A Study on Anthropometric Profile and Somatotype of Sub-Junior Kabaddi Players of West Bengal

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Abstract

Objective: The aim of present investigation was to find out the anthropometric variables and somatotype and to compare these between sub-junior rural and urban kabaddi players of west Bengal.

Methodology: For the purpose of the study 30 boys and 30 girls (Total 60) subject were randomly chosen of which fifteen boys and fifteen girls (B_r=15 & G_r=15) were from rural area and rest fifteen boys and fifteen girls (B_u=15 & G_u=15) were from urban area. The age of the subjects ranged from 12-16 years. For the purpose of the study subject were selected from Chakdaha Kabaddi Association, Chandannagar Saptasammilani Sangha, Naihati Kabaddi Club and Mankundu Friends' Union Club. Written consent was taken prior to the collection of data from the secretary of the unit of the respective clubs. Anthropometric measurements of all the subjects were taken by appropriate tools and techniques according to the guidelines of revised Heath & Carter somatotype manual (2002) which was used for calculating somatotype in the present study.

Statistics: Mean standard deviation (SD) and independent t-test were the statistics used in the study for data interpretation. Level of significant difference between two groups was set at $p<0.05$. For statistical calculations Excel Spread sheet of windows version10 was used.

Result: Significant difference was observed in only anthropometric variables i.e. humerous bredth and only somatotype component i.e. endomorphy between the rural and urban sub-junior boys kabaddi players of West Bengal. But no significant difference was observed in any anthropometric variables and somatotype components between the rural and urban sub-junior girl's kabaddi players of West Bengal.

Conclusion: It can be concluded form the results of the study that the Rural and urban sub-junior girls and boys kabaddi player of West Bengal are predominantly endomorphic in somatotype. In humerous breadth and mesomorphy the rural sub-junior boy's kabaddi players are significantly higher than the urban sub-junior boy's kabaddi players. On the other hand there is no significant difference in anthropometric variables and somatotype components between rural and urban girl's sub-junior kabaddi players of West Bengal.

Key Words: Rural area, Urban area, Somatotype, Endomorphy, Mesomorphy, Ectomorphy.

1. Introduction:

No human is alike in this world. Every individual is unique and differ from each other in physiological, psychological and sociological aspect. In sports world physiological characteristics or physique play an important role. Success in sports has been associated with specific anthropometric characteristics, body composition and somatotype. To achieve success in certain sporting event some specific anthropometric characteristics are required (Manohar L. 2015). Physical trait of a sportsman influences the sports performance significantly revealed by different studies .The characteristics of physique apparently associated with success in sport and other forms of physical performance .Game specific physique is an important factor in sport performance besides other physiological variables and skills (Adhikari A., McNeely E. 2015). Kabaddi is a combat type sports demanding Strength, power, agility. Thus, physical structure is an important factor that contributes to success in Kabaddi game. The physique of athletes is suggested to contribute to their performance (e.g., Bloomfield et al., 1994; Carter and Heath, 1990). Somatotype is a unique method for the classification of human physique which was first invented by William Sheldon in 1940.Later on the technique was modified by Barbara Hanyman Heath and Lindsay Carter. The technique of somatotype is used to appraise body shape and composition. The

somatype is defined as the qualification of the present shape and composition of the human body. It is expressed in the three-number rating representing endomorphy, mesomorphy and ectomorphy components respectively, always in the same order. Endomorphy is the relative fitness, mesomorphy is the relative musculo-skeletal robustness, and ectomorphy is the relative linearity or slenderness of a physique. The Heath –Carter method of somatype is the most commonly used technique today.

There are three way for obtaining the somatype viz.1). The anthropometric method, in which anthropometry is used to estimate the criterion somatotype. 2) The photoscopic method, in which rating are made from a standardized photograph.3). The anthropometric plus photoscopic method, which combines anthropometry and ratings from a photograph – it is the criterion method. In the present study anthropometric somatype method was used. The present research project was undertaken by the researchers as they were interested to find out the difference of somatype of sub-junior kabaddi players (Boys & Girls) of rural and urban areas.

