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Shoulder width, Pelvic width and Handgrip Strength of Male Junior Freestyle Wrestlers of different Weight Category

Parwinder Singh and Ashok Kumar

Abstract

Aim: The aim of study was to observe shoulder width, pelvic width and handgrip strength of male junior wrestlers based on weight category. **Materials and Method**: One hundred fifty (N=150) male junior freestyle wrestlers were participated in the study which further divided into five groups based on their weight categories. Each group comprised of thirty wrestlers. The shoulder width and pelvic width were measured using standard anthropometric procedure, while handgrip strength was recorded with help of a handgrip dynamometer. **Results**: A statistically significant difference in the mean values of biacromial breadth (shoulder width), biilliac breadth (pelvic width), right-hand grip strength and left-hand grip strength among various groups of junior freestyle wrestlers. An increasing trend in the mean value of biacromial breadth (shoulder width) from group1 to group5 except group2 and biilliac breadth (pelvic width) from group1 to group5 except group4 was observed. The mean value of biacromial breadth (shoulder width) was more than biilliac breadth (Pelvic width). The mean value of right hand grip strength was more than left hand grip strength. **Conclusion**: It was concluded that shoulder width (biacromial breadth), pelvic width (biilliac breadth), right hand grip strength and left hand grip strength was more of heavy weight category than lightweight category junior free style wrestlers. These findings underscore the heterogeneous nature of muscular strength attributes within the junior freestyle wrestling population, emphasizing the need for individualized training approaches tailored to specific group characteristics. By recognizing and accounting for these differences, coaches and trainers can better optimize training regimens to enhance performance outcomes for junior freestyle wrestlers.

Parwinder Singh
Assistant Professor
Govt. Shivalik College Naya Nangal, Punjab, India
E-mail:drparwindersingh@outlook.com
Ashok Kumar
Professor,
Department of Sports Science,
Punjabi University Patiala (Punjab) India
E-mail:akashokin@gmail.com

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Introduction

The sport of wrestling boasts a rich history dating back to ancient times, with legends like Zeus and Kronas purportedly engaging in epic bouts for dominion over the earth (Gallagher, 1951). Over the millennia, wrestling has retained its allure, admired for the discipline and mental fortitude it demands from its participants. Nonetheless, it is also confronted with the contentious issue of weight management, commonly known as "cutting weight," and the associated practices necessary for competing within designated weight classes. Similar to judo, boxing, and competitive weightlifting, wrestling necessitates athletes to vie within specific weight brackets, typically varying by approximately 7-11 pounds, contingent upon factors like age and wrestling style. A prevalent strategy in contemporary wrestling involves athletes competing in weight classes lower than their natural weight, aiming to gain advantages in strength, speed, and leverage over opponents (Steen & Brownell, 1990).In response to regulatory changes in wrestling, the fitness requirements for successful wrestlers have undergone significant modifications, prompting an evolution in training methodologies (Horswill, 1992; Sharratt et al., 1986). Wrestling is characterized as an intermittent physical endeavor, demanding considerable strength and muscle power from both the upper and lower body (Hubner-Wozniak et al., 2004; Kraemer et al., 2001; Horswill et al., 1992 & 1989). Wrestlers typically strive to minimize body fat levels and total body weight without compromising strength and power (Yoon, 2002). The aim of the present study was to observe differences, specifically in terms of shoulder width (Bi-acromial breadth), pelvic width (Bi-iliac breadth) and muscular strength (right & left grip hand strength), among male junior freestyle wrestlers across different weight categories. By shoulder width (Bi-acromial breadth), pelvic width (Bi-iliac breadth) measurements alongwith handgrip strengths, the study aimed to provide valuable insights into the distinct body size and muscular strength profiles male junior freestyle wrestlers.

Material and Methods

The present study was conducted on one hundred fifty (N=150) male junior free style wrestlers (age ranged 18-20 years) which were further divided into five groups i.e. Group 1(46-50 kg), Group 2 (55kg), Group 3 (60kg), Group 4 (66kg) and Group 5 (74kg) junior free style wrestlers. The aim of the study was explained to each participant and signed informed consent was obtained from the participants. The participants were instructed to remove all clothing except for their underwear, in accordance with the International Biological Program Protocol (Weiner and Lourie, 1969; Olivier, 1969). Two anthropometric measurements, Bi-acromial breadth and Bi-iliac breadth, were then taken with the subjects positioned in the standard anatomical posture, with their head aligned on the Frankfort Horizontal Plane.

Bi-acromial breadth: To measure the maximum shoulder width, the subject stood with their shoulders relaxed, avoiding any slumping forward. The measurer, positioned behind the subject, located the outer edge of the acromial process of the shoulder blade, identifiable as a ridge just above the shoulder joint. One arm of the anthropometer was then placed along the external border of one acromial process, and the other arm was brought inward until it rested on the opposite acromial external border (Tanner, Hiernaux, and Jarman, 1969).

