

SOMATOTYPES OF INDIAN NATIONAL ELITE ROWERS

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Abstract: The purpose of the study was to characterize and determine the anthropometric variable and somatotype of elite male national rowers of India. 8 male elite national rowers of India were selected as subjects and those subjects were represented for a country in various international competitions. The weight, stature, skin fold thickness, circumference, and width measurements of the rowers participated in the study were measured based on the ISAK guidelines. Heath-Carter method was used to determine the somatotypes of rowers. To characterize the anthropometric variables, SPSS 20 was used. The mean values of the 8 male elite national rowers (n=8) were found as follows; Body Mass 88.31, Stretch Stature 184.27, Triceps Skinfold 13.52, Subscapular Skinfold 16.80, Biceps Skinfold 5.62, Iliac Crest Skinfold 21.01, Supraspinale Skinfold 14.31, Abdominal Skinfold 23.86, Front Thigh Skinfold 17.46, Medial Calf Skinfold 12.02, Arm Girth Relaxed 32.72, Arm Girth Flexed And Tensed 34.52, Waist Girth 87.94, Gluteal Girth 61.00, Calf Girth 38.99, Humerus Breadth (Biepicondylar) 7.19, Femur Breadth (Biepicondylar) 10.39, Endomorphy 4.11 and Mesomorphy 4.75, Ectomorph 1.87. The mean somatotype of 8 male elite national rowers of India were identified as Endomorphic Mesomorph body type (4.11- 4.75- 1.87).

Key words: Anthropometric, Rower, Somatotype.

INTRODUCTION

The rowing has become a popular device in recent years, not only in specialized sports facilities but also in fitness clubs and even physical therapy clinics. The popularity of this kind of device stems directly from its vast array of possibilities of application in sports training as well as recreation and medical practice (Smith RM, 1994; Hawkins D, 2000). Rowing is large and heavy because their body weight is supported while seated in the boat. Rowing involves approximately 70% of the muscles mass because all extremities and the trunk participate in the propulsion of the boat. Rowing is a cyclic movement, where both legs and arms work synchronized. The body is

moved on a sliding seat by the propulsion of the legs during the stroke, while pulling on one (sweep rowing) or two oars (sculling) (Steinacker J. M, 1993). Rowing and Kayaking are categorized as a speed sport and known to be the most physically demanding of all endurance sports. There are the sports that put tremendous demands on the upper body and trunk muscular-skeleton (Tesch, 1983).

Anthropometric data for adult male rowers emphasize the importance of body mass (Secher, 1983; Secher & Vaage 1983; Shephard, 1998) and body size (Hebbelinck, Ross, Carter, & Borms, 1980; Hebbelinck, Ross, & Carter, 1981; Rodriguez, 1986; De Rose, Crawford, Kerr, Ward, & Ross, 1989) in

determining successful rowing performance at an international level. Anthropometry in general: is a systematic technique which sizes the objective characteristics of the human body with principles and classifies the certain methods of measuring according to the structure (Maud & Foster, 2006; Ozer, 1993). In other words, Anthropometry is a metric evaluation of individual's body features (Ackland, Ong, Kerr & Ridge, 2003; Akin & Sagir, 2000).

Somatotype is defined as the quantification of the present shape and composition of the human body, and it is accepted as one of the indicator of physical body structure. On the basis of physical characteristics and body type, subject is classified in endomorphy (relative fatness with predominance of abdomen over chest, high-square shoulders, and short fleshy neck), mesomorphy (musculoskeletal robustness with big bones, large chest, and waist relative slender), and ectomorphy (linearity or slenderness with small bones, thin muscle, relatively long limb, short trunk, and flat abdominal region).

OBJECTIVE OF THE STUDY

The objective of the study was to analysis of the Somatotypes of the male elite national rowers of India. Participants were informed about the aim and content of the study

METHODOLOGY

For the purpose of study, eight male elite national rowers of India belonging to the age level of 28 to 38 years were selected for the study. Those represented for a country in various international competitions. Participants were informed about the aim and content of the study. The necessary data was collected by administering the tests for the chosen variable. The entire test was measured based on the ISAK guidelines.

CRITERION MEASURES

1. Body mass was measured by digital weighing machine and recorded in kg.
2. Stretch stature was measured by digital Height measuring machine and recorded in cm.
3. Triceps skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
4. Subscapular skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
5. Biceps skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
6. Iliac Crest skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
7. Supraspinale skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
8. Abdominal skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
9. Front Thigh skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
10. Medial Calf skinfold was measured by Harpenden Skinfold Caliper and recorded in mm.
11. Arm girth relaxed was measured by steel tape and recorded in cm.
12. Arm girth flexed and tensed was measured by steel tape and recorded in cm.
13. Waist girth (min.) was measured by steel tape and recorded in cm.
14. Gluteal girth (max.) was measured by steel tape and recorded in cm.

