PalArch's Journal of Archaeology of Egypt / Egyptology

Analysis Of Anthropometric And Biomotoric Indonesia Paralympic Athletes

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Deddy Whinata Kardiyanto, Pomo Warih Adi, Hendrig Joko Prasetyo: Analysis Of Anthropometric And Biomotoric Indonesia Paralympic Athletes -- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(6). ISSN 1567-214x

Keywords: variable, paralympic, athlete, sport, anthropometry and athlete's biomotor.

ABSTRACT

Sports are a unifying medium and at the same time become an arena for every state citizen to fight for his country. To get good results, it requires athletes who have skills in the sports they are involved in. To print sportsmen, special requirements are needed in order to create or be born sportsmen who are superior and accomplished.

The formation of a superior sportsman starting from the nursery means that a coach must be able to see who the potential athletes are, including Paralympic athletes. This will be the beginning of the athlete's formation process. The more observant the coach is in selecting and choosing, the higher the potential for creating superior and accomplished Paralympic athletes.

This study aims to identify the anthropometry and biomotor which are carried out on athletes with disabilities that will be very beneficial for the coach in preparing training programs and providing targets to bring the athlete's physical condition to the level desired by the coach.

In addition, the analysis carried out on elementary anthropometric and physical components will provide an advantage when the coach wants to develop tactics or game strategies and identify potential athletes (Yüksel1 & Sevindi, 2018). The coach's assessment when selecting athletes contributed 44.4% to the anthropometric and somatotype components of the body, the rest was based on the psychology, motorbike and psychomotor aspects of the athlete (Limoochi, 2012).

This study used a quantitative descriptive approach, conducted to identify and study the anthropometry and biomotor of volleyball athletes in the Indonesian National Paralympic Committee. The use of the cross-sectional method in this study is useful in answering the

problem formulation proposed by the researcher, where the data is obtained through measurements at one time.

The population in this study were athletes with disabilities in sitting volleyball who are under the supervision of the National Paralympic Indonesia and are conducting training centers for the preparation of the 2020 Asean Para Games. The sample included in this study is the entire population of athletes with disabilities in the national sitting volleyball sport, totaling 11 people.

1. Introduction

Sports development needs to be done using a holistic scientific approach by utilizing science and technology. These efforts are carried out by increasing the quality and quantity of knowledge and technology with the aim of making use of tested and proven scientific principles and theories to improve the functions, benefits and applications of existing science and technology or to produce new technologies in the field of sports and to support sports achievements. .

Obviously, high-performing athletes need a specific biological profile with extraordinary biomotor abilities and strong psychological traits. The biometric quality or anthropometric measurement of an individual is an important asset for several sports, and as such, is considered a key criterion of success in many sports. Similar to the achievement of achievements in sports carried out by non-disabled athletes, coaches also often face problems in finding the best training method to be applied to Paralympic sports (Croft, Dybrus, Lenton, & Goosey-Tolfrey, 2010). Experts and coaches must be able to identify the fundamental elements according to the characteristics of a particular sport so that they can recruit and provide appropriate training methods for athletes with disabilities in the future. One method of identifying the fundamental elements or dominant physical components is by analyzing anthropometry and biomotor abilities, both related to fitness and athletic skills (Barfield & Malone, 2012).

The identification of anthropometry and biomotor carried out on athletes with disabilities will be very beneficial for the coach in preparing training programs and providing targets to bring the athlete's physical condition to the level desired by the coach. In addition, the analysis carried out on elementary anthropometric and physical components will provide an advantage when the coach wants to develop tactics or game strategies and identify potential athletes (Yüksel1 & Sevindi, 2018). The coach's assessment when selecting athletes contributed 44.4% to the anthropometric and somatotype components of the body, the rest was based on the psychology, motorbike and psychomotor aspects of the athlete (Limoochi, 2012). Several studies have clearly shown that the biomotor ability factor that is possessed will greatly affect the skills of an athlete. However, currently there are still very few studies that are oriented towards this problem, especially in sports with disabilities. Therefore, this study tries to examine how the anthropometry and biomotor of athletes with disabilities in the sport of volleyball sit so that they can become basic information in developing the achievement of sports with disabilities, especially sitting volleyball in Indonesia.

