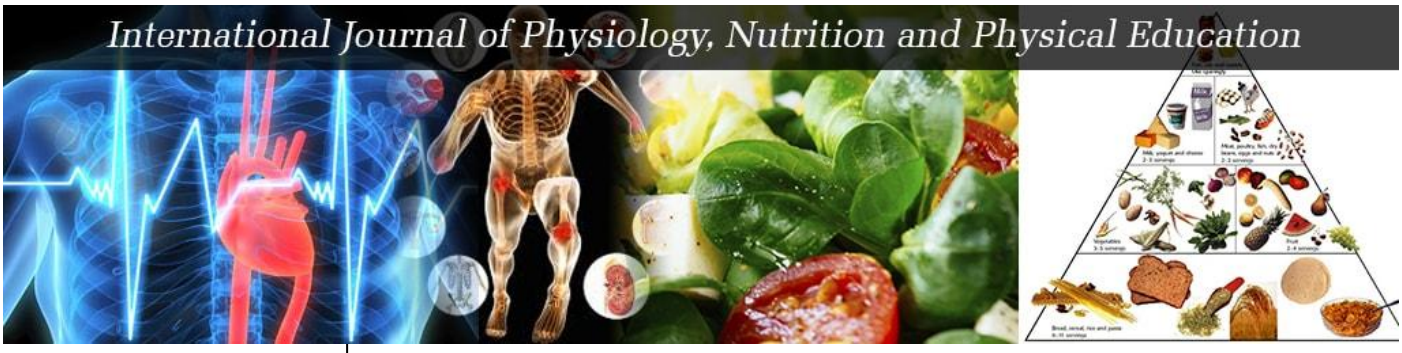


ISSN: 2456-0057
IJPNPE 2019; 4(1): 2075-2079

www.journalofsports.com
Received: 02-11-2018
Accepted: 05-12-2018

Dr. Pallob Kumar Mondal
Asst. Professor, State Institute of Physical Education for Women, Hastings House, Kolkata, West Bengal, India

Corresponding Author:
Dr. Pallob Kumar Mondal
Asst. Professor, State Institute of Physical Education for Women, Hastings House, Kolkata, West Bengal, India

Study on somatotype and coping ability of small framed female athlete and non-athlete

Dr. Pallob Kumar Mondal

Abstract
Somatotyping is a classification of human body-form with different ratings. This classification is done by Sheldon's three-component ratings viz., endomorph, mesomorph and ectomorph. In adult population, women athletes and non-athletes did differ in mesomorphy and ectomorphy characteristics. Coping refers to the cognitive and behavioral efforts to manage situations. The coping strategies are of two types (i) Approach coping strategies/ problem-focused: it deals with solving problem or active attempts to resolve the stressor and (ii) Avoidance coping strategies/ emotion-focused: it deals with avoiding active confrontation of the stressor or reducing emotional the tension of a stressor. Approach oriented coping strategies associated with less stress and illness, while avoidance oriented coping strategies associated with more stress and illness. It is seen that high-hardy individuals engage in approach coping strategies for the purpose of transforming stressful events into situations that seem to be more manageable. In contrast, low-hardy individuals tend to engage in avoidance coping strategies such as cognitive and behavioral disengagement and denial to deal with a stressful situation. The purpose of this study was to assess the somatotype and coping ability of small framed 20-25 years old female athletes and non-athletes. The study was conducted with sixty (N=60) small framed female subjects out of which thirty (n=30) were state level athletes from West Bengal and thirty (n=30) non-athletes were among the Kalyani University female students. Criterion measures for this study were height, weight, wrist circumference, frame size, Endomorph, mesomorph, and ectomorph and stress coping ability. It revealed from the study that; in somatotype, athlete somatotype rating was (endomorph-mesomorph-ectomorph) 4.34-3.55-2.55; whereas non-athlete somatotype rating was 6.02-3.43-2.54, which indicated that both the group was belonged to the mesomorphic-endomorph type of body structure. The stress coping ability of two small framed female groups had difference. The female athlete group performed active coping ability to reduce stress whereas, non-athlete female group performed avoidance coping ability to reduce stress.

