Somatotype of Regional Cricketers of West Bengal in India

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ABSTRACT

Heath-Carter somatotypes were sketched on 40 regional junior male cricketers of West Bengal to understand the structural differences according to specialization. The anthropometric profiles included the measurement of five skinfolds, two breadths, two girths along with height and weight. A significant difference (p ≤ 0.05) has been observed in height and humerus breadth among batsmen and bowlers according to Welch's t-test. Batsmen are endomorphic mesomorph (3.2 – 3.4 – 2.9) and bowlers are mesomorph ectomorph (3.2 – 3.5 – 3.5). The overall mean somatotype of the Cricketers has been found balanced mesomorph (3.2 – 3.5 – 3.2). The study revealed that bowlers have relatively greater humerus breadth to support, generate maximum power from elbow joint during bowling. A lower value of relative segments (except arm girth) has been observed in cricketers compared to Phantom scores. The study suggests specific physical training of the regional cricketers according to specialization to develop mesomorphic components. The study will help coaches, trainers, nutritionists, practitioners to implement effective training, diet schedules accordingly and data can be used as reference values for future investigations.

Key words: Anthropometry, Somatotype, Cricket, Batsmen, Bowlers

INTRODUCTION

Somatotype is the quantification of human body through some specific physical measurements. It deals with morphological state of the human physique according to the relative contribution of three fundamental elements; endomorph (fattiness), mesomorph (muscularity) and ectomorph (linearity). With a numerous variety of physical structures, it is a global consideration that specific physical characteristics played an important role to perform at the highest level in a specific sport [1]. Cricket is a field based team sports played throughout the year, exposed to demanding schedules, with longer periods of training and practicing [2]. In the last decade of past century, Australia was the dominating team of world cricket, addressed their fitness and body types as the key factor of success. With the introduction of T/20, the physical demand for cricket increased dramatically. According to game format and specialized role physical demands also vary which taxes on body type [3]. Professional cricketers have a tall, athletic built body structure, with definite morphological differences existing between batsmen, bowlers and all-rounders [4-6]. The batsmen tended to be shorter and lighter, although possessing greater relative fat mass than the bowlers. The bowlers were found to be tall, with long legs, broad shoulders and a small amount of fat in the thigh and shoulder regions [4]. Success in cricket, like other competitive sport, depends on various factors including physical fitness, skills, mental strength, stamina, body type as well as the morphological characteristics of the players [7]. There are hardly any scientific data available from the Indian perspective at present regarding the Somatotype of the cricketers. Keeping in mind this gap in knowledge, this study will focus on sketch out Somatotype of junior level cricketers of

West Bengal according to their specialization. The study will help to understand body type in perspective of national and international cricketers conferring to available world literature.

METHODS

The participants

Forty male volunteers were purposively selected from the regional training camp under the guidance of the Cricket Association of Bengal. According to their specialization cricketers were categorized into two disciplines; batsmen (including batting all-rounder and wicketkeeper) and bowlers (including spinners and medium-pacer and bowling all-rounder). The entire volunteer read the brochure outlining the purpose, procedures, and benefits of the study. A brief questionnaire (personal information and training history) and written consent were filled by the volunteer before the measurement. The volunteers who were under 18 years, consents were duly signed by their parents. The data were collected under natural environmental conditions in morning (between 8:00 am to 11:00 am). The study was approved by the ethical committee of Ramakrishna Mission Vivekananda Educational and Research Institute.

Procedure of data collection

All variables (Table 1) were measured by a Level 1 anthropometrist recognized by the International Society for the Advancement of Kinanthropometry (ISAK), in accordance with the ISAK guidelines. All the variables were measured three times and the mean value taken for analysis. The Technical Errors of Measurement (TEM) Scores were within 5% for skinfolds and within 1% for the remaining variables [8].

Standing height was measured during inspiration using a stadiometer to nearest 0.1 cm (Industrial & Commercial Services (ICS), India). Body mass was measured using a digital weighing scale to nearest 0.1 kg (Dr. Trust, USA). Selected skinfolds were measured using Harpenden calipers to nearest 0.1 mm (Baty, UK), girths were measured using a flexible anthropometric steel tape to nearest 0.1 cm (Cescorf, Brazil), and bi-epicondylar humerus and femur breadth were measured using the sliding caliper to nearest 0.1 cm (ICS, India) [8].

Data analysis

Descriptive statistics such as mean, standard deviation and Phantom Z-score were calculated. Data were analyzed separately for batsmen and bowlers. The hypotheses of normality and homogeneity of the variance were analyzed via Anderson-Darling test. Parametric analysis was performed because majority of the data were normally distributed. An independent sample t-test for unequal variance assuming equal population means was performed to reveal the differences between groups. Statistically significant level was considered as p values ≤ 0.05. Graphical expression and analyses were performed using the Gnumeric spreadsheet (1.12.48) free statistical software.