2. Method

This study used a quantitative descriptive approach, conducted to identify and study the anthropometry and biomotor of volleyball athletes in the Indonesian National Paralympic Committee. The use of the cross-sectional method in this study is useful in answering the problem formulation proposed by the researcher, where the data is obtained through measurements at one time.

The population in this study were athletes with disabilities in sitting volleyball who are under the supervision of the National Paralympic Indonesia and are conducting training centers for the preparation of the 2020 Asean Para Games. The sample included in this study is the entire population of athletes with disabilities in the national sitting volleyball sport, totaling 11 people.

In accordance with the objectives of the study, this study identified the anthropometric and biomotor profiles of athletes in sitting volleyball. To obtain the desired data, several test instruments are used to measure anthropometry and biomotor as follows:

Height and weight: In linear measurements, a tapeline with a sensitivity score of 0.01 m was used. Weight measurement was carried out using a digital weighing scale with a sensitivity level of 0.01 kg (Zorba & Saygın, 2009).

Body mass index: Using body weight and length, BMI is determined using the formula BMI = body weight / (Length) 2 (Zorba & Saygın, 2009).

Thump length, upper limb length, arm length, arm length, hand length, arm circumference and arm circumference measurements were measured by tape and recorded in cm (Easterby, Kroemer, Chaffin, 1982; Otman, Demirel, Sade, 1995).

Cap length: Determined by measuring the distance between the C7 and the coccyx. Length of the upper limb: Determined by measuring the distance between the acromion and the tip of the longest finger on the hand.

Arm length: Determined by measuring the distance between the acromion and olecranon while the shoulders and arms are loose.

Arm length: Determined by measuring the distance between the olecranon and the protrusion of the styloid radius.

Hand length: Determined by measuring the distance between the protrusion of the styloid radius and the tip of the longest finger on the hand.

Arm circumference: Determined by placing the midpoint of the distance between the acromion and olecranon, and measured when the muscles relax.

Forearm circumference: Determined by finding the point of the muscle that is the most swollen, and is measured when the arm is loose.

Modified functional range test: The test is used to evaluate trunk balance. The players are positioned in a position that the knees and hips are in a flexed position, the upper body is in a vertical 900 position, leaning against the back of the chair, and there is 5 cm between the popliteal fossa and the side of the chair. The lower extremities are tied to each other at the distal shaft of the femur. The players sit on high chairs to prevent leg support. The players were asked to do 900 shoulder flexions. The length of the arm is marked at the ulnar styloid level and the player is asked to reach forward as much as possible. During attaining activities, compensatory mechanisms are avoided such as

shoulder bow and neck flexion. The length of the distance transferred by the ulnar styloid is marked at the point of maximum attainment, and the distance between the first and second values is recorded in cm (Özünlü & Ergun,

Modified Sit-up Test: The player positions himself lying on his back on the mat, knees bent, soles of feet fully above the mats, hands on each side of the hips, and fingers in extension over the mats. The legs are supported to keep the knees bent. The individual is asked to appear up to the lower level of the scapula, and do as many sit-ups as he can in 30 seconds (Sahlberg, Svantesson, Thomas, & Strandvik, 2005; Tomchuk, 2011)

Modification of abdominal resistance: Lying on the back on the mat, the individual is asked to rise up to the lower level of the scapula and maintain this position as much as he can. Time is stopped and recorded, when participants touch the base level of the scapula or change positions (Ergun & Baltacı. 2006).

Modified push up test: Participants are positioned face down on the mat, and a modified push-up version for females is applied. The strength of the subject's upper limb muscles and the amount of backward movement of the upper body were recorded (Ergun & Baltacı. 2006).

Grip strength: Starting from the right hand, measurements are taken with a Jamar brand dynamometer and recorded in kg, while the subject is walking, arms straight at an angle of 10-150 from the shoulder on one side (Günay, Tamer, Cicioğlu, 2013).

Plate tapping test: Applied to measure the speed of arm movement. Two plastic discs (A and B) are placed on the table, 80 cm apart from each other. The subject touches the A and B discs 25 times (50 total) with dominant hand as quickly as possible. The chronometer starts when the subject touches disk A, and the score obtained at the end of the test is recorded in seconds (Adam, 1988).