Keywords: Somatotype, frame size, Athlete, Non-athlete

Introduction

Somatotyping is a classification of human body-form with different ratings. This classification is done by Sheldon's three-component ratings viz., endomorph, mesomorph and ectomorph (Sheldon *et al*., 1940) [13]. Sheldon's technique was a quantitative description of the present morphological confirmation and composition of the body. Though, the most widely used method of somatotype rating of human being is the anthropometric method of Heath and Carter (1990). In athlete and non-athlete children, somatotype ratings are quite similar though athletes are heavier and taller than non-athletes (Wiley, 1963) [17]. In adult population, women athletes and non-athletes did differ in mesomorphy and ectomorphy characteristics (Morris, 1960) [10]. Body type is an important predictor of risk for hypertension (high blood pressure), hyperlipidemia (high cholesterol), coronary heart disease, type-II diabetes and premature death (ACSM, 2000) [1].

Coping refers to the cognitive and behavioral efforts to manage situations. The coping strategies are of two types (i) Approach coping strategies/ problem-focused: it deals with solving problem or active attempts to resolve the stressor and (ii) Avoidance coping strategies/ emotion-focused: it deals with avoiding active confrontation of the stressor or reducing emotional the tension of a stressor (Roth & Cohen, 1986) [12]. Though the focus of both coping strategies are different but also they use cognitive and behavioral methods to address the stressful situation (Gentry & Kobasa, 1984) [6]. Approach oriented coping strategies associated

with less stress (Pearlin & Schooler, 1978) [11] and illness (Blake & Vandiver, 1988) [2], while avoidance oriented coping strategies associated with more stress (Pearlin & Schooler, 1978) [11] and illness (Blake & Vandiver, 1988) [2].

It is seen that high-hardy individuals engage in approach coping strategies for the purpose of transforming stressful events into situations that seem to be more manageable. In contrast, low-hardy individuals tend to engage in avoidance coping strategies such as cognitive and behavioral disengagement and denial to deal with a stressful situation (Gentry & Kobasa, 1984) [6]. Several studies have supported the relationship between hardiness and coping strategies, whereby high-hardy individuals use more approach or problem focused coping strategies and low-hardy individuals use more avoidance or emotion focused coping strategies (Florian *et al*., 1995; Williams *et al*., 1992) [4, 18] Florian. In general, men use approach or problem focused coping strategies (Folkman & Lazarus, 1980) [5] and women use avoidance or emotion focused coping strategies (Vingerhoets, & Heck, 1990) [16].

Frame size is a descriptive term for skeletal size that together comprises the body's supportive structure. Frame sizes are basically three types: small, medium and large. A variety of body breadths have been suggested as measures of frame size i.e. shoulder breadth, hip breadth, chest breadth, wrist breadth, elbow breadth, knee breadth and ankle breadth (Grant, 1980) [7]. The importance of frame size lies while considering overweight, the health consequences of a given high level of weight for height are more severe for individuals with relatively smaller skeletal frame and muscularity (fat free mass) compared to individuals whose fat free mass is relatively large.

Purpose of the study: The purpose of this study was to assess the somatotype and coping ability of small framed female athlete and non-athlete.

Methodology

The population (N=60) in this study comprises the small framed (20-25 years) female athletes and non-athletes. Out of which thirty (n=30) were district level athlete and thirty (n=30) were from Kalyani University students as non-athletes. The height and weight of subjects (barefooted and in light clothing) were measured to the nearest 0.5 cm and 0.1 kg, respectively, using the weighing machine for weight and stadio-meter for height. For frame size calculation, calculation of r (radius) value was needed. The r (radius) value was calculated by height in centimeters or inches divided by wrist circumference in centimeters or inches to get a radius (r). Then the radius (r) value was compared to constants.

The body type /somatotype was measured through the equation of Heath and Carter (1990). The coping ability was measured through coping strategies scale (Srivastava, 2001). The body frame size of the subjects was calculated from the r (radius) value, which was calculated by height in centimeters or inches divided by wrist circumference in centimeters or inches. Then the radius (r) value was compared to constants i.e. the r (radius) value >11.0 = small frame size for female. Mean, standard deviation (SD), independent t- tests were the statistics used for this study for data interpretation. Level of confidence was set at $p< 0.05$.

