



Body Composition and Somatotype of Kho-Kho Players in Relation to their Performance

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Abstract

The aim of present investigation was to examine the somatotype and body composition between medalist and non medalist kho-kho players. This study included 72 kho-kho players of All India Inter-University, including medalists (N=36) and non medalists (N=36). Each player was tested on various anthropometric measurements necessary for the estimation of somatotype and body composition. The results indicated that medalist kho kho players were older (1 year), taller (1cm) and significantly heavier (2kg) than non medalist kho kho players. It has been found that medalists were dominant on mesomorph component, however non medalists were dominant on endomorph and ectomorph component, and differences were found insignificant. These medalists had insignificantly higher bone mass and subcutaneous tissue, and having significantly more muscle development than the non medalists. This study suggests that the optimum stature and body weight play significant role in performance of kho kho players. Finding also indicated that medalist kho-kho players were more mesomorphic and having more muscle development than non medalist players. It has been found that non-medalist players were possessed more fat percentage and have linear physique than medalist players.

Keywords: Somatotype, body composition, kho-kho players.

Introduction

In the 21st century, sport and physical activity have earned a great importance in society. With this enhanced awareness, physical, technical and psychological improvements have become priority in sport teams with the intent of making the most of the athlete's potentiality. In this regard, the known sport sciences such as physiology, biochemistry, medicine, biomechanics, anthropometry, sociology and psychology have been improved, researched and applied in competitive sport¹. Success in sports has been associated with specific anthropometric characteristics, body composition and somatotype^{2,3}. To achieve success in certain sporting event some specific anthropometric characteristics are required. It has been found that sports persons were also possessed some difference in body structure and composition in respective to individual and team sports⁴.

In India, kho-kho is one of the greatest admired indigenous sports. It is very difficult to trace the origin of kho-kho, but many experts accept that it is a transformed form of 'Run and Chase. In simple it includes pursue and touching a person. It is an extremely complicated and tactical sport in which performance is depends upon many factors such as fitness, training, technique, skill, tactic etc. It is well understood that player's success in any sports is an appropriate combination of different sports sciences, namely Anthropometry, Biomechanics, Physiology, Sports Medicine, Sports training and Psychology.

It is well known fact that there is a growing interest in improving the performance of athletes⁵. According to⁶ all over the world sports scientists are giving more emphasis in identifying the talent, strengths and weaknesses, and designing the optimal training programs for sports persons. However, in many places without taking into consideration the assessment of the nutritional status and body composition of athletes, much more time is spent on increasing the physical fitness of athletes⁷. Contemporary sport science is designed to discover talents and refine the performance of upper-class athletes as precisely as possible. However, this process is very demanding, as different sports events require different types of physique to gain maximum performance. Therefore, understanding the body composition of elite players, and then assigning corresponding competitive weights for the athletes has been done for decades and is considered a vital part of the total management process⁸. Therefore, all over the world scientists are giving attention to find out the set formula that can discover the talents efficiently and ultimately raise the standard of performance.

Somatotyping has been used fairly and extensively as a research tool for describing and understanding variations in human physique². The different somaotypes are determined by varying expressions of three bodily components of structure in an individual. These are endomorphy, mesomorphy and ectomorphy, which are responsible for developing for the viscera, musculature and skeleton, respectively. There is no doubt that at the highest level of sports there are apparent somatotypic differences between sports. It is well established

fact that physique is sports specific. In other words, we can say that to excel in certain sports, players should have specific physique. There is evidence that in several sports the most successful somatotype have changed over the time. Some studies⁹⁻¹³ suggested that in different physical activities different types of body sizes, shapes and proportions are beneficial. Thus, by studying the top level athletes, model body type is easily determined for specific sports or event. The knowledge of body type helps the coaches and trainers to prepare their athletes for competition and making better training programs.

Material and Methods

Subjects: To achieve the purpose of this study, 72 kho-kho players (medalist: n=36 and non medalist: n=36) of All India Inter University level were selected to serve as subjects. They all were tested during the All India Inter-university competition held at Lovely Professional University, Phagwara (Punjab), from 25-01-2013 to 31-01-2013. The subjects selected were of the age group 18 to 25 years.

