7] Markovic et al. examined the differences between successful and less successful Croatian national Taekwondo champions and found that successful athletes achieved significantly higher maximum running speed, significantly higher ventilator anaerobic threshold at significantly lower heart rate, significantly higher explosive power, anaerobic alactic power and lateral agility, somewhat lower body fat (2.3%), and were slightly taller (by 5.8 cm) than less successful athletes.[8] On the other hand, other researchers agree that the possession of specific anthropometric qualities alone cannot guarantee a gold medal.[9-14] Success in competition is indeed a combination of physical attributes, talent, skill, technique, determination, strategy and psychological preparedness.

Physical fitness is one of the main factors for athlete. It has been shown that a high level of elements of physical fitness such as endurance, flexibility and speed is useful and effective in achieving success in different sport fields. Nowadays before being sent to the competitions, teams are given a test for the evaluation of physical status of the members. Iranian National Team of Taekwondo follows the same rule and has given this responsibility to the Center of Physical Capability Assessment of National Academy. In this sport, movement speed, reaction speed, jumping power and anaerobic power plus some anthropometric characteristics play an important role in the performance.

In Bump's idea, throughout the competition, both aerobic and anaerobic systems should be used.[15] Cho found that muscular and explosive power, flexibility, muscular endurance, reaction time play an important role in Taekwondo.[16] Due to the fact that discovering physiological characteristics plus true planning of exercises and discovering the talents, strengths and weaknesses are some important factors in preventing the wasting of resources, conducting some investigations in the field of these factions seems to be necessary.

The researcher decided to investigate the status of physical and anthropometric characteristics fitness of adolescent Iranian male Taekwondo competitors so that coaches, taking account of this fundamental information besides personal and performance differences among athletes, prepare calculated and specific plans for the selection and preparation of athletes. Unlike most sports in which many investigations have been done to determine the relationship of between characteristics, Taekwondo had been the subject of only a few studies.

The objective of this study was to survey the physical fitness (anthropometrics and physiological characteristics) of the adolescent male Taekwando athletes of Iran national team during 2002-2005 years.

METHODS

In this descriptive study, the researchers compared the results of practical tests of athletes, during 2002 and 2005, who were invited to adolescent Taekwondo National Team Camp. All the results were written on individuals' registration cards. The data collected was based on the practical test. Here, all adolescent male Taekwondo athletes of National Team during 2002 and 2005 were studied and thus decided to be the research population. Each year, adolescent Taekwondo team consists of 10 people. To conduct the research, necessary coordination was made by Assessment Center of National Olympic Academy. Having provided with the description and implications of the study, the researcher received the necessary information to evaluate the physical fitness in following terms.

The counter-movement vertical jump (CMJ) was used to assess **explosive power** of the legs. The subjects were allowed three jumps with 1- minute rest in between. The highest jump was used for statistical analysis. Muscle **endurance** was assessed using the one minute timed test for bent knee sit ups and push ups. For the sit ups, subjects were lying in a supine position with both

knees bent at right angles and both feet were shoulder width apart. Both arms were placed at the side of the trunk. All subjects were asked to perform as many sit ups as possible within one minute.

The Illinois **Agility** Run Test was conducted with the athlete lying face down on the floor at the start point. On the assistant's command the athlete jumped to his/her feet and negotiated the course around the cones to the finish. The assistant recorded the total time taken from their command to the athlete completing the course. A sit and reach flexibility box (Novell Products, Rockton, Illinois, USA) was used to assess low back and hip joint **flexibility**.[14] Each subject sat with legs fully extended with the bare soles of the feet placed flat against the flexibility box. With the knees fully extended, arms evenly stretched, palms down, the participants reached forward without jerking. The subject pushed the sliding marker along the scale with the fingertips as far as possible. The position of maximum trunk flexion was held for about two seconds. The test was repeated three times. The best value in cm was documented and used for data analysis.

Height was measured by means of a wall-mounted stadiometer (Lafayette Instrument Co. USA) and body mass on a calibrated digital scale (SECA, Vogel & Halke, GmbH & Co, Hamburg, Germany).

Using descriptive statistics, the researcher measured the indices distribution and central tendency. The mean values were compared to determine any significant difference between them.

RESULTS

Anthropometrics and physical fitness characteristics of the adolescent male taekwondo athletes in age, weight, height, vertical jump, sit ups, agility, flexibility and reaction time are presented in Table 1.

The mean age of athletes invited to the National Team Camp, in 2002 and 2003 were similar in their mean age, but in 2005, they were at the lowest age and, in 2004, they were at highest age. It was also noticed that the members of National Team Camp in 2003 were taller than other years and shortest in 2005.

Table 1 also shows the differences in motor abilities between male Taekwondo athletes in different years. The athletes in 2004 had higher explosive power test (vertical jump), sit ups, agility test and reaction time, whereas in 2005 had lowest record in vertical jump. They mean sit ups had lowest score in 2003 and the worst scores of agility test and reaction time in 2002. The mean flexibility (sit-and-reach) was best record and reaction time was worst scored in 2004.