Tools and Techniques Used

Table: Tools and Techniques Used

Parameter	Variable	Method/ Tool/ Technique Used	Unit
Personal Data	Age	Calculated from Date of Birth	years
	Height	A centimeter marked vertical wall	cm
	Weight	Standard Weighing Machine	kg
Frame Size		Female: r > 11.0 = Small Frame	-
Somatotype		Heath and Carter (1990) [3] formula	-
Variable	Method/ Tool/ Technique Used Unit		
Coping Strategies	Bengali Version of Coping Strategies Scale (Srivastava, 2001)		

Results and Discussion

Table 1: Personal data of the subjects of four groups

Variable \ Group	Athlete (Mean ± SD)	Non-Athlete (Mean ± SD)
Age (year)	22.33 ± 1.76	22.31 ± 1.28
Height (cm)	160.48 ± 1.67	160.3 ± 1.67
Weight (kg)	53.97 ± 1.30	53.83 ± 1.09
Wrist Circumference (cm)	14.25 ± 0.48	14.16 ± 0.36
Radius value (r)	11.27 ± 0.36	11.33 ± 0.28

Radius value (r) >11.0 = Small Frame

Table-1 represents the mean and SD (mean ± SD) values of personal data of the subjects of two female groups (Athlete and Non-athlete) of the study. The mean and SD values of age were for athlete group: 22.33 ± 1.76 years and non-athlete group: 22.31 ± 1.28 years respectively. The height of the subjects was for athlete group: 160.48 ± 1.67 cm and non-athlete group: 160.3 ± 1.67 cm. And body weight of the subjects was for athlete group: 53.97 ± 1.30 kg and non-athlete group: 53.83 ± 1.09 kg respectively. On the other hand, the average values with SD of wrist circumference of athlete and non-athlete female was 14.25 ± 0.48 and 14.16 ± 0.36.

Table 2: Descriptive statistics of somatotype of two groups

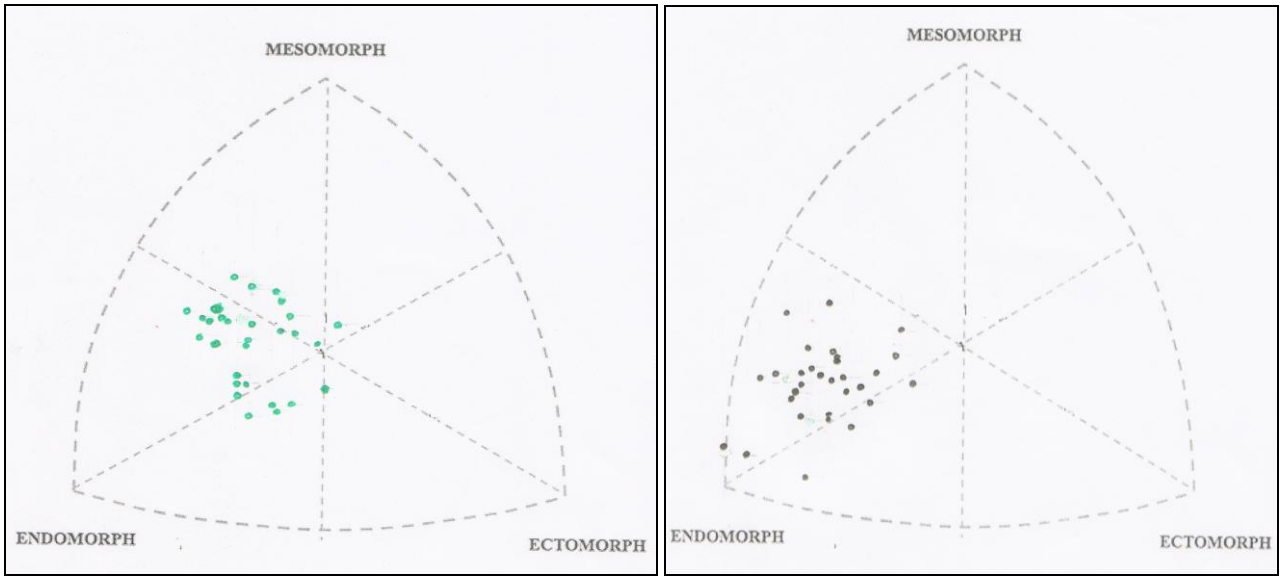
Variables	Group	Mean ± SD	t-ratio
Endomorph	Athlete	4.34 ± 0.64	8.36*
	Non-Athlete	6.02 ± 0.90	
Mesomorph	Athlete	3.55 ± 0.83	0.60^{NS}
	Non-Athlete	3.43 ± 0.61	
Ectomorph	Athlete	2.55 ± 0.46	0.11^{NS}
	Non-Athlete	2.54 ± 0.38	