15. Calf girth (max.) was measured by steel tape and recorded in cm.
16. Humerus breadth (bicipicondylar) was measured by sliding calliper and recorded in cm.
17. Femur breadth (bicipicondylar) was measured by sliding calliper and recorded in cm.
18. Endomorphy was measured by Heath-Carter somatotype chart (Carter & Heath, 1990).
19. Mesomorphy was measured by Heath-Carter somatotype chart (Carter & Heath, 1990).
20. Ectomorphy was measured by Heath-Carter somatotype chart (Carter & Heath, 1990).

The following equations were used for calculating somatotype.

The equation to calculate Endomorphy is:

$$\text{Endomorphy} = -0.7182 + 0.1451 (X) - 0.00068 (X^2) + 0.000014 (X^3)$$

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:

$$\text{Mesomorphy} = 0.858 \times \text{humerus breadth} + 0.601 \times \text{femur breadth} + 0.188 \times \text{corrected arm girth} + 0.161 \times \text{corrected calf girth} - \text{height} \times 0.131 + 4.5$$

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

$$\text{Ectomorphy} = 0.732 \text{ HWR} - 28.58$$

If HWR is less than 40.75 but greater than 38.25 then

$$\text{Ectomorphy} = 0.463 \text{ HWR} - 17.63$$

If HWR is equal to or less than 38.25 then

$$\text{Ectomorphy} = 0.1$$

STATISTICAL ANALYSIS

To characterize the anthropometric and somatotype of the male elite national rowers of India, Descriptive Statistics was used.

To analyze the somatypes of the male elite national rowers of India in this study, Heath-Carter method was used (Carter & Heath, 1990).

FINDINGS

The data was analyzed using descriptive statistics to determine the anthropometric and somatotype characteristics of the male elite national rowers of India. The results pertaining to the description are presented in Table no-1.

TABLE-1

Descriptive statistics of Anthropometric and Somatotype of male elite national rowers of India

	N	Mean	Std. Deviation
BODY MASS	8	88.3125	8.16573
STRETCH STATURE	8	184.2688	3.28991
TRICEPS SKINFOLD	8	13.5188	4.17663
SUBSCAPULAR SKINFOLD	8	16.8000	6.45783
BICEPS SKINFOLD	8	5.6250	1.47164
ILIAC CREST SKINFOLD	8	21.0063	5.21738
SUPRASPINALE SKINFOLD	8	14.3125	6.34557
ABDOMINAL SKINFOLD	8	23.8563	7.04336
FRONT THIGH SKINFOLD	8	17.4563	6.44900

MEDIAL CALF SKINFOLD	8	12.0250	3.10196
ARM GIRTH RELAXED	8	32.7250	1.55885
ARM GIRTH FLEXED AND TENSED	8	34.5250	2.18305
WAIST GIRTH	8	87.9375	6.93659
GLUTEAL GIRTH	8	61.0000	4.06220
CALF GIRTH	8	38.9938	2.06786
HUMERUS BREADTH(BIEPICON DYLAR)	8	7.1875	.31820
FEMUR BREADTH (BIEPICONDYLAR)	8	10.3875	.20310
ENDOMORPHY	8	4.1113	1.39758
MESOMORPHY	8	4.7538	.54610
ECTOMORPH	8	1.8700	.84836
Valid N (listwise)	8		

Table-1 revealed that the average values of anthropometrical variable of male elite national rowers of India were: Body Mass 88.31 ± 8.16 Stretch Stature 184.2688 ± 3.28991 , Triceps Skinfold 13.5188 ± 4.17663 , Subscapular Skinfold 16.8000 ± 6.45783 , Biceps Skinfold 5.6250 ± 1.47164 , Iliac Crest Skinfold 21.0063 ± 5.21738 , Supraspinale Skinfold 14.3125 ± 6.34557 , Abdominal Skinfold 23.8563 ± 7.04336 , Front Thigh Skinfold 17.4563 ± 6.44900 , Medial Calf Skinfold 12.0250 ± 3.10196 , Arm Girth Relaxed 32.7250 ± 1.55885 , Arm Girth Flexed And Tensed 34.5250 ± 2.18305 , Waist Girth 87.9375 ± 6.93659 , Gluteal Girth 61.0000 ± 4.06220 , Calf Girth 38.9938 ± 2.06786 , Humerus Breadth(Biepicondylar) $7.1875 \pm .31820$, Femur Breadth (Biepicondylar) $10.3875 \pm .20310$,

Endomorphy 4.1113 ± 1.39758 And Mesomorphy $4.7538 \pm .54610$, Ectomorph $1.8700 \pm .84836$.

Individual somatotype values of the male elite national rowers of India participated in this study are given in Table 2.