Table 1: The Mean Anthropometrics and physical fitness Characteristics in different years

Variable \ Years	2002	2003	2004	2005
Mean Age (year)	16/7	16/7	17**	15/9*
Mean Weigh(kg)	61/2	72/2**	62	51/6*
Mean Height(cm)	176/7	181/7*	175/1	169**
Mean vertical Jump(cm)	53	49/4	53/9*	49/2**
Mean sit ups test(repeat)	62/8	55/7**	69*	63/8
Mean Illinois Agility run(second)	17/36**	17/28	16/69*	17/11
Mean of Sit-and-reach test (cm)	41/2	38/4	42*	36/9**
Mean of Reaction time	464/4* *	436/9	356/9*	404/5

***The best record in** different years

****The worse record in** different years

According to figure 1, the members of National Team Camp had best qualification in 2004 with 25 score and had the worst condition in 2003 with 16 score.

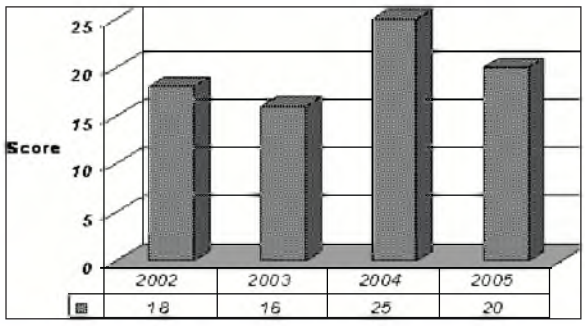

Figure 1: Total qualification of anthropometrics and physical fitness characteristics in different years of National Team Camp

DISCUSSION

Both male and female taekwondo athlete tended to be somewhat younger than the average age in their respective weight category average. Application of scientific training principles early in their development could be another reason for having younger winners. Taekwondo is one of the most popular sports which have a lot of supporters in many countries. Recently it has been included in the Olympic Games.[2]

Generally, in order to select the athletes for a special sport, a profile of their basic fitness and their process of exercises should be made. In this selection, emphasis should be placed on such characteristics and abilities that have a noticeable effect on the performance and that are influenced by genetic factor. Some researchers have found that aerobic power is not important in Taekwondo performance.[17,18] Others have also argued that improving aerobic power may be of importance in achieving success in Taekwondo competition.[2]

When the cardio respiratory function, energy expenditure and blood lactate system are well controlled only then an athlete can show potential and maintain high performance. This is very important to both coaches and athletes.[19]

Male and female athletes are young on an average than other competitors of the same weight. That is why in Olympic Games younger competitors are preferred. Moreover, paying attention to basic principles of special exercises for growth and improvement can be another reason for success. The winning athletes are also found to be taller than other competitor of the same weight. Gao et al. concluded that to gain the highest possible VO2max (aerobic ability) in Taekwondo, decreasing body fat percentage and increasing lean body mass are needed.[10] The nature of Taekwondo performance mainly requires bursts of sudden, fast and powerful kicks that lend itself to having a speed and power athlete profile and not an endurance athlete physiological profile suggested by Gao et al.[10] Flexibility plays an important role in taekwondo competition to enable athletes to execute high kicks. Toskovic et al. reported values of 31.7 cm (novice males), 39.1 cm (experienced males), 37.0 cm (novice females), and 35.9 cm (experienced females) for American recreational taekwondo-in using the conventional sit-and-reach test.[17] Markovic et al. found 55.8 cm for the total group of elite Croatian female taekwondo-in.[18] American recreational taekwondoin recorded heights of 43.7 cm (novice males), 51.5 cm (experienced males), 32.1 cm (novice females), and 31.3 cm (experienced females).[19]

Yiau et al. reported that winning Malaysian female taekwondo-in competing at the 2004 Malaysian Games jumped higher (39.1 cm) than their less successful colleagues (35.1 cm).[20]

Muscle endurance is the ability of a muscle group to execute contractions over a period of time sufficient to cause muscular fatigue. Douris studied the balance, flexibility, power and muscular endurance of male female Taekwondo athletes and found that at all age levels and in either gender group the average of measurement indicators were more than that in the non-athletes.[21] It was the case for both young and old athletes in other fields of martial art.[22-24] The reaction time, speed and agility all have a significant relationship with the success of Taekwondo athletes. Many experts believe that reaction time is more related to hereditary factors than to the exercises. In their opinion, exercise can improve the movement time but it cannot improve the reaction time.[25]

However Cho believed that exercise can contribute to the improvement of reaction time.[16] Heler found a signer between reaction time and competitive performance of tech at competitor.[11] In the same vein, Bompa reported that having high speeds contain the score for the Taekwondo competitors.[15] Melhim also observed that after period of Taekwondo exercises anaerobic power increased as much as 24 percent.[7] 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 in success and gaining better scores in most of the sports special martial arts. Therefore having a suitable physical fitness is important in every sport.

CONCLUSIONS

Based on the results of this study, it is clear that successful Taekwondo athletes have got to have remarkable anthropometric and physiological characteristics. They should also have a low amount of body fat, high speed in performing skills, perfect agility for rapid movements and, suitable reaction time against opponent's attacks thus, stopping the opponent's scoring

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