RESULTS

Descriptive statistics of anthropometric characteristics in batsmen and bowlers (mean ± SD) are shown in Table 1. A significant difference ($p \leq 0.05$) has been observed in standing height and humerus breadth among batsmen and bowlers according to Welch's t-test.

Table 1. Basic anthropometric characteristics of the Cricketers according to specialization

Variables	Batsmen	Bowlers
Age (years)	17.4 ± 1.4	17.2 ± 1.2
Standing height (cm)	167.2 ± 4.6	171.2 ± 5.0*
Body Weight (kg)	59.6 ± 7.1	60.7 ± 10.2
Biceps skinfolds (mm)	4.8 ± 1.8	5.1 ± 1.8
Triceps skinfolds (mm)	9.4 ± 4.1	9.7 ± 3.8
Subscapular skinfolds (mm)	11.1 ± 4.1	11.3 ± 5.0
Supraspinal skinfolds (mm)	11.3 ± 4.8	11.5 ± 5.0
Medial calf skinfolds (mm)	11.4 ± 4.9	11.6 ± 6.3
Humerus breadth (cm)	6.2 ± 0.7	6.8 ± 0.8*
Femur breadth (cm)	9.1 ± 0.4	9.0 ± 0.9
Arm girth flex (cm)	27.6 ± 2.2	27.7 ± 2.8
Max. calf girth (cm)	34.5 ± 2.2	34.8 ± 3.5
BMI (kg/m²)	21.3 ± 2.1	20.7 ± 2.8
Body fat percentage (%)	14.7 ± 4.4	14.9 ± 4.7

Graphical representation of Somato components (endomorphy, mesomorphy and ectomorphy) are shown in Figure 1. The comparative modified box plot along with mean values of somato components are displayed underneath.
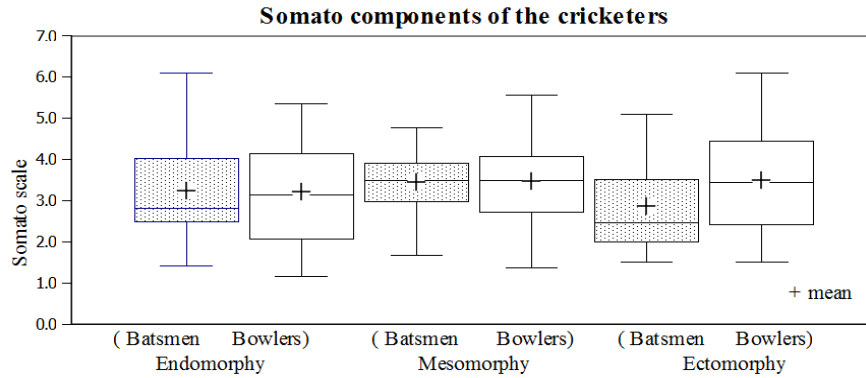

Figure 1. Graphical representation of the somato components of the cricketers

Somato plotting of all the cricketers are displays in Figure 2. The three morphological components was converted and represented in 12 points somato graph [9].
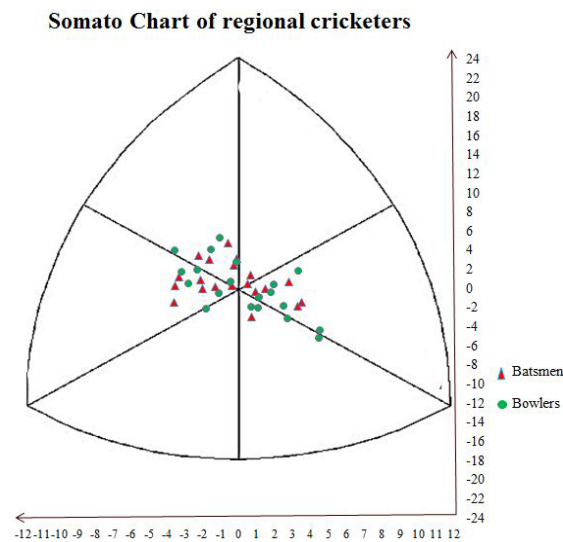

Figure 2. Somato chart of all regional cricketers

Comparisons of relative anthropometric variables of batsmen and bowlers with phantom Z score are displayed in Figure 3. Phantom Z score '0' denotes relative segment value of reference man [8,9].
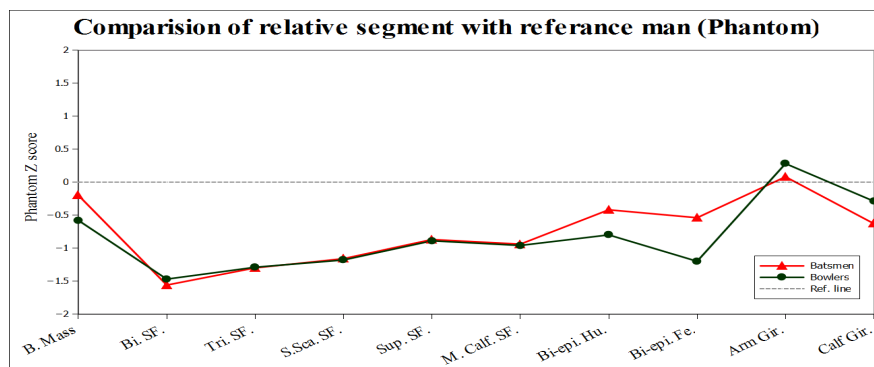

