Anthropometric Variability among different Events of Fencing

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ABSTRACT

The present study has been conducted on 37 Fencing players (20 boys and 17 girls) of SAI Training Centre (STC) and Pay & Play (P&P) scheme trainees of NSNIS, Patiala. The study tries to find out the variation of height and arms span, in different Fencing events, fencers. Anthropometric parameters of height, weight, height acromion, height dactylion and arm span were measured . The mean value of BMI for boys is 20.26 ± 2.7 and 21.84 ± 3.7 for girls. It signifies that the players are in normal range (18.5-24.9). The mean value of arm span (cm) is higher than the mean value of height with the margin of 7.68 ± 3.01 for boys and 5.27 ± 3.0 for girls. For boys, Mean height value (cm) of Epee players (173.48 ± 5.40) is higher than Sabre (172.05 ± 7.39) and Foil players (162.15 ± 11.40). In girls, the mean height (cm) value of Epee players (164.33 ± 4.45) is higher than Foil (160.00 ± 5.16) and Sabre (154.72 ± 6.57). Similarly, for boys the arm span (cm) is longest in Epee player (181.48 ± 4.56) followed by Sabre (179.15 ± 7.51) and Foil (170.28 ± 12.25). In girls the arm span (cm) is longest in Epee players (170.34 ± 7.75), which is followed by Foil (162. 93 ± 5.67 girls) and Sabre (160.08 ± 7.49). One way ANOVA and post hoc analysis were conducted to find out the difference among different event of Fencing and it has been found that there is a significant difference for height among all three events for boys as well as girls.

KEYWORDS

Height, Arm span, Height acromion, Height dactylion and BMI

INTRODUCTION

A number of studies provide information regarding anthropometric characteristics and physical fitness in various sports. The athlete's anthropometric dimensions, reflecting body shape, proportionally, and composition (Carter, 1970, 1984) play a significant role in determining the potential for success in sport (Battinelli, 1990). The distinct combination of longitudinal dimension, such as stature arm span, leg length, flexibility, muscular strength, muscular power, and inter-limb combination is

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necessary for successful performance and influencing Fencing specific motor abilities (Barth & Beck, 2007).

A number of differences in players' body morphology and composition (Lozovina, 1986; Vujovic, 1986) due to the environmental changes in general, and changes within the game of Fencing itself (Pavicic, 1991; Lozovina, 2003) could be expected. Scientific research and practical experience show that positive relation between height, arm span and sports performance. Arms span is especially important. With outstanding fencers, it is 10-20 cm. more than their height (Dryukov, 1996). In this paper, an attempt has been made to observe the variation of height and arm span of players among various Fencing event.

METHODOLOGY

The anthropometric data for the study has been collected from 37 Fencing players (20 boys and 17 girls) of SAI Training Centre (STC) and Pay & Play (P&P) scheme trainees of NS NIS Patiala, within the age range of 12-18 years, at the time of measurement. All participants were clinically healthy, without morphological aberrations. The selected anthropometric parameters, for this paper, are height, weight, height acromion, height dactylion and arm span, which has been measured using standard instruments and standard techniques.

[Arms Span : The distance between open hands at the shoulder level. Total upper arm length (TUAL): Subtract the value of height dactylion from that of height acromion. Body Mass Index (BMI) : Weight (Kg.) / Height (m.)2 Difference (Diff.): Arm Span minus Height]

Mean value, Standard deviation (SD),Standard error (SE), ANOVA and Post-hoc analysis of age, height, weight, arm span, total upper arm length (TUAL), difference, and body mass index (BMI) has been calculated and analysed by using SPSS software (V.20).

RESULTS & DISCUSSION

Table 1 (a) and 1 (b) shows overall descriptive statistics for various variable of interest

Table-1 (a): Descriptive Statistics (overall) for boys

Variable	No. of Sample	Range	Mean	St. Deviation	Std. Error
Age (yrs.)	20	12-18	14.20	1.98	0.44
Height (cm.)	20	144.60-180.10	169.51	9.32	2.08
Weight (kg.)	20	45.00-80.50	58.24	9.40	2.10
Arm span (cm.)	20	155.50-189.90	177.19	9.39	2.10
BMI	20	15.39-24.82	20.26	2.70	0.60
TUAL (cm.)	20	64.00-81.00	75.27	4.77	1.06
Difference (cm.)	20	1.10-12.80	7.68	3.01	0.67

Table-1 (b): Descriptive Statistics (overall) for girls)