$t_{0.05}$ (58) = 2.00, * = Significant, NS = Not Significant

Table-2 represents the somatotype variables in the form of endomorph, mesomorph and ectomorph characteristics of the subjects of four groups. The mean and SD values of endomorph, mesomorph and ectomorph characteristics of female athlete group was (4.34 ± 0.64; 3.55 ± 0.83 and 2.55 ± 0.46) and female non-athlete group was (6.02 ± 0.90; 3.43 ± 0.61 and 2.54 ± 0.38) respectively.

It is evident that the calculated t-ratio for endomorph was

8.36, which was greater than the tabulated t-value ($t_{0.05}$ 58 = 2.00). Therefore, the difference in endomorphic characteristics of two groups was statistically significant. In case of mesomorph rating, the t-ratio was 0.60, which was lesser than the tabulated t-value of 2.00 at 0.05 level of confidence. Therefore, the difference in mesomorph rating for four groups was statistically not-significant. On the other hand, the t-ratio of 0.11 for ectomorph rating was less than the tabulated t-value. So, between the two groups, the difference in ectomorph characteristics was not statistically significant.



A. **B.**

Plate 1: Somato-chart of female athlete and non-athlete A. Female Athlete, B. Female Non-Athlete

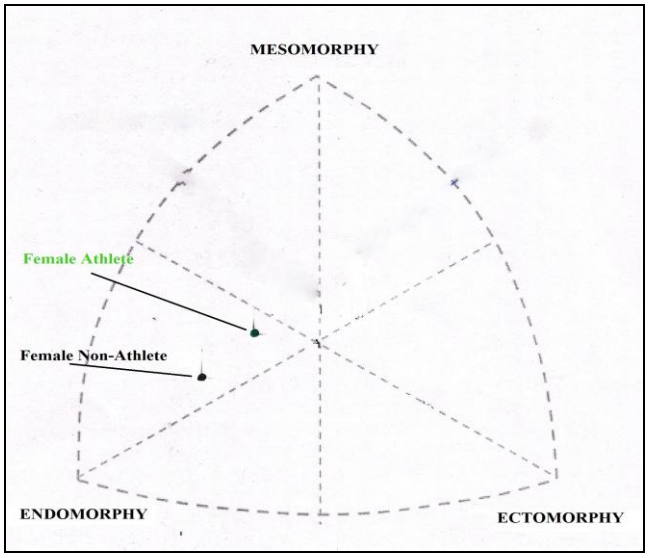


Plate: Mesomorphy of Female Athlete and Female Non-Athlete

Table 3: Comparison of data on active coping ability of two groups

Dimensions	Group	Mean ± SD	SE_M (±)	t-ratio
Behavioural	Athlete	35.03 ± 2.64	0.48	4.15*
	Non-Athlete	31.36 ± 4.04	0.73	
Cognitive	Athlete	13.96 ± 1.51	0.27	0.87^{NS}
	Non-Athlete	14.46 ± 2.76	0.50	
Cognitive Behavioural	Athlete	21.90 ± 2.39	0.43	3.26*
	Non-Athlete	19.20 ± 3.84	0.70	
Active Coping Ability	Athlete	70.90 ± 4.61	0.84	3.52*
	Non-Athlete	65.03 ± 7.88	1.44	

$t_{0.05}$ (58) = 2.00, * = Significant, NS = Not Significant

Table–3 represents the descriptive statistics (mean ± SD) of different dimensions of coping strategies. The mean and SD values of behavioral approach/active coping strategies were for female athlete: 35.03 ± 2.64 and female non-athlete: 31.37 ± 4.04. The cognitive approach coping strategies were for Group-C: 13.96 ± 1.51 and Group-D: 14.46 ± 2.76.