Morphological Characteristics: Each athlete was tested for various anthropometric measurements necessary for estimations of somatotype and body composition. A set of anthropometric measurements, which included height, body weight, bicondylar widths of humerus, femur, wrist and ankle, the circumference of upper arm, forearm, thigh and calf, and the skin folds at biceps, triceps, forearm, thigh, calf (medial), supra-iliac, supra spinal and subscapular sites were taken on each subject by following standard technique by given (Heath and Carter)¹⁴. The stature was measured with the assistance of anthropometric rod and weight was evaluated by using portable weighing machine. Flexible steel tape was used to measure the Circumferences (upper arm, forearm, thigh and calf) of the body. Skinfold measurements (biceps, triceps, forearm, thigh, calf, supra-iliac, supra spinal and subscapular) measured with Harpenden skinfold caliper. Matiegka's¹⁵ Method was used to assess the bone mass and muscle mass. To calculate the fat percentage, body density was obtained by using formula devised by Durnin and Womersley's¹⁶ for male between 16 to 19 years of age and 20 to 29 years of age. Body density thus calculated was converted into body fat by equation devised by Brozek et al¹⁷. Heath and Carter² somatotype method was used to get the three components of somatotype.

Statistical Analysis: For the purpose of analysis of data, Independent t-test was applied to compare the body composition and somatotype between medalist and non medalist kho-kho Players. The level of significance was set at 0.01 level (p<0.01) and 0.05 level (p<0.05).

Results and Discussion

Table-1 exhibits the results of medalist and non medalist kho kho players in a tabular figure for the variables 'age, height and weight'. Statistical deduction stated that the values of mean and standard deviation for the variable 'age' were 21.5±1.86 (medalist) and 20.7±1.8 (Non-medalist), for height 168.41±6.32 (medalist) and 167.1±5.14 (Non-medalist) and for weight 57.5±5.69 (medalist) and 54.52±4.38 (Non-medalist). While testing the difference of mean between the medalist and non medalist the t-values for age and height came out to be 1.87 and .99, respectively, which were insignificant at .05 level of significance. However in case weight it lies at 2.48, which was significant at .05 level of significance.

Table-2 depicts the mean and S.D. value of bone mass, muscle mass and fat percentage of medalist and non medalist kho-kho players. It has been observed that medalist players were heavier in bone mass and muscle mass and possess less fat percentage than the non medalist players. Further from above table, the t ratio indicates that medalist and non medalist players do not differ significantly in bone mass and fat percentage. However, significant difference has been observed in muscle mass, (t=2.80) at .05 level when compared with each other.

Table-3 explains mean and standard deviation of somatic traits between medalist and non medalist kho-kho players. It has been observed that medalist kho kho players were less endomorphic and ectomorphic, and more mesomorphic than non medalist kho kho players. It has also revealed from the above table that there was exist insignificant difference between medalist and non medalist kho-kho players in all three components of somatotype, because they obtained (t) ratio value (for endomorphy, t=.16, for mesomorphy, t=.1.09 and ectomorphy, t=1.32) was found to be much smaller than their required't value (1.98) to be significant at .05 level of confidence.

Table-1
Comparison of age, height and weight between medalist and non medalist Kho-Kho players

| Variables | Medalist (N=36) | | | Non-Medalist (N=36) | | | t ratio |
|-------------|-----------------|------|-------|---------------------|------|-------|---------|
| | Mean | S.D | S.E.M | Mean | S.D. | S.E.M | |
| Age (Yrs) | 21.5 | 1.86 | .31 | 20.7 | 1.8 | .30 | 1.87 |
| Height (Cm) | 168.41 | 6.32 | 1.05 | 167.1 | 5.14 | .86 | .99 |
| Weight (Kg) | 57.5 | 5.69 | .95 | 54.52 | 4.38 | .73 | 2.48* |

* Significant at .05 level; ** Significant at .01 level

Table-2
Comparison of body composition between medalist and non medalist Kho-Kho players

| Variables | Medalist (N=36) | | | Non-Medalist (N=36) | | | t ratio |
|-------------|-----------------|------|-------|---------------------|------|-------|---------|
| | Mean | S.D | S.E.M | Mean | S.D. | S.E.M | |
| Bone Mass | 8.56 | 1.01 | .16 | 8.41 | .91 | .15 | .65 |
| Muscle Mass | 27.89 | 2.88 | .48 | 25.93 | 2.96 | .49 | 2.80* |
| Body Fat % | 11.22 | 2.36 | .39 | 11.29 | 2.36 | .39 | 013 |