Variable	No.of Sample	Range	Mean	St. Deviation	Std. Error
Age (yrs.)	17	12-18	15.76	1.75	.42
Height (cm.)	17	149.40-170.20	160.74	6.53	1.58
Weight (kg.)	17	40.60-89.00	56.58	11.15	2.70
Arm span (cm.)	17	150.90-179.30	166.01	8.45	2.05
BMI	17	16.67-31.68	21.84	3.70	0.89
TUAL (cm.)	17	63.90-76.20	70.15	3.56	0.86
Difference (cm.)	17	1.50-11.40	5.27	3.03	0.73

BMI : Body Mass Index: TUAL: Total Upper Arm Length

Table 1 (a) and 1 (b) show gender wise break up of descriptive statistic for various variables. Mean vlaue ± SD, standard error for all anthropometric parameters are given in the Table 1 (a) and 1 (b) for boys and girls, respectively. The sample subjects fall under the age range of 12 to 18 years, for both boys and girls.

Mean value of height for boys is 169. 51 cm ; and it is in the range of 144. 60 to 180.10cm. For girls the height ranges from 149.40 to 170. 20 and means value is 160.74. Mean value of weight is 58.24 kg. and 56.58 kg. for boys and girls, respectively. For boys, weight range is 45.00 to 80.50; and for girls, it is 40. 60 to 89.00. Arm span for boys ranges from 155.50 to 189.90 and mean value lies at 177.19; and for girls arm span ranges from 150.90 to 179.30, mean value is 166.01.

Body Mass Index (BMI) for boys falls under the range of 15.39-24.82; mean value is at 20.26. BMI for girls falls within 16.67-31.68 range, with the mean value of 21.84. Total upper arm length (TUAL) for boy's falls at the range of 64.00-81.00, with mean value of 75.27. For girls, the TUAL range is 63.90- 76.20, with mean value of 70.15. Difference between the arm span and height (Diff.) is within 1.10 to 12.80 for boys and mean value is 7.68. For girls the differences are in the range of 1.50 to 11.40 and mean value is 5.27.

Table - 2 : Event wise distribution of Mean ± SD

		Height	Weight	Arm span	BMI	TUAL	Diff.
Event	Sex	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Epee	Boys	173.48 ± 5.40	60.76 ± 11.17	181.48 ± 4.56	20.16 ± 3.25	77.25 ± 3.31	8.00 ±2.57
	Girls	164.33 ± 4.45	60.52 ± 12.84	170.34 ± 7.75	22.39 ± 4.49	72.00 ± 3.19	6.01 ±3.62
Sabre	Boys	172.05 ± 7.39	59.72 ± 8.69	179.15 ± 7.51	20.13 ± 2.27	75.62 ± 3.36	7.10 ±2.67
	Girls	154.72 ± 6.57	51.48 ± 7.76	160.08 ± 7.49	21.50 ± 3.10	67.80 ± 3.04	5.36 ±2.25
Foil	Boys	162.15 ± 11.40	53.75 ± 8.37	170.28 ± 12.25	20.54 ± 3.13	72.83 ± 6.91	8.13 ±4.11
	Girls	160.00 ± 5.16	53.26 ± 8.01	162.93 ± 5.67	20.76 ± 2.56	68.56 ± 3.04	2.93 ±0.50

BMI: Body Mass Index; TUAL: Total upper Arm Length; Diff: Arm Span Minus Height

In Table 2 the mean value ± SD of all anthropometric measurement are shown event-wise viz. Epee, Sabre and Foil, for both boys and girls. For boys, mean height value of Epee Players (173.48 ± 5.40) is higher than Sabre (172.05± 7.39) and Foil players (162.15 ± 11.40). In Girls, the mean height value of Epee players (164.33± 4.45) is higher than Foil (160.00 ± 5.16) and Sabre (154.72 ± 6.57). Similarly, for boys the arm span is longest in Epee player (181.48 ± 4.56) followed by Sabre (179.15±7.51) and Foil (170.28± 12.25).In Girls the arm span is longest in Epee players (170.34±7.75) followed by Foil (162.93 ±5.67 girls) and Sabre (160.08 ±7.49). The mean value of weight for Epee player is 60.76±11.17 and 60.52 ±12.84 for boys and girls, respectively. In Sabre event , the mean value of weight for boys 59.72±8.69 and 51.48±7.76 for girls. Further the mean value for weight is 53.75±8.37 (boys), 53.26±8.01 (girls) in Foil event.