2. Research Process and Methodololgy:

For the purpose of the study 30 boys and 30 girls (Total 60) subject were randomly chosen of which fifteen boys and fifteen girls (B_r=15 & G_r=15) were from rural area and rest fifteen boys and fifteen girls (B_u=15 & G_u=15) were from urban area. The age of the subject ranged between 12-16 years. For the purpose of the study subject were selected from Chakdaha Kabaddi Association, Chandannagar Saptasammilani Sangha, Naihati Kabaddi Club and Mankundu Friends' Union Club. Written consent was taken prior to the collection of data from the secretary of the unit of the respective clubs. Anthropometric measurements of all the subjects were taken by appropriate tools and techniques according to the guidelines of revised Heath & Carter somatotype manual (2002) which was used for calculating somatotype in the present study.   In the present study anthropometric somatotype technique was used. For the present study following anthropometric measurements were taken as data to calculate the somatotype of the subjects' viz. a) *Body weight* by weighing machine b) *Height* by anthropometric Rod c) *Triceps, Subscapular, Supraspinale* and *Calf* skinfolds by Harpenden calliper d) *Humerus breadth* and *Femur breadth* by small sliding calliper e) *Armgirth* and *Calf girth* by steel tape. For calculating Endomorphy, Mesomorphy and Ectomorphy ratings following regression equations were used.
For measuring endomorphy the equation was:

> **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 was:

> **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.

Where Corrected arm girth = biceps girth - triceps skinfold in cm.
       Corrected calf girth = Calf girth - calf skinfold in cm.

Three different equations were used to calculate ectomorphy according to the height-weight ratio HWR. Where $HWR = \frac{Height}{\sqrt[3]{weight}}$ this ratio is also called Ponderal Index.

> 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

In all the above measurements and procedure standard guidelines were followed.

[24]

Mean and standard deviation of each variable were calculated. For the purpose of analysis of data, Independent t-test was applied to compare the somatotype between rural and urban female school children. For statistical calculations Excel Spread Sheet of windows version 10 was used.

3. Results of the Study:

In **Table – 1,** the mean and standard deviation of age, height, and weight of the subjects of four groups have been presented. In **Fig-1,** the descriptive statistics of two groups of subjects have been presented.

Table - 1
Descriptive statistics of boys' and girls' rural and urban subjects in Age, Height and weight

Sl No.	Name of the groups		No. Of subject	Age (years) Mean ± SD	Height (cm) Mean ± SD	Weight (kg) Mean ± SD
1	Boys	Rural	15	13.72 ± 1.22	154.93 ± 9.05	43.13 ± 8.14
		Urban	15	13.53 ± 1.24	149.47±12.94	42.07±10.23
2	Girls	Rural	15	13.53 ± 0.99	150.31 ± 8.87	40.63 ± 6.74
		Urban	15	13.27 ± 0.88	148.91 ± 7.42	40.47 ± 6.80
Total No. of Subject			60			