Shoulder Flexibility: measured by the Back Scratch Test. The players sit in a vertical back position. The players are asked to tie their hands behind their back while one of their respective shoulders is in flexion, abduction, external rotation and flexion of the elbow; and the other shoulder in extension, adduction, and internal rotation and elbow flexion. In this phase, the distance between the 2nd fingers is recorded in cm. If the radii are in contact with each other the value is 0, otherwise the distance is recorded in minus cm. The measurements were repeated after the limb position was changed and the results were recorded in cm as well (Adam, 1988).

The SPSS 24.0 program was used in the analysis of the data obtained in the study and the minimum, maximum, mean, and standard deviation values.

3. Result

Table 4.1. Anthropometric and Biomotor Mean Values of Sitting Volleyball Players

Variable	n	Min	Max	Mean	SD
Age (years)	11	20	42	31.91	7.43
Exercise age (years)	11	1	2	1.36	0.48

Weight (kg)	11	49.1	94.9	67,32727	12.91694
Height (cm)	11	163.5	195	173.9545	8.192165
Body mass index (kg / m2)	11	17.39654	28,96737	22,14443	3.361819
Togok length (cm)	11	45	64	54.58	7
Upper limb length (cm)	11	87	99.8	92,33636	3.253606
Sleeve length (cm)	11	25	32	28.33	1.95
Hand length (cm)	11	18.5	23.5	20.95	1.37
Arm circumference (cm)	11	27.5	42.5	32.37	4.06
Forearm circumference (cm)	11	23	38.5	28.75	3.65
Test reach (cm)	11	21	64	45	13.5
Modify sit ups (times)	11	31	50	39.08	6.57
Modification of abdominal endurance (seconds)	11	45	307	126.41	75.53
Push up modification (times)	11	17	54	39.16	10.43
Dominant hand grasping strength (kg)	11	34	67	53.08	11.93
Non-dominant hand grasping strength (kg)	11	32	67	50.63	11.03
Plate tapping test for dominant hand (seconds)	11	7.68	14.4	9.78	1.86
Plate tapping test for non-dominant hand (seconds)	11	9.09	14.09	11.12	1.94
Right shoulder flexibility (cm)	11	-5	24	8.31	7.58
Left shoulder flexibility (cm)	11	-7	16.5	3.68	8.05

4. Discussion

This research was conducted to determine the physical profile of the seated volleyball player of the Indonesian National Team. Bringing some of the initial value gained in research into the literature, it aims to create a reference guide for coaches, sports scientists and other stakeholders. In the context of the literature review that was completed, no research was found regarding determining the physical and biomotor features of volleyball players sitting on the Indonesian national team. Therefore, the findings of this study will be useful and can be assessed for this and other sports. In the context of the study, several tests and measurements were determined regarding height, weight, BMI, upper body length, upper limb length, arm length, arm length, arm length, arm circumference, forearm circumference, upper body length, changes in body position. ups, modified abdominal endurance, modified push-ups, hand gripping power, plate tapping, and shoulder flexibility.

In a study conducted to determine the anthropometric profile of seated volleyball players, the average length of the right and left arms of each player

was 30.21 and 30.77 cm, while the average lengths of the right and left arms were 21.30 and 21, 98 cm, and the mean lengths of the right and left hands were reported as 13.44 and 13.69 cm [20]. In our study, it was observed that the upper limb length values (mean 35.20 cm, 28.33 cm, 20.95 cm respectively) were higher. This difference is ascribed to the study group being elite level players and consisting of national team level players. What's more İnce et al. [20] reported that arm length was not detrimental for persons with disabilities because of the lower net height. However, even though the net height is lower, given the characteristics of the game, Since failure to contact both buttocks to the ground is prohibited by the rules, we are of the opinion that both upper limb and upper height are very important in all parts of the game, especially in attacking and blocking positions, and they are important criteria in player selection. This determination is supported by studies conducted by [9, 21].

A study was reportedly conducted by Mahmutovic et al [9] to determine the effect of morphological features of volleyball players sitting in the Premier League of Bosnia Herzegovina on conditional motor skills. According to the results of the study, it was reported that players with longer arm lengths, wider hip width and upper arm circumference, and lower abdominal skinfold values had the advantage in applying conditional motor features and dominant morphological measurements in sitting volleyball. . The findings of the study verify the determinations obtained by Mahmutovic et al. [9].

