Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

A Comparative Study on Somatotypes of North Zone Badminton and Tennis Players

Dr. Brij Bhushan Singh: Associate Prof., Department of Physical Health and Sports Education, AMU, Aligarh (U.P.)
Jaswant Singh: Research scholars, Department of physical health and sports education, AMU Aligarh (U.P.)

Abstract

Badminton and tennis are the racquet sports which are played between two opposing players or two opposing pairs the size, shape and form of the players are known to play a significant role in Badminton and Tennis. The purpose of this study was to compare the somatotype profile of Badminton and Tennis players. For this purpose 90 players(50 badminton and 40 tennis players) were selected from the North Zone Badminton Intervarsity Tournament 2009 and North Zone Tennis Tournament 2010. The z-test was used for comparing the mean somatotypes of Badminton and Tennis players. Statistical analysis revealed significant differences in the mean meso and ectomorphic profiles and insignificant difference in the mean endomorphic profile of North zone Badminton and tennis players.

Key words:. Endomorphy , Mesomorphy, Ectomorphy, Badminton and Tennis

Introduction

The physique of an athlete is the configuration or build of the entire body, and the assessment of the physique is most often expressed in the context of somatotype (Maud and Foster, 1995). The somatotype is a composite of the contributions of three components: endomorphy (relative fatness), mesomorphy (relative musculoskeletal robustness), and ectomorphy (relative linearity) (MacDougall *et al.*, 1991 and Maud and Foster, 1995).

Badminton is a sports branch which can be played easily by all people from several ages, which does not drives the player to violence, which also can be used for a recreation and fitness purposes (R. C. Memedov and R. Kale, 1994). On the other hand tennis is not only a sports branch which is so popular but also has new point of views. On one hand it is a kind of sport which is a popular spare time activity and many people can exercise and this sport also became a remarkable revenue source provider (P. Unierzyski, 1995).

At high levels of play, the sport demands excellent fitness: players require aerobic stamina, agility, strength, speed and precision. It is also a technical sport, requiring good motor coordination, the development of sophisticated racquet movements and adequate anthropometrical requirement and biomechanical development.

According to Groppel and Roetert (1992) and Lei *et al.* (1993), the physical requirements of racquet sports demand efficiency in a number of fitness components. To be able to execute advanced strokes or compete effectively against progressively stronger opponents, a player would need to develop higher levels of the basic physical qualities, such as strength, power, muscular endurance, flexibility, coordination and agility.

Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

Thus we see that size, shape and form of the players are known to play a significant role in the performance of Badminton and Tennis players. Fundamental Skills of Badminton and Tennis like servicing, lifts and smashing, requires a specific type of physique having specific proportions with certain conditional abilities.

The Purpose of this study was to assess and compare the somatotype of North Zone level Badminton and Tennis players.

Procedure

Selection of subjects:

For the purpose of this study, total 90 players (50 Badminton and 40 Tennis players) were selected.

The 50 badminton players were randomly selected from North Zone Badminton Intervarsity 2009-10 held at AMU Aligarh. The 40 tennis players were selected from North Zone Tennis Intervarsity Tournament 2010 also held at Aligarh Muslim University, Aligarh.

Data Collection

Ten anthropometric dimensions are needed to calculate the anthropometric somatotype: Stature, Body Mass, four Skinfolds (Triceps, Subscapular, Supraspinale, Medial calf), two bone breadths (Biepicondylar Humerus and Femur), and two limb girths (Arm Flexed and Tensed, calf). The following descriptions are adapted from Carter and Heath (1990).

Stature (height) Taken against a height scale or stadiometer. Take height with the subject standing straight, against an upright wall or stadiometer, touching the wall with heels, buttocks and back. Orient the head in the Frankfort plane (the upper border of the ear opening and the lower border of the eye socket on a horizontal line), and the heels together. Instruct the subject to stretch upward and to take and hold a full breath. Lower the headboard until it firmly touches the vertex.

Body mass (weight). The subject, wearing minimal clothing, stands in the center of the scale platform. Record weight to the nearest tenth of a kilogram. A correction is made for clothing so that nude weight is used in subsequent calculations.