The values of cognitive-behavioral coping were for Group-C: 21.90 ± 2.39 and Group-D: 19.20 ± 3.84. As far as approach/active coping strategies, the values of two groups were Group-C: 70.90 ± 4.61 and Group-D: 65.03 ± 7.88

respectively.

On the other hand, significant difference was observed in behavioural coping and cognitive behavioural coping strategies but no difference was observed in cognitive coping strategies between the two groups. However overall significant difference was observed in active coping ability.

Table 2: Comparison of data on avoidance coping ability of two groups

Dimensions	Group	Mean ± SD	SE_M (±)	t-ratio
Behavioural Avoidance	Athlete	11.20 ± 3.34	0.61	4.58*
	Non-Athlete	16.53 ±5.43	0.99	
Cognitive Avoidance	Athlete	11.1 ± 1.74	0.31	5.25*
	Non-Athlete	15.3 ± 4.01	0.73	
Avoidance Coping Ability	Athlete	22.3 ± 3.65	0.66	6.47*
	Non-Athlete	31.8 ± 7.15	1.3	

$t_{0.05}$ (58) = 2.00, * = Significant, NS = Not Significant

The values of behavioral avoidance coping strategies were for Group-C: 11.20 ± 3.34 and Group-D: 16.53 ± 5.43. Cognitive avoidance coping strategies were for Group-C: 11.10 ± 1.74 and Group-D: 15.30 ± 4.01. Avoidance coping strategies of the groups were for group-C: 22.3 ± 3.65 and Group-D: 31.8 ± 7.15 respectively.

In case of avoidance coping ability, significant difference was observed between the two groups of the study.

Discussion on Somatotype

Somatotyping is a classification of human body form with different ratings. This classification was done by Sheldon's three-component ratings viz., endomorph, mesomorph and ectomorph (Sheldon *et al*., 1940) [13]. Sheldon's technique was subjective in nature. It was a quantitative description of the present morphological confirmation and composition of the body. Though, the most widely used method of somatotype rating of human being, now-a-days, is the anthropometric method of Heath and Carter (1990) [3].

Among athlete and non-athlete children, somatotype ratings had quite similar but athletes were heavier and taller than non-athletes, observed Wiley (1963) [17]. In adult population, women athletes and non-athletes did differ in mesomorphy and ectomorphy characteristics (Morris, 1960) [10]. Somatotype and flexibility had no relationship; on the contrary, somatotype and anthropometric measurements had positively correlated (Lloyd *et al*., 1966) [9]. In physical fitness tests, mesomorphic-ectomorph type of body structure performed better than other body type and ectomorph-endomorph type of body structure performed constantly lower.

Older non-athletes had higher endomorphy, skinfolds, fat percentage and fat mass than the younger athletes than older athlete and elite young athletes. Older athletes and older non-athletes were considered mainly endomorphic-mesomorph and young athletes mainly ectomorphic-mesomorph type of body structure (Silva *et al*., 2012) [14].

Body type is considered as an important predictor of risk for hypertension (high blood pressure), hyperlipidemia (high cholesterol), coronary heart disease, type-II diabetes and premature death (ACSM, 2000) [1]. In the present study, female athlete and non-athlete group shows the mesomorphic-endomorph type of somatotype rating (4.34-3.55-2.55) and (6.02-3.43-2.54) respectively.

Discussion on Coping Strategies

Coping refers to the cognitive and behavioral efforts to manage situations. The coping strategies are of two types (i) Approach/ problem focused coping strategies: it deals with solving problem or active attempts to resolve the stressor and (ii) Avoidance/emotion focused coping strategies: it deals with avoiding active confrontation of the stressor or reducing emotional the tension of a stressor (Roth & Cohen, 1986; Moos *et al*., 1990) [12]. Though the focus of both coping strategies is different but also they use cognitive and behavioral methods to address the stressful situation (Gentry & Kobasa, 1984) [6]. Approach oriented coping strategies associated with less stress (Pearlin & Schooler, 1978) [11] and illness (Blake & Vandiver, 1988) [2], while avoidance oriented coping strategies associated with more stress (Pearlin & Schooler, 1978) [11] and illness (Blake & Vandiver, 1988) [2].