Table - 3: One way ANOVA for Boys

Variable		Sum of Square	df	Mean Square	F	Sig.
Height	Between Groups	471.355	2	235.677	3.398	0.57*
	Within Groups	1179.083	17	69.358		
	Total	1650.438	19			
Weight	Between groups	176.906	2	88.453	.999	.389
	Within Groups	1505.083	17	88.534		
	Total	1681.990	19			
Arm span	Between Groups	427.541	2	213.771	2.907	.082
	Within Groups	1250.317	17	73.548		
	Total	1677.858	19			
BMI	Between Groups	.674	2	.337	.041	.959
	Within Groups	138.189	17	8.129		
	Total	138.863	19			
TUAL	Between Groups	60.154	2	30.077	1.370	.281
	Within Groups	373.083	17	21.946		
	Total	433.238	19			
Difference	Between Groups	4.539	2	2.269	230	.797
	Within Groups	167.853	17	9.874		
	Total	172.392	19			

*Level of significance at 0.05

Table 3 shows one way ANOVA analysis to find out any difference between various anthropometrical variables in different event for boys. It shows that there is no significant difference found among different fencing events for anthropometric parameters viz. Weight, BMI, TUAL and Difference. And significant difference is found for height (F=3.398, Sig. =0.05), moreover arm span variable are approaching to a significantly difference level (F=2.907, Sig, =0.082).It can be assume that if the sample size would be large than they may appeared to be significantly difference.

Table-4: Post hoc comparison for Boys

Dependent Variable		(1) Event	(J) Event	Mean Difference (I-J)	Std.Error	Sig.
Height	LSD	Epee	Foil	11.333	4.808	.031*
		Sabre	Foil	9.900	4.497	.042*

*Level of significance at 0.05

To find out mean difference among different fencing events for boys' post-hoc analysis were conducted and shows in Table 4. It has been found that there are significant difference between Epee and Foil as well as Sabre and Foil only for height variable.

Table-5: One way ANOVA for Girls

Variable		Sum of Square	df	Mean Square	F	Sig.
Height	Between Groups	299053	2	149.527	5.438	.018
	Within Groups	384.928	14	27.495		
	Total	683.981	16			
Weight	Between Groups	302.981	2	151.427	1.255	.315
	Within Groups	1689.570	14	120.684		
	Total	1992.425	16			
Arm Span	Between Groups	373.308	2	186.654	3.392	.063
	Within Groups	770.397	14	55.028		
	Total	1143.705	16			
BMI	Between Groups	6.783	2	3.391	.223	.803
	Within Groups	213.324	14	15.237		
	Total	220.107	16			
TUAL	Between Groups	65.935	2	32.967	3.366	.064
	Within Groups	137.127	14	9.795		
	Total	203.061	16			
Difference	Between Groups	21.363	2	10.682		.335
	Within Groups	126.168	14	9.012		
	Total	147.531	16			

* Level of significance at 0.05

Table-6:Post-hoc comparison for Girls

Dependent Variable		(1) Event	(J) Event	Mean Difference (I-J)	Std.Error	Sig.
Height	LSD	Epee	Sabre	9.613	2.924	.005*

*Level of significance at 0.05

In Table 5, one way ANOVA analysis for girls, to find out any difference between various anthropometrical variables in different events of Fencing, is given. Significant difference was found for height (F=3.398, Sig.=0.05); moreover, arm span and TUAL variables are approaching to significant difference level (F=3.392, Sig.=.063 and F=3.366, Sig. = .064). It can be assumed that if the sample size would be large then they may appear to be significantly different. No significant difference was found among different Fencing events for anthropometric parameters viz. weight, BMI and difference.

Table 6 shows post-hoc analysis to find out mean difference among different Fencing events for girls. It was found that there were significant differences between epee and sabre, only for height variable.

CONCLUSION

The present study tries to give a contemporary scenario of the fencers from anthropometrical point of view. The mean values of all the anthropometric parameters are shown in tables. The mean value of BMI signifies the players are in normal range (18.5-24.9). The mean value of arm span is higher than the mean value of height with the margin of 7.68 ± 3.01 for boys and 5.27 ± 3.0 for girls.

For boys the height is tallest in Epee players, than it came down to Sabre and Foil players in descending order. Although tallest height in girls is found in Epee event but Foil players is taller than Sabre. Similarly, the arm span is highest in Epee player followed by Sabre and Foil players for boys, and for girls the arm span is longest in Epee players followed by Foil and Sabre. Thus the difference between arm span and height is more in Epee player comparatively.

According to post-hoc analysis there is significant difference for boys between Epee and Foil for anthropometric variables of height, also a significant difference between Sabre and Foil for height variable. For girls significant difference is found between Epee and Sabre for height,. Hence, it can be concluded that the taller height and longer arm span may have comparatively advantage in Epee event of fencing regardless of gender.

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