Skinfolds. Raise a fold of skin and subcutaneous tissue firmly between thumb and forefinger of the left hand and away from the underlying muscle at the marked site. Apply the edge of the plates on the caliper branches 1 cm below the fingers of the left hand and allow them to exert their full pressure before reading at 2 sec the thickness of the fold. Take all skinfolds on the right side of the body. The subject stands relaxed, except for the calf skinfold, which is taken with the subject seated.

Triceps skinfold. With the subject's arm hanging loosely in the anatomical position, raise a fold at the back of the arm at a level halfway on a line connecting the acromion and the olecranon processes.

Subscapular skinfold. Raise the subscapular skinfold on a line from the inferior angle of the scapula in a direction that is obliquely downwards and laterally at 45 degrees.

Supraspinale skinfold. Raise the fold 5-7 cm (depending on the size of the subject) above the anterior superior iliac spine on a line to the anterior axillary border and on a diagonal line going downwards and medially at 45 degrees. (This skinfold was

Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

formerly called suprailiac, or anterior suprailiac. The name has been changed to distinguish it from other skinfolds called "suprailiac", but taken at different locations.)
Medial calf skinfold. Raise a vertical skinfold on the medial side of the leg, at the level of themaximum girth of the calf.

Biepicondylar breadth of the humerus, right. The width between the medial and lateral epicondyles of the humerus, with the shoulder and elbow flexed to 90 degrees. Apply the caliper at an angle approximately bisecting the angle of the elbow. Place firm pressure on the crossbars in order to compress the subcutaneous tissue.

Biepicondylar breadth of the femur, right. Seat the subject with knee bent at a right angle.Measure the greatest distance between the lateral and medial epicondyles of the femur with firm pressure on the crossbars in order to compress the subcutaneous tissue.

Upper arm girth, elbow flexed and tensed, right. The subject flexes the shoulder to 90 degrees and the elbow to 45 degrees, clenches the hand, and maximally contracts the elbow flexors and extensors. Take the measurement at the greatest girth of the arm.

Calf girth, right. The subject stands with feet slightly apart. Place the tape around the calf and measure the maximum circumference.

Read stature and girths to the nearest mm, biepicondylar diameters to the nearest 0.5 mm, and skinfolds to the nearest 0.1 mm (Harpenden caliper) or 0.5 mm on other calipers. Traditionally, for the anthropometric somatotype, the larger of the right and left breadths and girths have been used. It is recommended that all measures (including skinfolds) be taken on the right side.

Anthropometric Somatotype

The Heath and Carter method (1967) was applied to determine Somatotype of subjects.

endomorphy = - 0.7182 + 0.1451 (X) - 0.00068 (X 2) + 0.0000014 (X 3)

where X = (sum of triceps, subscapular and supraspinale skinfolds) multiplied by (170.18/height in cm). This is called height-corrected endomorphy and is the preferred method for calculating endomorphy.

The equation to calculate mesomorphy is:

mesomorphy = 0.858 x humerus breadth + 0.601 x femur breadth + 0.188 x corrected armgirth + 0.161 x corrected calf girth – height 0.131 + 4.5.

Three different equations are used to calculate ectomorphy according to the height-weight ratio:

$$HWR = \frac{\text{Height in cm.}}{\sqrt[3]{\text{Weight in kg}}}$$

If HWR is greater than or equal to 40.75 then

ectomorphy = 0.732 HWR - 28.58

If HWR is less than 40.75 but greater than 38.25 then

ectomorphy = 0.463 HWR - 17.63

If HWR is equal to or less than 38.25 then

ectomorphy = 0.1

Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

Analysis of Data

As the objective of this study was the comparison of the Somatotypes of north zone level badminton and tennis players so we had applied Z-test to asses the significant difference between two group means at .05 level of significance.