Bi-iliac breadth: For this measurement, the subject stood with their heels together, and the anthropometer arms were brought into contact with the iliac crest at the point yielding the maximum diameter. The measurer applied firm pressure to the anthropometer blades to displace any fat covering the bone. This measurement was preferably taken with the measurer positioned in front of the subject (Tanner, Hiernaux, and Jarman, 1969).

In the context of wrestlers, biacromial breadth refers to the horizontal distance measured between the outermost points of the acromions (the bony points at the top of each shoulder blade). This measurement, also known as shoulder width, is a key anthropometric measure. Biliac breadth, on

the other hand, refers to the horizontal distance between the two iliac crests (the bony ridges on the hip. This measurement, also known as pelvic width). While both are related to body size and frame, biacromial breadth primarily focuses on shoulder width, which is important in wrestling for leverage and strength, while biliac breadth relates to pelvic width.

The handgrip strength of the dominant hands was evaluated using a handgrip dynamometer. The test was performed in the standing position. The subject held the dynamometer in the hand to be tested with the arm at right angles and the elbow by the side of the body. Subject was then asked to squeeze the dynamometer with his maximum isometric effort for a 5 sec period. Test was repeated two times with both hands. The 30 second rest interval was provided between measurements and the highest score was recorded. To determine the differences between the mean of the various variables among different groups, one way Analysis of Variance (ANOVA) was used. Scheffe Post Hoc test was also used to identify the location of significant differences among the different groups. The level of significance was $p<0.05$.

Results and Discussion

The mean biacromial breadth (shoulder width) for male junior freestyle wrestlers in group1, group2, group3, group4, group 5 were 32.46 ± 3.5cm, 32.43 ± 3.2cm, 34.12 ± 3.4cm, 34.30 ± 3.1cm, and 37.71 ± 2.9 cm, respectively. An increasing trend was observed in the mean value of biacromial breadth (shoulder width) from group1 to group5 except group2 for male junior freestyle wrestlers. Similarly, the mean biilliac breadth (pelvic width) for male junior freestyle wrestlers in group1, group2, group3, group4, group 5 were 25.90 ± 1.03 cm, 26.63 ± 1.25 cm, 27.75 ± 1.75 cm, 26.45 ± 6.51 cm, and 29.62 ± 1.68 cm respectively.

An increasing trend was observed in the mean value of biilliac breadth (pelvic width) from group1 to group5 except group4 for male junior freestyle wrestlers. Furthermore, the mean value of biacromial breadth (shoulder width) was more than biilliac breadth (Pelvic width) from group1 to group5 of male junior freestyle wrestlers (Table 1).

The mean right-hand grip strength of male junior freestyle wrestlers in group1, group2, group3, group4, group 5 were 43.13 ± 6.58 kg, 44.17 ± 4.84 kg, 45.53 ± 2.81 kg, 49.73 ± 6.76 kg, and 56.50 ± 5.67 kg respectively. An increasing trend was observed in the mean value of right-hand grip strength from group1 to group5 for male junior freestyle wrestlers. Similarly, the mean left-hand grip strength of male junior freestyle wrestlers in group1, group2, group3, group4, group 5 were 39.37 ± 6.30kg, 41.30 ± 6.01kg, 43.60 ± 3.95kg, 47.27 ± 6.91kg, and 53.83 ± 6.30kg.

An increasing trend was observed in the mean value of left-hand grip strength from group1 to group5 for male junior freestyle wrestlers (Table 1). Furthermore, the mean value of right hand grip strength was more than left hand grip strength from group1 to group5 of male junior freestyle wrestlers (Table 1).

Table 1. Mean± SD of Biacromial breadth, Biilliac breadth, Right hand grip and Left hand grip Strength of Junior Free Style Wrestlers

Variable(s)	Group 1 (46-50 kg) (n=30)	Group 2 (55kg) (n=30)	Group 3 (60kg) (n=30)	Group 4 (66kg) (n=30)	Group 5 (74kg) (n=30)	Total (n=150)
Biacromial breadth (Shoulderwidth) (cm)	32.46±3.5	32.43±3.2	34.12±3.4	34.30±3.1	37.71±2.9	34.20 ±.3.2
Biilliac breadth (Pelvic width) (cm)	25.90 ± 1.0	26.63 ± 1.2	27.75± 1.7	26.44 ± 6.5	29.62 ± 1.6	27.26 ±2.4
Right hand grip	43.1±6.5	44.1±4.8	45.5±2.8	49.73±6.7	56.50±5.6	47.8

(kg)						±5.3
Left hand grip (kg)	39.36±6.2	41.30±6.0	43.6±3.9	47.2±6.9	53.8±6.3	45.0 ±5.8

The analysis of variance results shows that a statistically significant difference in the mean values of biacromial breadth (shoulder width) among various groups of junior freestyle wrestlers (F=12.801, p≤.05). Similarly, a statistically significant variance was found in the mean values of biilliac breadth (pelvic width) (F=6.436, p≤.05), right-hand grip strength (F=29.396, p≤.05), and left-hand grip strength (F=27.368, p≤.05) across different groups of male junior freestyle wrestlers (Table 2).