In **Fig-1,** the descriptive statistics of two groups of subjects have been presented.
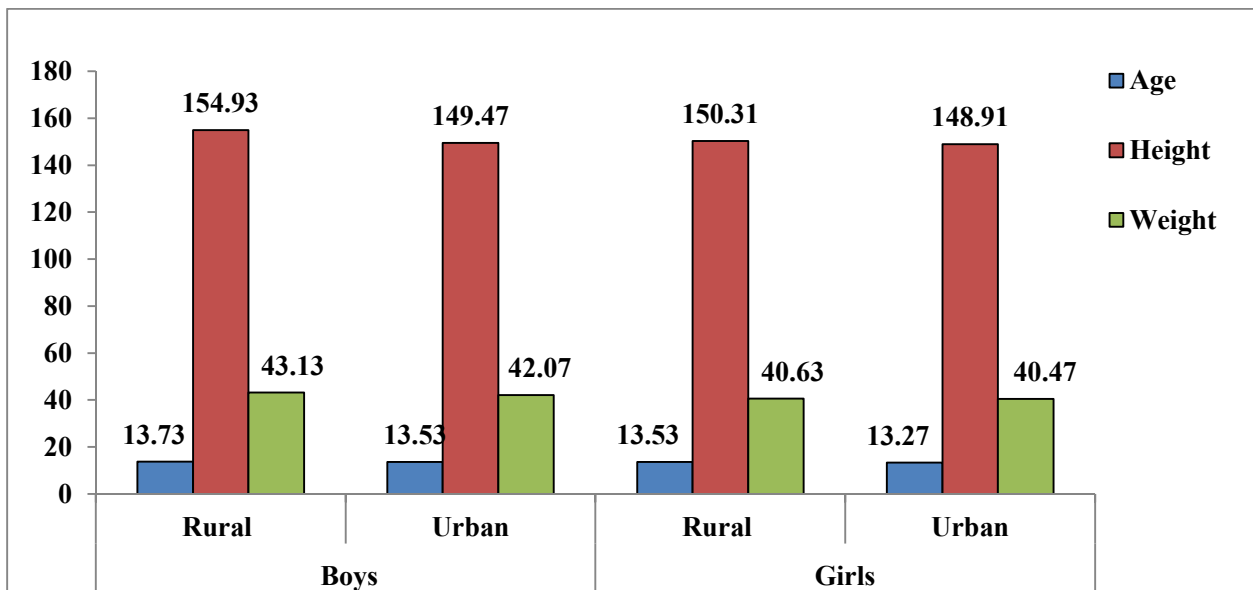

Fig-1: Descriptive statistics of rural and urban boys' and girls' sub-junior Kabaddi Players

Table - 2
Comparison of anthropometric characteristics of rural and urban Boys

Name of the Variables		Rural	Urban	t-value
		Mean ±SD	Mean ±SD	
Ponderal index or HWR $(\mathrm{cm.kg}^{-\frac{1}{3}})$		44.43 ±2.40	43.29 ±2.21	1.34
Skinfold Thickness (mm)	Triceps	6.47 ± 4.22	9 ± 5.15	1.47
	Subscapular	6.73 ± 7.46	8.13 ± 5.42	0.59
	Suprailiac	6.33 ± 8.05	7.93 ± 5.86	0.62
	Calf Skin	5.8 ± 4.59	8.73 ± 4.5	1.77
Muscle Girth (cm)	Arm girth	22.12 ± 2.95	22.03 ±2.93	0.08
	Calf girth	29.39 ± 2.99	29.93 ± 3.41	0.46
	Corrected arm girth	15.65 ±4.01	13.03 ± 4.11	1.77
	Corrected calf girth	23.59 ± 3.75	21.2 ± 3.58	1.79
Breadth (cm)	Femur breadth	9.47 ± 0.63	8.98 ± 0.77	1.81
	Humerus breadth	6.4 ± 0.36	5.97 ± 0.52	2.62

Significant table value of 't' in p<0.05level at df (28)=-2.05

In **Table -2** the anthropometric variables of rural boys, urban boys have been presented. It was observed from the table that there was no significant difference in all the anthropometric variables except Humerus breadth between rural and urban boys also. Thus rural & urban boys were almost identical in morphology.

