

Body Types of Softball Players in the 39th National Games of Thailand: Contributions for Selection of Players, the Development of Softball and Softball Teaching and Learning

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Abstract

The purpose of this study was to investigate the body types, size, and body compositions of softball players in the 39th National Games of Thailand. The population was 352 softball players participated in the 39th National Games of Thailand from which the sample size of 291 was determined using the Yamane formula (1967) and selected with stratified random sampling method. The collected data were weight, height, arm length, leg length, chest circumference, mid-upper arm circumference, calf circumference, subcutaneous fat in the upper arm area, the scapula bone area, above the pelvis area, and mid-calf area. Keys and Brozek's formula (1953) was used to calculate the fat quantity, Kitagawa formula (1955) to calculate the muscle quantity, and Heath and Carter method (1967) to determine the values of body dimensions. The results of the study can be concluded as follows. The average body dimensions of the male softball players were the endo-mesomorph body type while the average body dimensions of female softball players were the meso-endomorph body type. When considered according to the softball positions,

it was found that the male softball players in every position had the endo-mesomorph body type while the female softball players in every position had the meso-endorph body type except the center fielder that had the endo-ectomorph body type. Thus, the results of this research should be very important and useful not only to trainers or those involved in softball players' selection and the development of softball in Thailand but also the body of knowledge for softball teaching and learning in educational institutions at all levels in Thailand.

Keywords: Body Types, Softball Players, National Games of Thailand

Introduction

The body size, body building, and components of the body are important factors for playing sports as they can affect movement and strength in playing sports. If athletes possess the body size and body building suitable for any kind of sports they play, they will have advantages over their opponents (Kanchanakit, 1991: 40). On the contrary, if they do not possess the body type suitable for any kind of sports, they may be injured from playing. Therefore, studies about body types and other components of athletes can be used as tools for predicting the kind of sports suitable for them. Moreover, the study results can also be used in selecting athletes for competitions at various levels.

Purpose of the Study

To investigate the body types, size and compositions of softball players in the 39th National Games of Thailand.

Research Methodology

The population of the softball players in the 39th National Games of Thailand was 352. The sample group of 291 was determined using Yamane formula and selected by using stratified random sampling method.

The research instruments consisted of 1) a centimeter measuring tape, 2) a kilogram weighing scale, 3) a centimeter height measuring scale, 4) a skinfold

caliper, 5) a bone caliper, and 6) a recording form for the body type, size and composition.

Data were collected by measuring weight, height, arm length, leg length, chest circumference, upper-arm length, calf circumference, subcutaneous fat in the upper arm area, the scapula bone area, above the pelvis area, and mid-calf area. The data were calculated for fat quantity using Keys and Brozek's formula (1953); for muscle quantity using Kitagawa formula (1955), and for the body types using Heath and Carter method (1967).

Results and Discussion

The results of the study revealed that the female and the male softball players in the 39th National Games of Thailand possessed different average body dimensions according to the position they played as shown in the tables below.

Table 1 Means (\bar{X}) and standard deviation (S.D.) of body size and composition classified by gender and overall

Variables	Male player		Female player		Overall	
	\bar{X}	S.D.	\bar{X}	S.D.	\bar{X}	S.D.
Height	170.524	9.269	159.946	5.251	166.125	9.420
Weight	72.971	14.926	56.037	10.787	65.930	15.744
Arm length	75.648	9.333	70.715	3.556	73.597	7.869
Leg length	95.609	11.968	94.008	10.486	94.943	11.384
Chest width	89.606	14.096	84.161	6.497	87.342	11.853
Upper arm length	30.692	5.205	26.764	2.994	29.059	4.823
Calf	37.629	5.495	35.558	2.703	36.768	4.655
Forearm width	6.693	0.390	5.867	0.329	6.348	0.548
Thigh width	9.014	0.683	8.525	0.672	8.809	0.719

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Thigh width	9.014	0.683	8.525	0.672	8.809	0.719
Fat (%)	15.779	5.236	19.623	4.276	17.377	5.210
Muscle mass (%)	28.581	4.281	21.018	3.208	25.436	5.374
Endomorphy	3.788	1.717	4.590	1.196	4.121	1.570
Mesomorphy	4.758	1.990	4.069	1.270	4.472	1.758
Ectomorphy	1.896	1.282	2.512	3.461	2.152	2.451

This table showed that male players had an average height of 170.524 centimeters, an average weight of 72.971 kilograms, an average arm length of 75.648 centimeters an average leg length of 95.609 centimeters, an average chest width of 89.606 centimeters and an average length around the upper arm of 28.418 centimeters. Moreover, their average calf length was 37.629 centimeters, their average forearm width was 6.693 centimeters, their average thigh width was 9.014 centimeters, their average fat was 15.779 %, their average muscle volum was 28.581 %, their average endomorphy was 3.788, their average mesomorphy was 4.758 and their average ectomorphy was 1.896.

