

Somatotype of Elite Indian Female Boxers

Sukhdeep Singh Kang¹, Dr. Jaswinder Singh², Dr. Rajdeep Kaur Talwar³

ABSTRACT

The present Anthropometric study was conducted on elite Indian female boxers (N=29) of seven weight categories, in March 2011, during the Boxing National Coaching Camp held at SAI NSNIS Patiala. Ten anthropometric measurements like height, body weight, bony diameters, girths and skinfolds were taken with standard instruments and standard techniques. Somatotypes were computed by using equations of Carter, 1980. The mean decimal age in all Weight categories ranged from 22.4 to 24.5 years.

The minimum height was found in 48 weight category (154.18cm±3.18); whereas, maximum in 81 kg weight category (172.0cm±6.08). The increasing trend of height was observed from light weight category (48 kg) towards the higher weight category (81 kg). The maximum height-weight ratio was observed in 81 kg weight category (39.64±1.64); whereas, maximum was in 48 kg weight category (42.02±0.91). Among all weight categories, the female boxers of 81 kg weight category possessed maximum endomorphy (5.59±0.84) and it was minimum in 51 weight category (2.98±1.12). The 64 kg weight category had maximum mesomorphy (5.12±0.42) and it was minimum in 69 kg weight category (3.68±0.74); whereas, 69 kg weight category had maximum ectomorphy (2.44±1.05) and it was minimum in 81 kg weight category (0.44±0.48). Boxers of all weight categories, when combined, were found to be 163.93 cm tall, 61.92 kg heavy and 4.00-4.78 -1.87 average somatotype.

KEYWORDS

Somatotype, Endomorphy, Mesomorphy and Ectomorphy

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1. Junior Scientific Officer, Department of Sports Anthropometry, SAI, NSNIS, PATIALA
 2. Senior Scientific Assistant, Department of Sports Anthropometry, SAI, NSNIS PATIALA
 3. Senior Scientific Officer, Department of Sports Anthropometry, SAI, NSNIS, PATIALA

INTRODUCTION

Many Scientist have conducted somatotype studies on various sports populations of national and international level (Tanner, 1964; Sodhi & Sidhu, 1984; de Garry et al 1974; Carter, 1984; Carter & Heath, 1990; and Sharma et al 1990). Zabukovec and Tiidus (1995) reported Canadian elite professional male kick boxers to have a Heath-Carter somatotype of 2.6 - 4.3 - 2.5. In a study on Italian physical education students, Gualdi-Russo and Graziani (1993) reported that combined sample of Karate, Wushu and Judo athletes had somatotypes of 3.19 - 5.02 - 2.14 and 3.26 - 4.03 - 2.47 for males and females, respectively. Chan et al (2003) found that British female Taekwondo club athletes were more endomorphic than their male counterparts but they were not different in mesomorphy. Taaffe and Pieter (1990) profiled the physical and physiological characteristics of American elite male and female Taekwondo athletes (taekwondo-in). Franchini et al (2007) likewise described Brazilian elite male Judo athletes (judoka) from an anthropometric and judo-specific fitness perspective. Katic et al (2005) found Croatian adult elite Karate athletes (karateka) to be predominantly characterized by a mesomorphic physique and transverse skeletal dimensionality. Fritzsche and Raschka (2007) reported German adult male elite karateka to have a Heath-Carter somatotype

of 2.0-3.7-2.7 and their female counterparts, of 3.4-2.4-2.4. Tsolakis et al (2006) found no differences in somatotype between Greek female fencers 18 - 20 years and those who were older than 20 years. The somatotype of young (12.5 years) female Cuban fencers was reported to be 3.0 - 3.2 - 3.5 (Carter & Heath, 1990). In case of female, Boxing studies are still lacking at the national level. Keeping this in view, the present study was conducted to find out body height, body weight and somatotypes of elite Indian female boxers, with respect to their weight categories.