Table – 1

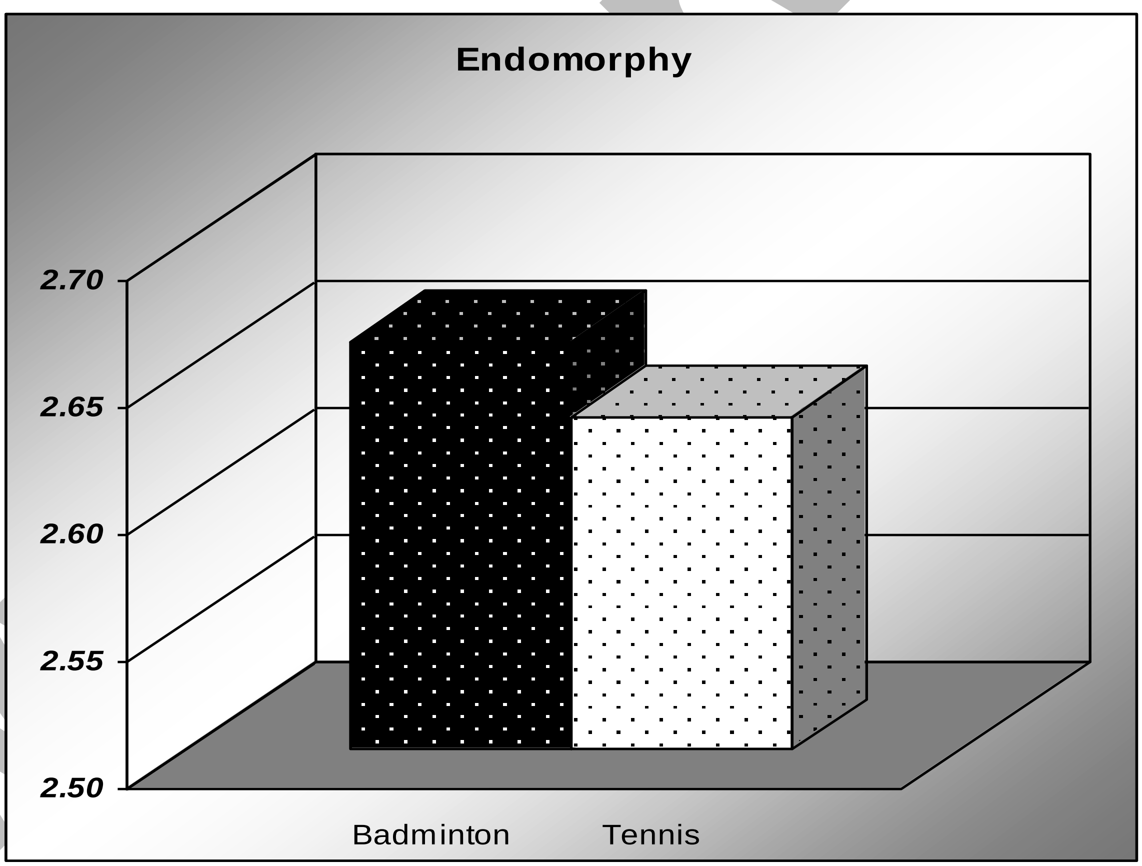
Endomorphy

Endomorphy	*Badminton Players*	*Tennis Players*
Mean	2.66	2.63
Standard Deviation	1.079122	0.969736
Obtained value $\lvert Z \rvert$	0.137173*	

*Insignificant at .05 level

Table shows insignificant obtained Z value for one tail test, which leads us to conclude that the mean Endomorphy of Badminton player was insignificantly greater than the mean endomorphy of Tennis players.

Figure- 1



Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

Table – 2

Mesomorphy

Mesomorphy	*Badminton Players*	*Tennis Players*
Mean	3.17	4.36
Standard Deviation	1.114164	1.193815
Obtained value $\|Z\|$	4.83597*	
The mean mesomorphy of Tennis players is > than mean mesomorphy of Badminton players by 27.26%.		

* *Significant at 0.05 level*

Table-2 shows significant obtained Z value for one tail test, which leads us to conclude that the mean mesomorphy of tennis player was significantly (27.26%) greater than the mean mesomorphy of Badminton players.