TABLE 2

The Somatotype description of the male elite national rowers of India

Rowers	Endomorph	Mesomorph	Ectomorph
1	6.90	5.37	0.54
2	4.75	5.17	0.97
3	3.32	4.46	2.21
4	4.15	5.42	1.58
5	4.49	4.23	1.96
6	3.03	4.60	2.97
7	2.23	3.92	2.89
8	4.02	4.86	1.84

Table-2 revealed that the somatotype description of subjects, subject 1 have mesomorphic endomorph body type, subject 2 endomorphic mesomorph, subject 3 endomorphic mesomorph, subject 4 endomorphic mesomorph, subject 5 mesomorphic endomorph, subject 6 endomorphic mesomorph, subject 7 endomorphic mesomorph, subject 8 endomorphic mesomorph.

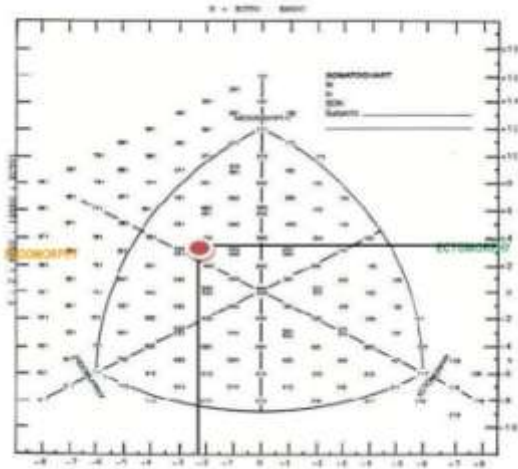


Figure 1. The distribution of the male elite national rowers of India mean somatotype on the somato-chart.

The Distribution of the male elite national rowers of India' average somatotype on the somato-chart according to the data obtained from the study is shown in figure 1.

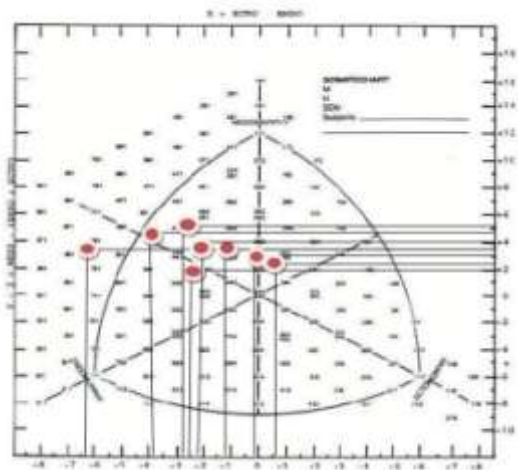


Figure 2. The Distribution of the male elite national rowers of India' Somatotypes on the somatochart. Distributions of the 8 male elite national rowers of India. Those participated in international competition' Somatotypes on the somatochart according to the data obtained from the study are seen in figure 2.

DISCUSSION

The research on the basis of sports science shown the fact related to performance of sports person in our country. On the basis of research structure of the body, suitable body type and somatotype can be defined. The objectives of the study to characterised the anthropometric variables and determine the somatotype of male elite national rowers of India. Anthropometric data available for male and female, elite sprint canoe/kayak paddlers suggest a homogenous shape and size (Ackland et al., 2003). Ackland et al. noted that sprint kayak paddlers possess unique characteristics, which not commonly observed in the general population. These include a lean body composition with proportionately large upper body girths and narrow hips (for males). The mean somatotype recorded for males by Ackland et al. was 1.6 – 5.7 – 2.2 and demonstrated that canoe paddlers are best described as mesomorphs. Alacid et al. (2011) found that mean somatotype for 13-year-old male paddlers as 2.7-4.8-3.1 and 14-year-old male paddlers as 2.6-4.6-3.1 described them as balanced mesomorphs. When the canoe and somatotype studies in literature are examined, canoe athletes have mesomorphic or endomorphic mesomorphic structure; In the study of Diafas et al. (2011) men skiers who participated in their study are best described as endomorphic-mesomorph.

In this study the male elite national rowers of India values of the mean somatotype were 4.1-4.7-1.8 and it was determined as endomorphic mesomorph. In the obtained result, somatotype structures of male elite national rowers of India were revealed. On the other hand, it has been found that most of the rowers in this study was determined as endomorphic mesomorph. It may be because of the data was collected during they were studying in

Diploma in Coaching after the participation in international competition. The result may differ when the data collects during international competition.

CONCLUSION

Based on the results of the study, the following conclusion made.

It is concluded from the result of the study that means score of the rowers as Endomorphic Mesomorph.

It is concluded that, out of a total of eight players, six were found to have Endomorphic Mesomorph body type and the rest of the two were found to have Mesomorphic Endomorph body type.

RECOMMENDATION

1. It is recommended for the coaches who trained players in the sports of rowing for improvement in the performance of the players in the sports.
2. It is also recommended for literature review in this particular field of study and if this study is conducted taking into consideration a larger number of players, would prove to be beneficial in providing much better result.
3. This study will also help coaches to identify players having the talent of rowing and stand by their abilities.

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