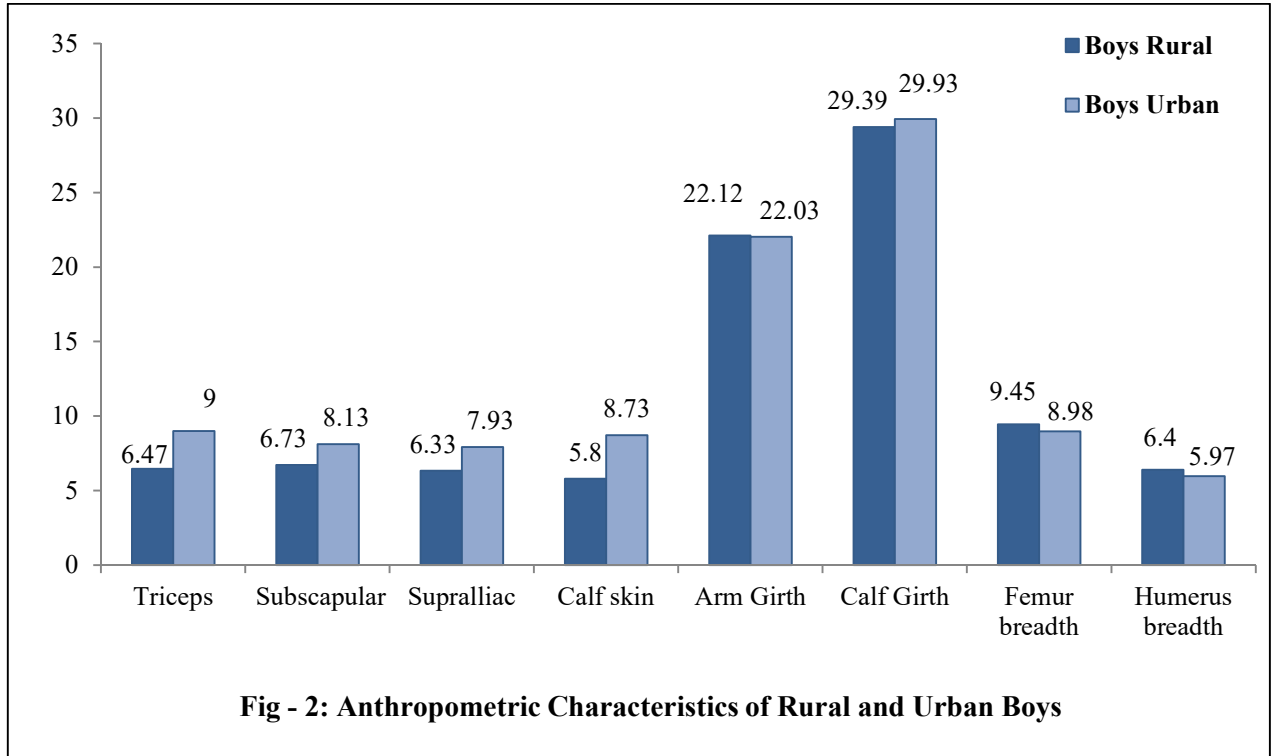In **Fig - 2** anthropometric Characteristics of Rural and Urban Boys have been presented.

Fig - 2: Anthropometric Characteristics of Rural and Urban Boys

Table - 3
Comparison of anthropometric characteristics of rural and urban Girls

Name of the Variables		Rural	Urban	t-value
		Mean ±SD	Mean ±SD	
Ponderal index or HWR (cm. $kg^{-\frac{1}{3}}$)		43.85 ±1.61	43.62 ±2.57	0.30
Skinfold Thickness (mm)	Triceps	7.47 ± 2.95	7.93 ± 4.85	0.31
	Subscapular	7.8 ± 3.26	9.73 ±7.31	0.94
	Suprailiac	7.33 ± 2.87	9.06 ± 6.35	0.96
	Calf Skin	5.53 ± 2.59	6.8 ±4.99	0.87
Muscle Girth (cm)	Arm girth	21.51 ± 1.88	21.47 ± 2.34	0.05
	Calf girth	29.65 ± 2.27	29.61 ± 2.92	0.05
	Corrected arm girth	14.04 ± 3.16	13.53 ± 3.38	0.03
	Corrected calf girth	24.12 ± 3.27	22.81 ± 3.73	1.02
Breadth (cm)	Femur breadth	9.11 ± 1	9.07 ± 0.79	0.10
	Humerus breadth	6.09 ± 0.66	5.83 ± 0.64	1.06

Significant table value of 't' in p<0.05level at df (28)=2.05

In **Table - 3** the anthropometric variables of rural girls and urban girls have been presented. From table-3 it was evident that there was no significant difference in any anthropometric variables between rural girls and urban girls. Thus it can be concluded that rural & urban girls were completely identical in morphology.