Figure -2

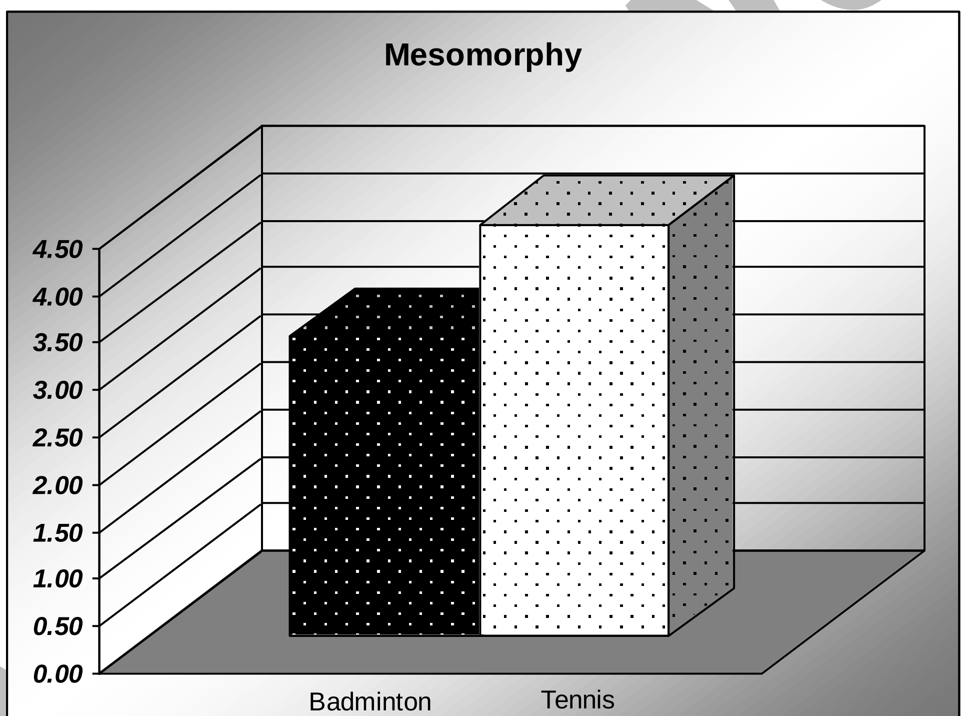


Table – 3

Ectomorphy

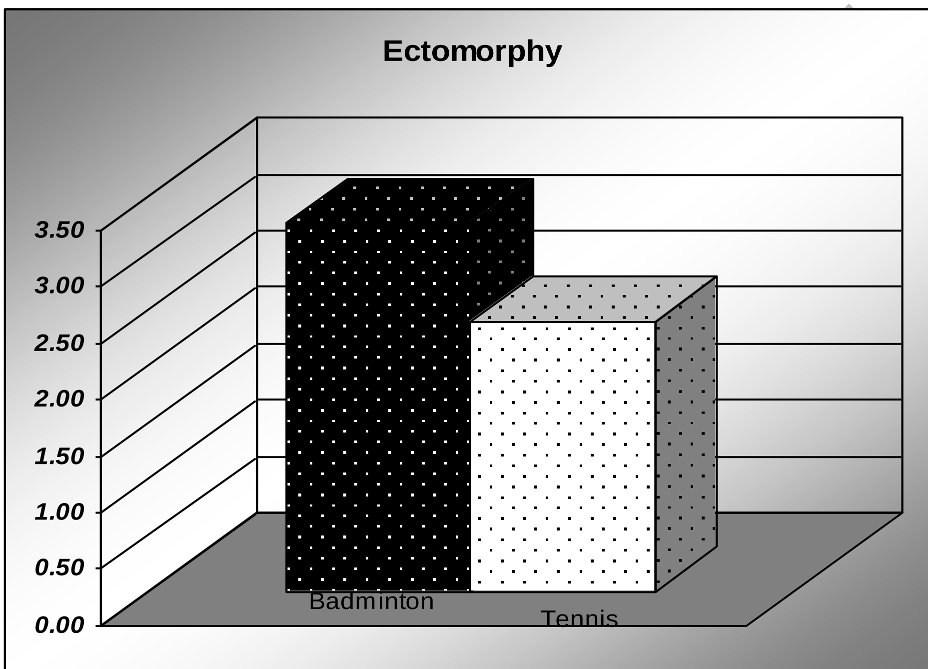
Ectomorphy	*Badminton Players*	*Tennis Players*
Mean	3.26	2.39
Standard Deviation	1.176	1.228
Obtained value $\|Z\|$	3.403927*	
The mean ectomorphy of Badminton players is > than mean ectomorphy of Tennis players by 26.7%.		