Figure 3. Comparison of relative segment of the cricketers with phantom reference Z score

DISCUSSION

It is well known that cricket is a skill-oriented game, although physical fitness played an important role. According to specific skill, cricketers are divided into batsmen and bowlers, more specifically batsmen (openers/upper order, middle order, and lower order), bowlers (spinner, pacer), all-rounders (batting, bowling), wicket keepers, etc. The physical structures of the cricketers are different than other populations. Average heights of the cricketers are higher than the sedentary population of West Bengal [10] and bowlers are significantly taller than that of batsmen. The height and weight of the cricketers according to age, same as Indian Academy of Pediatrics (IAP) growth chart norms [11]. Although height of the batsmen lies in lower quartile range and in case of bowlers lies in upper quartile range. The body weights of the cricketers are lower than ideal body weight according to Devine formula (1974). However height of an individual largely depends on genetic potentials, nutrition of early childhood and economic-social health status. Physical activity or specific physical training of the cricketers may also be cause greater height of the cricketers. At the time of growth and development, active physical training changes the physiological structure of young sportsmen.

Morphological characteristics of regional batsmen and bowlers have been found merely similar. Bowlers have to bowl (a form of throwing) continuously for a prolonged time during net practice sessions that may cause larger bi-epicondyle humerus breadth. The Somatotype analysis of the regional cricketers of west revealed that at U-19 age group they are balanced mesomorph. Further, it was observed that batsmen are endomorphic mesomorph and bowlers are Mesomorph ectomorph [6]. According to somato rating scale cricketers have moderate relative subcutaneous fat which covers muscle and bone outlines, increased muscle bulk and thicker bones and joints, along with moderate bulk per unit of height and more stretched-out. It is well known that desirable somato structure for best performance is ectomorphic mesomorph. Although no significant difference has been observed in absolute skin folds, breadth, girth, BMI, height weight ratio and percentage of body fat measurement but a trend of higher value have been found in bowlers. The percentages of body fat and BMI of the cricketers are similar to inter-university male cricketers of India [12]. It is well-known cricket is endurance based intermittent sports. Physical and physiological demands of the cricketers differ according to specialized category and match format at professional level which may alter anthropometric structure. So, specific physical training according to specialization is important but very rare in regional cricket, only during skill/net practice session they trend accordingly. A lower value of anthropometrical characteristics (except arm girth) has been observed in cricketers compared to reference man (Phantom) which denotes structural difference. In intuition of somatotopy success in cricket associated with moderate (not extreme) mesomorphic body type. There are enough evidence in world literature indicates bowlers are more ectomorphic and taller than batsmen and batsmen are more mesomorphic than bowlers but in case of endomorphy component both are identical [5, 13]. Success of a batsman influenced by bursts of power and speed which inherent quality of mesomorphy and fast-twitch fibers, the study also supports this observation. Although, somatotypes also influenced by genetics, socio-economic structure, lifestyle and nutritional status which is neglected in this study. While stereotyped is not good all time because all individuals are unique and their anthropometric, physical, physiological characteristics can affect in success dramatically. Adaptation of physiological system depends on physical training and specific activity of the sports. Mesomorphy components of that cricketers are relatively higher followed by ectomorphy and endomorphy components, indicates cricketers in this study possess a meso-ectomorphic physique [14]. Bowlers have relatively greater humerus breadth than the batsmen indicate that maximum power originates from elbow joint during bowling. Throwing ability of the bowlers may also be higher than batsmen. Femur breadth of the cricketers helps to generate strength from surface and maintain balance. No significant differences exist in somato component of regional cricketers of West Bengal. Relatively higher mesomorphic value has been observed in batsmen may be for greater balance, power and strength. Somatotype characteristics of present study shadowed by other studies indicate a dominant mesomorph physique required for cricket.

CONCLUSION

From this study, it can be concluded that with some certain deviation regional cricketers of West Bengal are Balance Mesomorph. The endomorphic and mesomorphic components are merely same in batsmen and bowlers but a lower value has been observed in ectomorphic components. Some development in mesomorphic component is needed for regional cricketers. The chronological age, height and weight are ideal according to IAP standard. The study will help coaches, dietitians, trainers to train cricketers with suitable nutritional needs according to their specialization. The anthropometric values of regional cricketers can be used as reference values for future investigation.

ACKNOWLEDGMENTS

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

CONFLICT OF INTEREST

The authors declare no conflict of interest for this study.

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