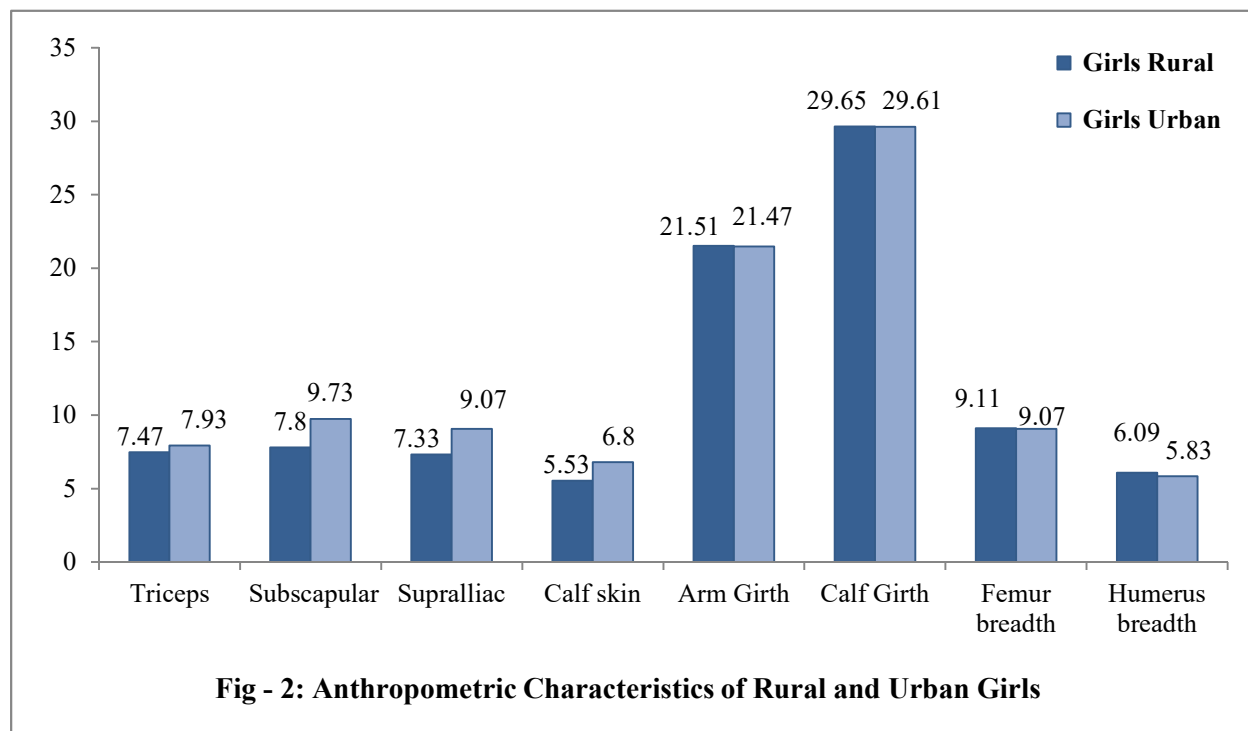In **Figure - 3** anthropometric Characteristics of Rural and Urban Girls have been presented

Fig - 2: Anthropometric Characteristics of Rural and Urban Girls

Table-4
Comparison of somatotype between Rural and Urban boys' players

Variables	Boys		Mean Difference	t-value
	Rural	Urban		
	Mean SD	Mean SD		
Endomorphy	3.34 ± 2.10	4.16 ± 1.85	0.82	1.13
Mesomorphy	2.11 ± .065	1.31 ± 1.07	0.81	**2.51**
Ectomorphy	4.02 ± 1.51	3.04 ± 1.56	0.88	1.58
Somatotype	**3.34 - 2.11 - 4.02**	**4.16 - 1.31 - 3.04**		

Significant table value of 't' in p<0.05 level at df (28) =2.05

Table-4 shows significant t- value for the mean mesomorphy between the rural and urban boys of West Bengal. But in endomorphy and ectomorphy the difference was not statistically significant. In **Fig-4** the comparison of the means of the somatotype between Rural and urban boys sub-junior kabaddi players of West Bengal were graphically represented.

