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Comparative study of muscular strength among somatotypes of National female baseball players

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Abstract
The main purpose of the study is to find the comparison of muscular strength among somatotypes of National female baseball players. In this investigation (30) Female National Base-Ball Players studying in various educational institutions were selected as sample. The population was the (30) Female National Base-Ball Players ranging in between 20 to 26 years of ages from various region were selected as subjects by applying Random sampling technique. Somatotype components (endomorphy, mesomorphy and ectomorphy) of the subjects were calculated according to Carter and Heath anthropometric method (1990). Mean and standard deviation were determined for each variable. The analysis of variance (one-way ANOVA) was employed to compare mean differences between the somatotype. A 0.05 level of probability was used to indicate statistical significance. Result: There was no significant difference in the right and left hand grip strength among endomorphy, mesomorphy and ectomorphy of national female baseball players.

Keywords: muscular strength, somatotypes, baseball players

Introduction
There are so many kinds of people we find in the society. Each individual differs from others. These diversity is found because of having different psychological and economical status, culture, cast, creed, environment, persona, and very important "The Body Structure" of that particular individual. Every person in the world always wishes to have good looking Body Structure. A human being has a tendency to classify, analyse and invent something, which makes his life better and joyful. So the Body structure, which is also not an exception to be studied hence classified, analysed and considered by many scientists. After long journey of the scientific study by many researchers a term somatotype is established and became popular to recognize body structure.

Sheldon's concept of the three components of physique rated on scales from 1-7 was unique break from the traditional categorical placement of all physiques into only 2, 3 or 4 categories. The three-number rating provided for a wide variety of possible somatotypes. Aa long as he maintained that the somatotype was "permanent morphogenotype", there were persistent criticisms of the method. Human biologists and others saw greater utility in the somatotype as a morphoohenotype – i one that could change.

In response to criticisms of the somatotype method. Sheldon developed a "new" method called the Trunk Index method [1]. This consisted of planimetry of trunk areas marked on somatotype photographs, along with tables of maximal and minimal weight and stature, and a table of the somatotype height weight ratio and trunk indices. This method did not answer the main criticisms of the original method and has not been widely used.

Muscular strength is the ability of the muscle to exert force during an activity. The key to making your muscles stronger is working them against resistance, whether that is from weights or gravity [2].

Strength is the ability of the individual to exert force against an object. It is the ability to overcome resistance or to act against resistance. Muscle strength is what happens when the nervous system communicates a message to the muscle fibers to contract so as to produce force. Often the force produced by a muscle contraction is against resistance. Strength should not be considered as a product of only muscular contractions. It is in fact a product of voluntary muscular contractions caused by the neuromuscular system. The abdominal strength is very much useful in the field of sports and games. When an individual possess a high degree of abdominal strength, he will be able to perform any type of activity such as running, jumping and throwing. The abdominal strength helps to maintain the body postures, thereby involving in many activities in the field of sports and games. Lifting a load or moving an inanimate or animate object essentially depends on the abdominal muscular strength.

Strength is the most important element in motor performance. Strength is a consistent differentiator of ability to make and to achieve success in sports. Young athletes develop strength through natural, unbroken movements such as jumps, throws and other body weight exercises. Proper strength training serves not only to improve overall performance, but also to secure the body and help the athlete avoid injury.

Methodology
In this investigation (30) Female National Base-Ball Players studying in various educational institutions were selected as sample. The population was the (30) Female National Base-Ball Players ranging in between 20 to 26 years of ages from various region were selected as subjects by applying Random sampling technique.

Administration of the test
Somatotype [3]
Somatotype components (endomorphy, mesomorphy and ectomorphy) of the subjects were calculated according to

Carter and Heath anthropometric method (1990). Heath and Carter derived two ways to calculate the anthropometric somatotype

a) Somatotype rating form.
b) Equation method.

Equations for a decimal anthropometric somatotype will be taken for the further studies to calculate the somatotype as given below

The second method of obtaining the anthropometric somatotype is by means of equations into which the data are entered.

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 arm girth + 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:

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

Muscular Strength

Hand Grip Dynamometer Test [4]

To measure the maximum isometric strength of the hand and forearm muscles. The subject first dried the hand with chalk. The Hand grip dynamometer was adjusted and placed comfortably in the hand. The second joint (articulation) of the fingers had fitted snugly under the handle. The female assumed a standing position (using an upper cut portion) in a way so that the instrument was not being touched by the body or and other object. The female gave an all-out effort, statically contacting the muscles of hand, wrist and forearm for at least two to three seconds. The same process was repeated with the other hand.

The female was given three trail, and best of taken as the score. The score was recorded to the nearest half kilogram.