METHODOLOGY

The present anthropometric data was taken on elite Indian female boxers (N=29) of seven weight categories, in March 2011, during the Boxing National Coaching Camp held at SAI NSNIS, Patiala, as shown in Table 1. Ten anthropometric measurements like height, body weight, two bony diameters, two girths and four skinfolds were taken with standard instruments and standard techniques (Ross et al, 1980). Somatotypes were computed by using equations of Carter, 1980. Appropriate statistics were used to analyse the data. Due to small sample size, analysis of variance (ANOVA) was not used for analysis of data. Results were interpreted from mean values along with standard deviations.

Table-1 : Sample size of elite Indian female boxers weight category wise

S. No	Weight Category	Sample Size
1	48 kg	04
2	51 kg	03
3	57 kg	06
4	60 kg	03
5	64 kg	03
6	69 kg	02
7	75 kg	06
8	81kg	02
	Total	29

RESULTS & DISCUSSION

Decimal Age (years)

Table 2 depicts that the mean decimal age of all weight categories ranges from 22.4 to 24.5 years. It was found that 60 kg weight category boxers were youngest and 75 kg weight category boxers were recorded oldest among all weight categories, followed by 48kg, 51kg, 57kg, 64kg, 69kg, 81kg, respectively. An increase trend was observed

in age from light weight category to heavy weight category.

Body Height (cm)

Minimum height was recorded in 48 kg weight category (154.18cm ± 3.18) and maximum height in 81kg weight category (172.0cm ± 6.08), respectively. The increasing trend of height has been observed from light weight category (48kg) to higher weight category (81kg), as shown in Table 2.

Table-2 : Anthropometric parameters of elite Indian female boxers

S. No	Anthropometric Variables	Weight Category	48kg	51kg	57kg	60kg	64kg	69kg	75kg	81kg
		Sample Size	N=4	N=3	N=6	N=3	N=3	N=2	N=6	N=2
1	Decimal Age (years)	Mean	22.4	22.4	22.67	22.00	24.13	23.75	24.50	24.15
		SD	1.69	2.20	2.16	2.30	1.55	3.46	4.68	2.90
2	Body Height (cm)	Mean	154.2	156.1	161.9	165.4	162.8	169.3	171.8	172.0
		SD	3.18	5.24	3.67	4.80	4.05	6.29	5.68	6.08
3	Body Weight (kg)	Mean	49.43	51.00	58.25	61.53	62.57	63.7	72.05	81.75
		SD	2.26	2.54	2.31	0.38	0.40	0.71	4.41	1.48
4	Height Weight ratio (Height/(Weight) ^{0.333})	Mean	42.02	42.11	41.77	41.9	41.00	42.38	41.33	39.64
		SD	0.91	1.40	0.88	1.29	0.96	1.42	2.03	1.64

Body Weight (kg)

In Table 1, more body weight (up to 0.75 kg to 1.5 kg) was observed in 48 kg, 57 kg, 60 kg and 81 kg, with respect to their weight categories weight; same weight in 51kg and less body weight (up to 2 kg to 5 kg) was recorded in 64 kg, 69 kg and 75 kg weight categories, respectively. The variations in body weight may be due to the players being in the training camp. But, during competitions,

players reduce their body weight and adjust according to their weight category.

Height Weight Ratio

Minimum height-weight ratio was examined in 81kg weight category (39.64 ± 1.64) and maximum height-weight ratio was recorded in 51kg weight category (42.11 ± 0.91). Height weight ratio of all the weight categories ranged from 39.64 to 42.11 (as shown in Table 2).

Table-3 : Somatotype of elite Indian female boxers

S. No	Somatotype	Weight Category	48kg	51kg	57kg	60kg	64kg	69kg	75kg	81kg
		Sample Size	N=4	N=3	N=6	N=3	N=3	N=2	N=6	N=2
1	Endomorphy	Mean	3.36	2.98	3.58	4.10	4.13	4.92	4.41	5.59
		SD	0.66	1.12	0.88	1.03	1.31	1.24	1.30	0.84
2	Mesomorphy	Mean	4.44	4.70	5.08	4.55	5.12	3.68	5.04	4.91
		SD	0.86	0.93	0.56	0.66	0.42	0.74	1.64	0.84
3	Ectomorphy	Mean	2.18	2.25	2.00	2.09	1.43	2.44	1.75	0.44
		SD	0.66	1.03	0.64	0.94	0.70	1.03	1.37	0.48