* Significant at .05 level; ** Significant at .01 level

Table-3
Comparison of somatotype between medalist and non medalist Kho-Kho players

| Variables | Medalist (N=36) | | | Non-Medalist (N=36) | | | t ratio |
|------------|-----------------|------|-------|---------------------|------|-------|---------|
| | Mean | S.D | S.E.M | Mean | S.D. | S.E.M | |
| Endomorphy | 1.72 | .46 | .07 | 1.73 | .48 | .08 | .16 |
| Mesomorphy | 3.22 | .69 | .11 | 3.01 | .92 | .15 | 1.09 |
| Ectomorphy | 3.40 | 1.03 | .17 | 3.70 | .84 | .14 | 1.32 |

* Significant at .05 level; ** Significant at .01 level

Discussion: From the last decades it has been observed that curiosity in anthropometric characteristics and body composition of sports scientists has increased tremendously. Some sports scientists¹⁸⁻²⁰ studied that morphological characteristics and anthropometric dimensions played very significant role in ascertaining the success of an athlete. In the present study, it is evident from mean values in table-1 that medalists were older, taller and heavier than non-medalists kho kho players, but found significant difference only in body weight. The above results might be due to the reason that older players have more experience of participation in competition that helps them to achieve high performance. Advantage in height helps medalist players to achieve high performance, because greater height helps them to make greater reach during run and chase. Therefore, height is an essential factor in the success of kho-kho players. Wilmore and Costill²¹ observed that kho-kho players were significantly taller than control. In case of body weight, the medalist players showed (57.5 kg) and non medalist players show (54.5 kg), which indicate that average body weight helps the kho kho players to give better performance in the competition. Dhayanithi and Ravi²² also reported that average body-weight (55 to 64 Kg) showed high relationship with almost all the Kho-Kho skills.

According to Ghosh and Kundu²³ at all the level of competition, body composition is very important in sports performance for creating athletes profile as well as planning conditioning training plan throughout a season at. They suggest that body compositions of athletes and detecting possible differences in relation to competition levels may give coaches to better understanding of working of the athletes, so that they will give their optimal performance. While analyzing the mean values of both the groups from the table-2, it has been observed that medalist players have greater bone mass and muscle mass and possess lesser fat percentage than the non medalist players, but found significant difference only in muscle mass between them. This shows that medalist players have considerably greater

amount of muscle mass than non medalist players, which will helps them to generate more power to perform better in the competition. According to the study of Burris B, (1973) kho-kho players show significantly higher LBM values than the non-sporting population. In present study medalist kho kho players were also have higher bone mass and less fat deposits, which is considered a major precondition for a good performance in kho-kho. Silvestre et al.,²⁴ and Gomez²⁵, have also found that athletic performance of players is often negatively associated with body fat%.

It has been observed from the mean values in tables-3 that somatotyping scores of medalist and non medalist kho-kho players are 1.72-3.22-3.40 and 1.73-3.01-3.76, respectively. They are reported as mesomorph-ectomorph, which are in line with south Asian kho-kho players reported by Burris B²³, as mesomorph-ectomorph with a rating of 2.4-3.5-3.7. Medalist kho kho players are less endomorphic and ectomorphic, and more mesomorphic than non medalist kho kho players. However there was insignificant difference exists between medalist and non medalist kho-kho players in all three components of somatotype. The above results show that medalist players were less fatty, better developed and had leaner physique than non medalist kho kho players which helps them to gain high performance in kho kho.

Conclusion

The medalist kho-kho players were older, taller and significantly heavier than non medalist kho-kho players. The medalist had higher lean body mass and less amount of subcutaneous tissue than the non medalist players. However medalist kho kho players have significantly more muscle development than non medalist kho kho players. The medalist kho-kho players were also less endomorphic and ectomorphic and more mesomorphic component than non medalist kho kho players.

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