* *Significant at 0.05 level*

Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

Table shows significant obtained Z value for one tail test, which leads us to conclude that the mean Ectomorphy of Badminton player was significantly 26.7% greater than the mean Ectomorphy of Tennis players.

Figure -3



DISCUSSION OF FINDINGS

The Statistical technique revels insignificant difference in the mean edomorphy of badminton and tennis players. Whereas mean mesomorphy of Tennis players was significantly greater than the mean mesomorphy of Badminton players by 27.26%. However mean Ectomorphy of Badminton player was significantly (26.7%) greater than the mean Ectomorphy of Tennis players.

The somatotype measurement is an indication of the general build or configuration of an individual. The three components of the somatotype include the relative fatness (endomorphy), the relative musculoskeletal robustness (mesomorphy) and the relative linearity (ectomorphy) of the individual, and the highest value gives an indication of the general shape of the individual (**Lieshout 2002**).

The Tennis players in this study are highest in their mesomorphic components. The endomorphic values were found to be slightly similar, but ectomorphy of tennis players is slightly lower than the badminton players. To gain an advantage in badminton the players should preferably have a tall, lean and muscular build. They would need to be high in their meso and ectomorphic components, and low in their endomorphic component. Both the tennis and badminton players could be at a slight disadvantage due to the high endomorphic value.

ISSN 0976-9714

Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

REFERENCE

Memedov, R. C., Kale R., 1994, *Uçan Tüytop Badminton.* İstanbul: Başak Ofset.

Unierzyski P., 1995, *Influence of Physical Fitness Specific to the Game of Tennis, Morphological and Psychological Factors on Performance Level in Tennis in Different Age Groups.* Science and Racket Sports, E&FN Spon, London: 61-68.

Groppel, J.L. and Roetert, E.P. (1992). Applied physiology of tennis. *Sports Medicine,* 14(4):260 - 268.

Lei, R.R.; Deng, S.X. and Lu, L.F. (1993). Study on the physiological function, physical quality and mental characteristics of the Chinese badminton players. *Chinese Sports Science Technology,* 29:28 - 38.

Reilly, T.; Secher, N.; Snell, P. and Williams, C. (1990). *Physiology of Sports.* London: E. & F.N. SPON.

Chin, M.; Wong, A.S.K.; So, R.C.H.; Siu, O.T.; Steininger, K. and Lo, D.T.L. (1995). Sport specific testing of elite badminton players. *British Journal of Sports Medicine,* 29(3):153 - 157.

Elliot, B.C.; Ackland, T.R.; Blanksby, B.A.; Hood, K.P. and Bloomfield, J. (1989). Profiling junior tennis players part 1:Morphological, physiological and psychological normative data. *Australian Journal of Science and Medicine in Sport,* 21(3):14 - 21.

Elliot, B.C.; Ackland, T.R.; Blanksby, B.A. and Bloomfield, J. (1990). A prospective study of physiological and kinanthropometric indicators of junior tennis performance. *Australian Journal of Science and Medicine in Sport,* 22(4):87 - 92.

Wilmore, J.H. and Haskell, W.L. (1972). Body capacity of professional football players. In: T. Reilly; N. Secher; P. Snell and C. Williams (Eds.), *Physiology of Sport* (371 – 419). London: E and FN Spon.

Lieshout K. A. V. (2002). "Physiological Profile of Elite Junior Badminton Players In South Africa" An MPhil (Sport Science) Dissertation of the Department of Sport and Movement Studies, Rand Afrikaans University, Johannesburg p-69.

Heath, B.H., & Carter, J.E.L. (1967). A modified somatotype method. American Journal of PhysicalAnthropology, 27, 57-74.

Carter, J.E.L., & Heath, B.H. (1990). Somatotyping - Development and Applications. Cambridge:Cambridge University Press.

Mac Dougall, J.D.; Wenger, H.A. and Green, H.J. (1991). *Physiological Testing of the High-Performance Athlete.* Champaign, Illinios: Human Kinetics.

ISSN 0976-9714

Variorum, Multi- Disciplinary e-Research Journal
Vol.-02, Issue-I, August 2011

Maud, P.J. and Foster, C. (1995) *Physiological Assessment of Human Fitness.* Champaign, Illinios: Human Kinetics.