SOMATOTYPE

Among all weight categories, maximum endomorphy (5.59 ± 0.84) was reported in 81kg weight category and minimum in 51kg weight category (2.98 ± 1.12). Maximum mesomorphy (5.12 ± 0.42) was recorded in 64 kg weight category and minimum mesomorphy (3.68 ± 0.74) in 69 kg weight category. Maximum ectomorphy (2.44 ± 1.05) was examined in 69kg weight category minimum ectomorphy (0.44 ± 0.48) in 81kg

weight category. Increase trends were observed in endomorphy and mesomorphy, while moving from light weight category to heavy weight category, as shown in Table 3.

On combining all weight categories, average values of elite female boxers were found to be 23.24 years old, 163.93 cm tall, 61.92 kg heavier and having somatotype of 4.0 - 4.78 - 1.87, as shown in Table 4.

Table 5 shows comparative somatotypic studies between the present study and other

**Table-4 : Anthropometric parameters and Somatotypes of Elite Indian Boxers
(Combined All Weight Categories; N=29)**

Anthropometric Variables		Age (years)	Height (cm)	Weight (kg)	Height Weight ratio	Endo morphy	Meso morphy	Ecto morphy
Combined All Weight categories	Mean	23.24	163.93	61.92	41.58	4.00	4.78	1.87
	SD	3.03	7.62	9.69	1.38	1.16	0.96	0.95

sports discipline studies of females. The present study female boxers were more endomorphy (fatty tissue), good mesomorphy and less ectomorphy (heavier) with respect to other female sports studies of different disciplines.

Table-5 : Comparative somatotypes studies of national / international female combative sports athletes with present study female boxers

S. no	Sport/Study Somatotypes (National /International)	Endo-Meso-Ecto
1	Boxing	
	Present study	4.00- 4.78- 1.87
2	Silat	
	Pieter and Bercades(2009)	3.98 - 4.09 - 1.94
3	Fencing	
	Pieter and Bercades(2009)	3.69 - 4.84 - 1.32
	Tsolakis et al (2006) - 18-20 years	4.30 - 2.30 - 2.90
	Tsolakis et al (2006) - > 20 years	3.10 - 1.90- 3.70
	Carter and Heath (1990) - Bolivar Games(1981)	3.60- 3.60 - 2.40
4	Karate	
	Pieter and Bercades(2009)	3.05 + 3.68 - 2.38
	Fritzsche and Raschka (2007) (elite)	3.40 - 2.40- 2.40
	Fritzsche (2006)	3.60- 4.50 - 2.70
	Amusa and Onyewadume (2001) (elite)	4.40 - 4.70 - 1.30
5	Taekwondo	
	Chan et al (2003) (club)	6.30 - 4.20 - 2.00
	Song et al (1997) (varsity)	5.00- 4.10 - 2.50
	Pieter (1991) (elite)	2.47 - 3.08 - 3.47
	Taaffe and Pieter (1990) (elite)	2.08 - 3.23 - 3.98

CONCLUSION

It was concluded that

1. Indian elite female boxers showed increasing trends from light weight categories towards heavy weight categories, for body height and body weight.
2. Height-weight ratio showed decreasing trends from light weight category to heavy weight category.
3. In somatotype,
 - a. Indian female boxers, in all weight categories, were found more endomorphic (having more fatty tissue). Endomorphy had also shown increased trends from light weight categories to heavy weight categories, except 69 kg weight category.
 - b. Indian female boxers had shown very good mesomorphy (muscular skeletal development). Mesomorphy was recorded minimum in light weight categories and maximum in heavy weight categories, except 69 kg weight category. Mesomorphy dominates over endomorphy in all weight categories except 61 kg and 81 kg weight categories.
 - c. Ectomorphy (leanness of body) was found minimum in heavy weight categories followed by light weight categories (maximum).

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