For female players, they had an average height of 159.946 centimeters, an average weight of 56.037 kilograms, an average arm length of 70.715 centimeters an average leg length of 94.008 centimeters, an average chest width of 84.161 centimeters and an average length around the upper arm of 26.764 centimeters. Moreover, their average calf length was 35.558 centimeters, their average forearm width was 5.867 centimeters, their average thigh width was 8.525 centimeters, their average fat was 19.623 %, their average muscle volum was 21.018 %, their average endomorphy was 4.590, their average mesomorphy was 4.069 and their average ectomorphy was 2.512.

Table 2 Body types of softball players classified according to their position and gender

Position	Body Type		
	Male Player	Female Player	Total
Pitcher	Endo mesomorph (4.335-5.6331.635)	Meso endomorph (4.498-4.124-2.318)	Endo mesomorph (4.402-5.01-1.917)
Catcher	Endo mesomorph (3.892-4.23-1.678)	Meso endomorph (4.881-4.155-1.974)	Meso endomorph (4.243-4.204-1.783)
First Baseman	Endo mesomorph (4.358-5.459-1.644)	Meso endomorph (4.739-4.335-2.075)	Endo mesomorph (4.474-5.116-1.776)
Second Baseman	Endo mesomorph (3.32-3.955-2.102)	Meso endomorph (3.916-3.764-2.605)	Endo mesomorph (3.598-3.866-2.337)
Third Baseman	Endo mesomorph (3.972-4.982-1.839)	Meso endomorph (4.639-4.367-1.841)	Endo mesomorph (4.292-4.686-1.840)
Shortstop	Endo mesomorph (3.264-4.254-2.293)	Meso endomorph (4.365-3.902-2.259)	Endo mesomorph (3.618-4.140-2.282)
Left Fielder	Endo mesomorph (2.719-4.174-2.372)	Meso endomorph (4.670-3.847-2.407)	Endo mesomorph (3.564-4.032-2.388)
Center Fielder	Endo mesomorph (3.912-5.043-1.647)	Endo ectomorph (4.502-3.973-4.718)	Endo mesomorph (4.217-4.490-3.235)
Right Fielder	Endo mesomorph (3.811-4.496-2.057)	Meso endomorph (5.072-4.165-2.025)	Meso endomorph (4.407-4.340-2.042)

The results of this study indicated that the male and female softball players who participated in the 39th National Games of Thailand had different body types as follows.

The male softball players in every position had endo-mesomorph body type with the average fat quantity of 15.78 percent and the total body mass index (BMI) of 25.61 which is slightly higher than the standard index. Hence, it can be considered that most Thai male softball players were medium-sized, strong, and slightly fat.

This finding corresponds with the study by Office of the Sports Science (2007) on body types and compositions of youth football players that found the average body type of the youth football players to be endo-mesomorph (3.07-4.47-2.47). Kusum (2003) found that the rugby players in the 33rd National Games of Thailand, especially the forward position had the endo-mesomorph body type, too. In fact, as softball players, while playing, football or rugby players must move towards to the ball for catching it. To do that, they have to use body strength, speed and agility and also need to have a good coordination between eyes and hands and between eyes and legs. Indeed, when they are in game for a long time, they need to use muscle endurance too.

Gripping the ball is a fundamental skill in making the ball move from one place to another using the hand components and fingers to control the ball in the hands and not to drop it. Generally, softball players use their hands and fingers to grip and to control the ball and use the muscle force to throw the ball. Therefore, if the player is medium-sized and strong, he can use the muscle force at a moderate level well (Laurence and Miller, 1967) which make gripping the ball easier and controlling the ball better with less chances of dropping it. Moreover, throwing and catching the ball are important softball skills. There are many ways of throwing the ball depending on the chances and situations. To play softball well, players need to practice throwing and catching regularly to be skillful, rapid, and safe. Catching the ball can also be done in different ways depending on the directions and levels of the ball coming towards the catcher. If the catchers are efficient, it will be difficult for the offensive team to play and they may get three outs quickly. Each inning is a protection for losing the run and to get a chance to play as the offensive team and to make the runs.