Statistical Analysis

Mean and standard deviation were determined for each variable. The analysis of variance (one-way ANOVA) was employed to compare mean differences between the somatotype. A 0.05 level of probability was used to indicate statistical significance.

Table1: Mean and SD of the right hand grip strength of the endomorphy, mesomorphy and ectomorphy

Groups	*Mean*	*SD*
Endomorphy	26.30	3.02
Mesomorphy	30.60	6.17
Ectomorphy	27.30	3.5

The descriptive statistics i.e. mean (M) and standard deviation (SD) of the right hand grip strength of the endomorphy, mesomorphy and ectomorphy was presented in the table- 1. Results revealed that the endomorphy female were found that 26.30 ± 3.02, mesomorphy female 30.60± 6.17 and ectomorphy 27.30±3.5 respectively.

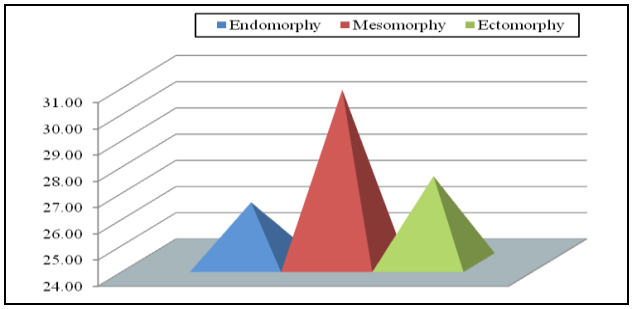

Fig 1: Showing Mean Difference among the endomorphy, mesomorphy and ectomorphy female in right grip strength

Table 2: Analysis of variance in right hand grip strength among endomorphy, mesomorphy and ectomorphy

Source of Variation	SS	df	MS	F
Between Groups	101.27	2	50.6333	2.557
Within Groups	534.60	27	19.8	

*Significant at 0.05 level, Tabulated $F_{0.05}(2, 27) = 3.354$

From the table 2 it is clear that the obtained 'F' ratio for groups is 2.557, which is less than the table value of 3.354 with df 2 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that, insignificant differences in among endomorphy, mesomorphy and ectomorphy of testing on right hand grip strength.

Since the obtained F-ratio was found to be not significant, to determine the paired mean difference, Least Significant Different (LSD) Post Hoe Test was not employed.

Table 3: Mean and SD of the left hand grip strength of the endomorphy, mesomorphy and ectomorphy female

Groups	*Mean*	*SD*
Endomorphy	24.90	4.63
Mesomorphy	28.80	6.88
Ectomorphy	25.30	5.06

The descriptive statistics i.e. mean (M) and standard deviation (SD) of the left hand grip strength of the endomorphy, mesomorphy and ectomorphy was presented in the table- 3. Results revealed that the endomorphy female were found that 24.90 ± 4.63, mesomorphy female 28.80± 6.88 and ectomorphy 25.30±5.06 respectively.

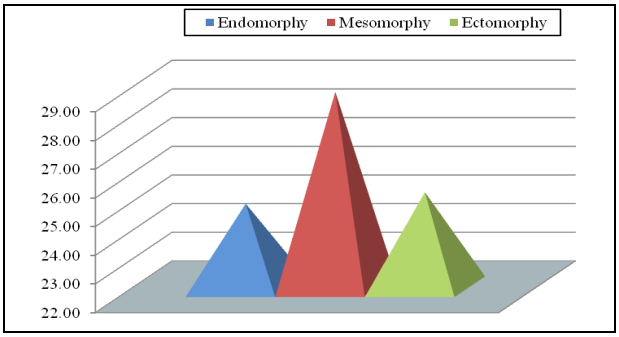

Fig 2: Showing Mean Difference among the endomorphy, mesomorphy and ectomorphy female in left grip strength

Table 4: Analysis of variance in left hand grip strength among endomorphy, mesomorphy and ectomorphy female

Source of Variation	SS	df	MS	F
Between Groups	92.07	2	46.0333	1.465
Within Groups	848.60	27	31.4296	

*Significant at 0.05 level, Tabulated $F_{0.05}(2, 27) = 3.354$

From the table 4 it is clear that the obtained 'F' ratio for groups is 1.465, which is less than the table value of 3.354 with df 2 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that, insignificant differences in among endomorphy, mesomorphy and ectomorphy of testing on left hand grip strength.
Since the obtained F-ratio was found to be not significant, to determine the paired mean difference, Least Significant Different (LSD) Post Hoe Test was not employed.

Conclusion

On the basis of the result drawn with the mentioned methodology the following conclusion were sort out:
There was no significant difference in the right and left hand grip strength among endomorphy, mesomorphy and ectomorphy of national female baseball players

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