Table-5
Comparison of somatotype between Rural and Urban Girls players

Variables	Girls		Mean Difference	t-value
	Rural	Urban		
	Mean SD	Mean SD		
Endomorphy	3.97 ± 1.09	4.37 ± 2.09	0.41	0.75
Mesomorphy	2.03 ± 1.65	1.67 ± 1.06	0.27	0.53
Ectomorphy	3.52 ± 1.08	3.40 ± 1.78	0.12	0.21
Somatotype	**3.97 – 2.03 - 3.52**	**4.37 - 1.67 - 3.40**		

Significant table value of 't' in p<0.05 level at df (28) =2.05

Table -5 shows t-value for the mean endomorphy, mesomorphy and ectomorphy of rural and urban sub-junior girls kabaddi players. It was evident from the table that there was not statistically significant difference in any somatotype components i.e. endomorphy, mesomorphy and ectomorphy. In **Fig-5** the comparison of the means of the somatotype between Rural and urban girls sub-junior kabaddi players of West Bengal have been graphically represented.
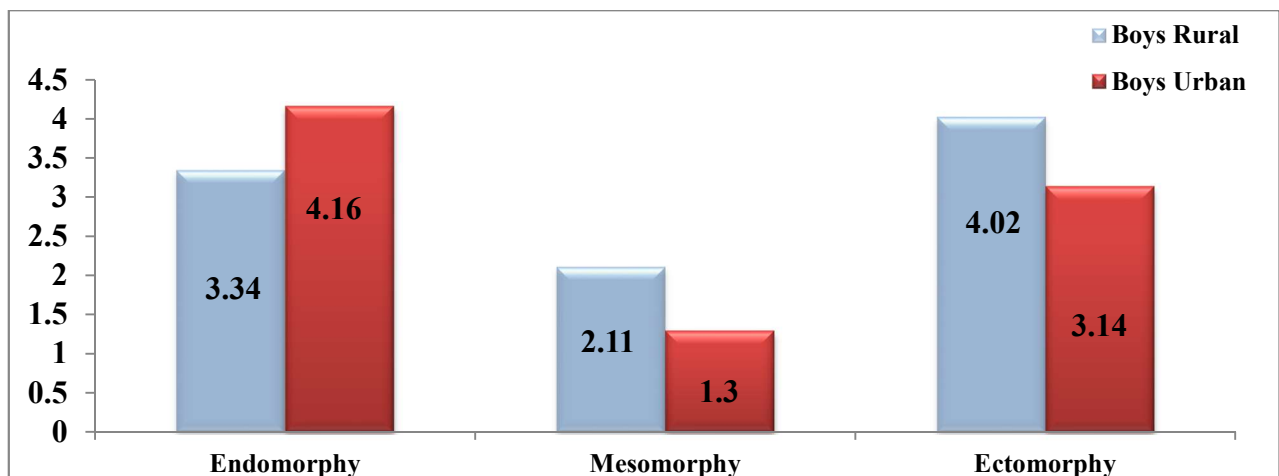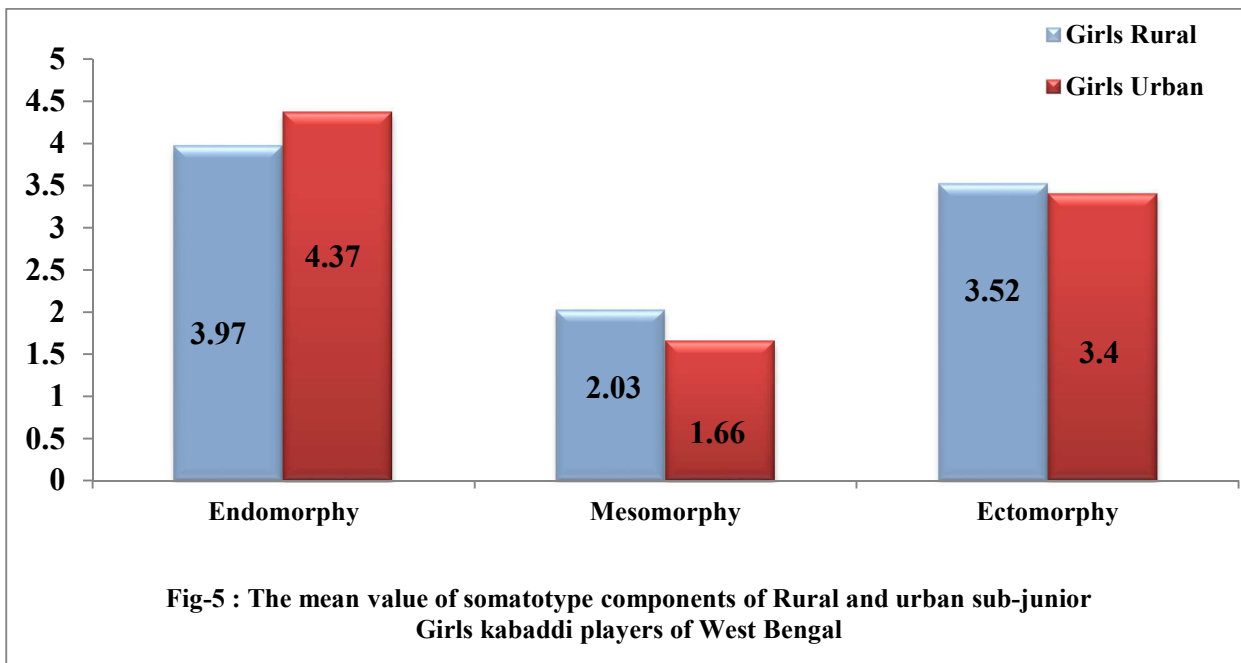