Hitting is the beginning of the runs for the offensive team. The player must use the bat to hit the ball pitched by the pitcher to the field then run to the bases. Hitting is, therefore, the heart of the offensive team, and the weapon or tool that gives advantages to the team and makes the team win. The hitting skill depends on the ability of the individuals who must dedicate to practice to be skillful.

However, not only practice is important but the correct way of hitting and suitable, harmonious, and continuous transfer of the force in hitting are also very important as they are significant components of the body type for softball players and can directly affect their playing ability. Therefore, when players are medium-sized and strong, they are considered having strong muscles to enable them to better cope with the force coming towards them (Chintanaseri, 1979) and enable them to exert moderate muscle force well (Laurence and Miller, 1967), enabling them to hit the ball with more force.

Base running is an important skill for the offensive team to occupy the bases that begins after hitting the ball to the field or after the umpire orders the player to walk. If there is a runner on a base, it begins after the ball is released from the pitcher's hand. Running to the first, the second, the third or home plate, the player must be quick and strong enough to run to the bases fastest. Thus, when the player is medium-sized and strong, he or she can run more efficiently.

For the female softball players competing in the 39th National Games of Thailand, it was found that the pitcher and the third baseman had the endo-mesomorph body type while the catcher, the first baseman, the second baseman, the shortstop, the left fielder and the right fielder had the meso-endomorph body type, and the center fielder had the endo-ectomorph body type. The findings of this study indicated that the female softball players were all slightly fat with no muscles that can be seen from the outside. However, when their heights and weights were calculated for the average body mass index (BMI), it was found that the players in every position had a suitable body mass index (the average BMI was 21.58, and the average fat quantity was 19.62 percent). When compared with the standard fat quantity in Thai female aged 20 - 29 years old, the BMI of all the female softball players was in the normal range. Therefore, the female softball players in the 39th National Games of Thailand were not fat but they look thick with soft muscles because of subcutaneous fat. This is in agreement with the study by Viviani and Baldin (1993: 400-404) who found that female volleyball players in the age group of under 18 years had the meso- endomorph body type (4-.9-3.8-2.6) and

those in the age group of over 18 years also had the meso- endomorph body type (4.7-3.9-2.3). The endomorphy, mesomorphy and ectomorphy values of these female volleyball players were very close to those of the female softball players in the 39th National Games of Thailand. It is known that volleyball players, as softball players. must use body strength, speed and agility to move towards to the ball and have a good coordination between eyes and hands to catch or hit a ball and between eyes and hands for moving while playing. Moreover, they also need to use endurance when they are in game for a long time. Thus, it can be said that the meso-endomorph body type of most softball players was suitable for the five important basic softball skills: gripping, throwing, catching, hitting, and base running.

Conclusion

This research shows that the suitable body type for male softball players is endo-mesomorph while that for female players is meso-endomorph because these body types are suitable for the five basic softball skills of gripping, throwing, catching, hitting, and base running. Therefore, persons related to selecting and developing softball players to represent in competitions at different levels should consider factors in characteristics, body types, sizes, and components of the players. Moreover, persons or organizations related to develop and promote softball players' potential at the national level should attach importance to sports medicine, nutrition, and sports psychology in addition to body types, sizes, and components.

However, the body of knowledge about characteristics, body types, sizes, and components of softball players that are suitable for the gender and softball positions provided by this study are not only very beneficial to players selection for Thai national competitions, and to the development of softball in Thailand for national and international competitions in the future but also to softball teaching and learning in educational institutions at all levels in Thailand, from secondary schools and sport schools to universities. Physical education teachers in secondary schools and sport schools can apply the findings of this research in softball

course for their students and as an approach to develop in the long term the physical form including the body types, size, and body compositions of their young students interested in becoming softball players in the future to suit the sport type, gender and positions. Since childhood is the age appropriate to develop the ability to become an athlete (Panthong, Phromthep, Kaesaman, Khasaenphan, and Satttham, 2017). Moreover, for higher education, particularly the physical education institutes and physical education department in faculties, the body of knowledge from this research can be contributed to their syllabus aimed to develop future teachers for softball as well both at undergraduate, graduate and doctoral degrees.

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