In a study conducted to determine the relationship between the anthropometric variables of 20 Polish elite seated volleyball players and anaerobic strength, field tests, and game performance, it was reported that physical fitness and game performance were dependent on the anthropometric variables of the players [21] Hasanbegovic et al. [22] reported that they determined the effect of training in sitting volleyball on motor skills by factor analysis. It was stated that the participant's explosive power factor was very important in the initial measurement; However, after the training process, motor skills are especially developed, giving mobility and agility the basic components. Although studies [9, 21, 22] include important correlations and useful information regarding anthropometric and motor performance of players, it was observed that they did not give averages regarding anthropometric or motor performance. In this respect, this study differs from the existing one with respect to its findings providing an average score. These data are thought to have contributed to establishing standards with respect to seated volleyball and other disability sports.

In a study in Egypt, Amgad [23] reported that weight lifting consisting of 8 movements was applied to sitting volleyball players for 12 weeks, 3 days a week, and 60 minutes a day. At the end of the study, it was reported that training statistically increased arm muscle strength significantly and had a positive effect. In another study of amputated football players, it was reported that there was a positive correlation between upper body muscle stabilization and upper body flexor strength, and it was suggested that upper body stabilization, balance, and upper body strength training should be included. in

the training plan [24]. When the findings obtained by the researchers were examined, it is evaluated that the balance and upper body strength of the volleyball players who sit in the Indonesian national team is sufficient; However, the level of stomach resistance must be developed. The value of dominant hand grip (mean 53.08 kg) and non-dominant hand grip value (mean 50.63 kg) detected during the study were considered quite high. Those high values verify the determination of Amgad [23] and Aytar et al. [24] who stated that training has a positive effect on muscle development. Those high values verify the determination of Amgad [23] and Aytar et al. [24] who stated that training has a positive effect on muscle development. Those high values verify the determination of Amgad [23] and Aytar et al. [24] who stated that training has a positive effect on muscle development.

With regard to the types of disability, it was observed that the players of this study consisted of individuals with minimal (n = 2) and (n = 10) disabilities, who were not a homogeneous group. It is a known fact that these players have various pathologies which differentiate their functional level and their functional features can vary despite having the same defects. In this case, because this research was conducted on volleyball players sitting on the Indonesian national team and the participants were limited to 12, being unable to classify considering the disability condition or being unable to perform statistical analysis based on the disability condition could be accepted as a weakness of the study. However, in a study conducted on 128 male and 91 female volleyball players, Marszalek et al. [25], It was reported that there was no difference regarding the efficiency of play between male and female players with different types of disabilities. In their study, it was observed that Morres et al. [26] have focused on the relationship between sporting performances (service, reception, set, attack, block, and defense) and classification systems (disability, minimal disability). It was stated that the level of disability of participating athletes did not decrease

show. Similarly, Vute [7], Hayrinen and Blomqvist [27], Hayrinen et al. [28], Protic and Valkova [29] have conducted a study based on the playing efficiency of sitting volleyball. It can be understood that game analysis was conducted to evaluate game performance, so that the motivational factors behind participation in sitting volleyball were examined, and the researchers focused on the game variables in this study. Therefore, it can be stated that it is imperative that more comprehensive research be carried out based on the disability classification and functional features of the volleyball players.

Moving in total independence is very important for a physically handicapped individual. When people with disabilities who deal with or do not deal with sports are compared, I state that people who deal with sports are more independent in everyday life in terms of mobility, have higher social participation, and have a higher quality of life than with individuals who don't. dealing with sports. Moreover, it is reported that regular exercise of disabled people is effective on physical fitness [30-32].

Considering the data available in the literature, there is a limited amount of research on seated volleyball players and especially the physical features of

Indonesian national team level players are not determined, which motivates this research to be carried out. In this case, being the first analysis on the physical features of a seated volleyball player for the Indonesian national team and having reached some significant findings, it can be accepted as the strength of the research, and the findings obtained can be accepted as preliminary figures. In addition, it is considered that a more comprehensive study of seated volleyball with higher player numbers and in particular with field studies could provide findings that would fill the gaps that lie in this area. And the measurements obtained must be supported by evaluation of techniques such as attack, block, serve,

5. Conclusion

In conclusion, the anthropometric measurements and modified bio-motor test results relating to the disabled people in this study, which are the first studies conducted on the Indonesian national seated volleyball team, are very important because they provide data that can be used in player selection. for sports. scientists / trainers and other shareholders.

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