Fig-4 : The mean value of somatotype components of Rural and urban sub-junior boys kabaddi players of West Bengal

Fig-5 : The mean value of somatotype components of Rural and urban sub-junior Girls kabaddi players of West Bengal

In **Fig-6 the** Somatochart have been drawn that showing the somatoplots of mean somato-components of Rural, Urban boys and girls sub-junior kabaddi players of West Bengal.

Fig-6 : Somatochart for the rural & Urban Boys and Girls sub-junior Kabaddi players of West Bengal

[29]
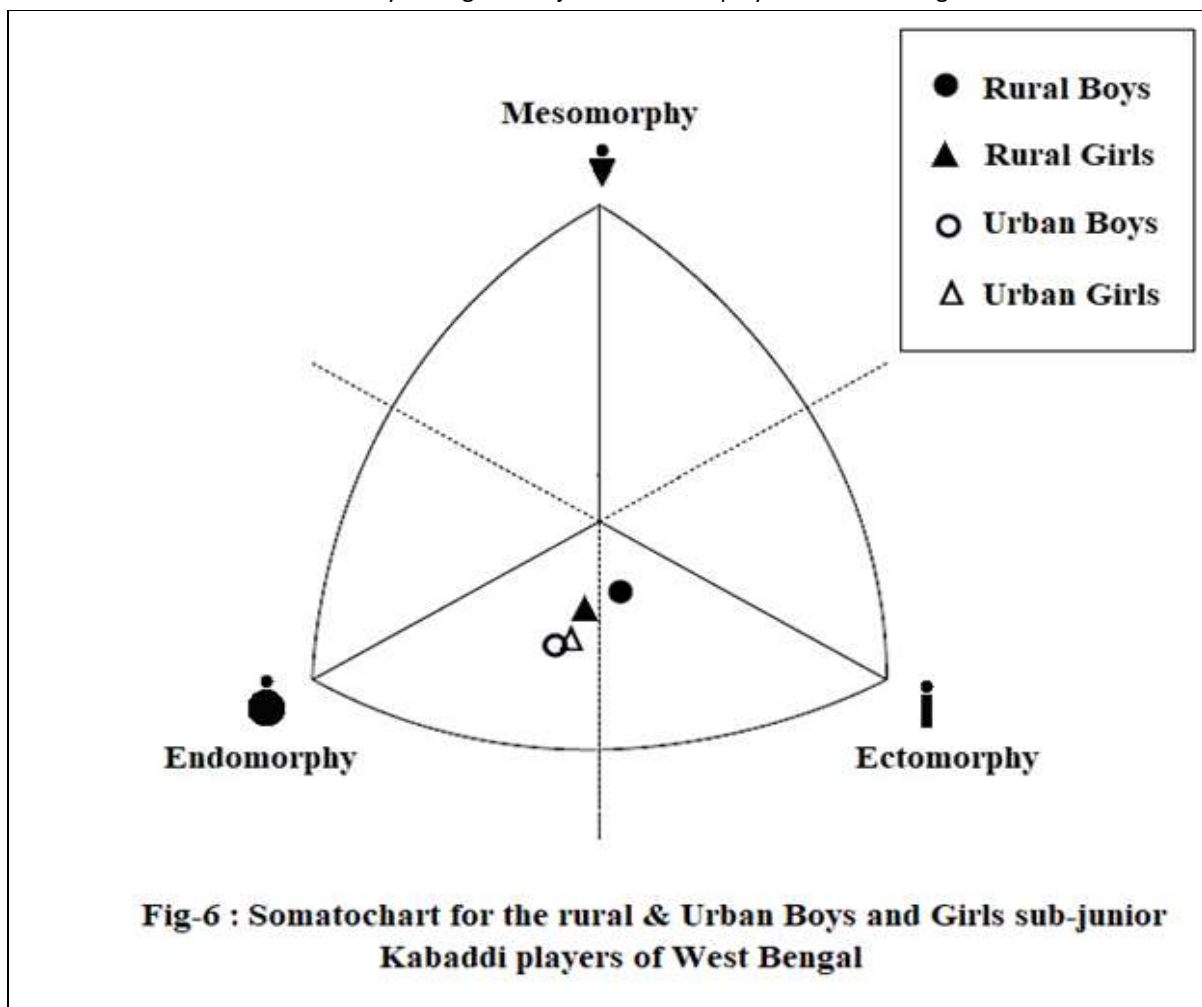
4. Discussion:

The result of the present study showed that there was no significant difference in anthropometric variables and somatotype components i.e. endomorphy, mesomorphy and ectomorphy between the rural and urban school girls of West Bengal. This result may be explained by the fact that the rural and urban sub-junior girl's kabaddi players are identical in body shape and size. This may happen as they played same games having same type of training effect on both the group and also the subjects have no racial difference at all may be a cause of no difference in somatotype. Again in sub-junior level as the training age of the subjects was not large enough that may make no difference in their stature, size and shape of their body can be a reason for getting no significant difference in anthropometric variables and somatotype as well. E.V. Monsma & R, M. Malina (2005) has got significant difference in anthropometric variables female figure skaters of different training age (elite, pre-elite and beginners). Thus it may be concluded that, in the present study, as there is no difference in training age between two groups may be a dominant cause of not getting any significant difference in testing variables.

On the other hand significant difference was observed between the rural and urban boys sub-junior kabaddi players in humerous breadth and mesomorphy which indicates that the rural kabaddi players were more muscular than the urban sub-junior kabaddi players. But no significant difference was observed in other anthropometric variables and other components of somatotype between rural and urban boy's sub-junior kabaddi players. This may happen due to harder training schedule and difference of food habit between both the groups. It can be a cause of accumulation of more fat percentage than the rural boys for taking more fast food and junk foods, including the habituation with comparatively less active lifestyle than the rural boys in their daily schedule. Taking more food may cause excess accumulation of body fat and it may also cause faster growth and maturity. Probably for that reason the urban boys showed significantly lesser value in mesomorphy than the rural boys.

5. Conclusions:

From the above results it can be concluded that

1. The anthropometric characteristics of the urban and rural sub-junior boy's kabaddi players are almost same except in humerous breadth.
2. The anthropometric characteristics of the urban and rural sub-junior girl's kabaddi players were same in nature.
3. The Rural and urban girls and boys sub-junior kabaddi player of West Bengal are predominantly endomorphic in somatotype.
4. In mesomorphic characteristics the rural sub-junior boy's kabaddi players are significantly higher than the urban sub-junior boy's kabaddi players. On the other hand there are no significant differences in endomorphic and ectomorphic characteristics between rural and urban boys kabaddi players of West Berngal.
5. There is no significant difference in somatotype components between rural and urban girl's sub-junior kabaddi players of West Bengal.

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