High-hardy individuals engage in approach coping strategies for the purpose of transforming stressful events into situations that seem to be more manageable. In contrast, low-hardy individuals tend to engage in avoidance coping strategies such as cognitive and behavioral disengagement and denial to deal with a stressful situation observed Gentry and Kobasa (1984) [6]. Several studies have supported the relationship between hardiness and coping strategies, whereby high-hardy individuals use more approach or problem focused coping strategies and low-hardy individuals use more avoidance or emotion focused coping strategies (Florian *et al*., 1995; Williams *et al*., 1992) [4, 18]. In general, men use approach or problem focused coping strategies (Folkman & Lazarus, 1980) [5] and women use avoidance or emotion focused coping strategies (Vingerhoets, & Heck, 1990) [16].

In the present study, female athlete group performed approach/problem focused coping ability and non-athlete female group performed avoidance coping ability to reduce stress.

Conclusions

On Somatotype

The small framed female athlete and non-athlete group was significantly different only in endomorph component. However, somatotype of both group was belonged to mesomorphic-endomorph type.

On Stress Coping Ability

The stress coping ability of two small framed female groups had difference. The female athlete group performed active coping ability to reduce stress whereas, non-athlete female group performed avoidance coping ability to reduce stress.

References

1. American College of Sports Medicine. ACSM's guidelines for exercise testing and prescription. 6th Edition. Philadelphia: Lippincott Williams and Wilkins, 2000.
2. Blake RL, Vandiver TA. The association of health with stressful life changes, social supports, and coping. Family Pract. Research Journal. 1988; 7:205-218.

3. Carter JEL, Heath BH. Somatotyping development and application. Cambridge: Cambridge University Press, 1990, 448.
4. Florian V, Mikulincer M, Taubman O. Does hardiness contribute to mental health during a stressful real-life situation? The roles of appraisal and coping. J. Person. Soc. Psychol. 1995; 68:687-695.
5. Folkman S, Lazarus RS. An analysis of coping in middle-aged community sample. Journal of Health and Social Behavior. 1980; 21:219-239.
6. Gentry WD, Kobasa SC. Social and psychological resources mediating stress illness relationships in humans. In Gentry, W. D. (ed.), Handbook of Behavioral Medicine, Guilford Press, New York, 1984.
7. Grant JP. Handbook of Parental Nutrition. W.B. Saunders, Philadelphia, 1980. http://touchcalc.com/calculators/height_wrist
8. Himes JH, Roche AF, Siervogel RM. Compressibility of skinfolds and the measurement of subcutaneous fatness. The American Journal of Clinical Nutrition. 1979; 32:1734-1740.
9. Lloyd L, Laubacha J, McConville T. Relationships between flexibility, anthropometry, and the somatotype of college men. Research Quarterly. American Association for Health, Physical Education and Recreation. 1966; 37(2):241-251.
10. Morris PC. A Comparative study of physical measures of women athletes and unselected college women. Ph.D. Thesis, Temple University, 1960.
11. Pearlin LI, Schooler C. The structure of coping. Journal of Health and Social Behavior, 1978; 19:2-21.
12. Roth S, Cohen LJ. Approach, avoidance, and coping with stress. Am. Psychol. 1986; 41:813-819.
13. Sheldon WH, Stevens SS, Tucker WB. Varieties of human physique: An introduction to constitutional psychology. Harper & Brothers Publishers, New York; United States, 1940.
14. Silva DA, Benedetti TR, Ferrari EP, Meurer ST, Antes DL, Silva AM *et al*. Anthropometric profiles of elite older triathletes in the ironman brazil compared with those of young portuguese triathletes and older brazilians, Journal of Sports Sciences. 2012; 30(5):479-484. doi: 10.1080/02640414.2011.647046.
15. Srivastava AK. Manual for coping strategies scale. Rupa Psychological Centre, 2001).
16. Vingerhoets AJJM, Vanheck GL. Gender, coping and psychosomatic symptoms. Psychological Medicine. 1990; 20:125- 135.
17. Wiley RC. Single year and longitudinal comparisons of maturity, physique, structural strength and motor characteristics of twelve-year-old elementary athletes and nonparticipants. Doctoral Dissertation, University of Gorgon, 1963.
18. Williams PG, Wiebe DJ, Smith TW. Coping processes as mediators of the relationship between hardiness and health. Journal of Behavior Medicine. 1992; 15:237-255.