Table 2. Analysis of Variance of Biacromial breadth, Biilliac breadth, Right hand grip And Left hand grip Strength of Junior Free Style Wrestlers

Variable	Groups	Sum of Squares	Mean Square	F	Sig.
Biacromial breadth (Shoulder width)	Between Groups	554.55	138.64	12.801	.000
	Within Groups	1570.37	10.83		
Biiliac breadth (Pelvic width)	Between Groups	261.95	65.48	6.436	.000
	Within Groups	1475.41	10.17		
Right hand grip(kg)	Between Groups	3586.30	896.57	29.396	.000
	Within Groups	4422.46	30.50		
Left hand grip(kg)	Between Groups	3915.69	978.92	27.368	.000
	Within Groups	5186.50	35.76		

Further, results of scheffe posthoc showed a statistically significant mean difference in biacromial breadth (shoulder width) group1 vs group5 (-5.24cm p≤0.01), group2 vs group5 (-5.28cm p≤0.01), group3 vs group5 (-3.59cm p≤0.01) and group4 vs group5 (-3.41cm p≤0.01) junior freestyle wrestlers (Table 3).

The maximum mean difference in biacromial breadth (shoulder width) group2 vs group5 (-5.28cm p≤0.01) was observed. The minimum mean difference in biacromial breadth (shoulder width) group4 vs group5 (-3.41cm p≤0.01) was observed (Table 3).

Further, results of scheffe posthoc showed a statistically significant mean difference in biilliac breadth (pelvic width) group1 vs group5 (-3.72cm p≤0.01), group2 vs group5 (-2.99cm p≤0.01), and group4 vs group5 (-3.17cm p≤0.01) junior freestyle wrestlers (Table 3).

The maximum mean difference in biacromial breadth (shoulder width) group1 vs group5 (-3.72cm p≤0.01) was observed. The minimum mean difference in biacromial breadth (shoulder width) group2 vs group5 (-2.99cm p≤0.01) was observed (Table 3).

Thus, it was observed that biacromial breadth (shoulder width) and biilliac breadth (pelvic width) was more of heavy weight category junior free style wrestlers than lightweight category junior free style wrestlers.

Further, results of scheffe posthoc showed a statistically significant mean difference in right hand grip strength group1 vs group4 (-6.60kg p≤0.01), group1 vs group5 (-13.36kg p≤0.01), group2 vs group4 (-5.56kg p≤0.01), group2 vs group5 (-12.33kg p≤0.01), group3 vs group5 (-10.96kg p≤0.01) and group4 vs group5 (-6.76kg p≤0.01) junior freestyle wrestlers (Table 4).

The maximum mean difference in right hand grip strength group1 vs group5 ((-13.36kg p≤0.01) was observed. The minimum mean difference in right hand grip strength group2 vs group4 (-5.56kg p≤0.01) was observed (Table 4).

Further, results of scheffe posthoc showed a statistically significant mean difference in left hand grip strength group1 vs group4 (-7.90kg p≤0.01), group1 vs group5 (-14.46kg p≤0.01), group2 vs group4 (-5.96kg p≤0.01), group2 vs group5 (-12.53kg p≤0.01), group3 vs group5 (-10.23kg p≤0.01) and group4 vs group5 (-6.56kg p≤0.01) junior freestyle wrestlers.

Table 3. Scheffe Posthoc Multiple Comparisons of Biacromial breadth and Biilliac Breadth among different groups of junior free style wrestlers

Dependent Variable	**(I)** Group 1 (50kg) Group 2 (55kg) Group 3 (60kg) Group 4 (66kg) Group 5 (74kg)	**(J)** Group 1 (50kg) Group 2 (55kg) Group 3 (60kg) Group 4 (66kg) Group 5 (74kg)	**Mean Difference** (I-J)	**Sig.**
Biacromial breadth (Shoulder width)	1	2	.03333	1.000
		3	-1.65667	.437
		4	-1.83667	.327
		5	-5.24667*	.000
	2	3	-1.69000	.416
		4	-1.87000	.309
		5	-5.28000*	.000
	3	4	-.18000	1.000
		5	-3.59000*	.002
	4	5	-3.41000*	.004
Biiliac breadth (Pelvic width)	1	2	-.73333	.939
		3	-1.85333	.286
		4	-.54667	.979
		5	-3.72333*	.001
	2	3	-1.12000	.763
		4	.18667	1.000
		5	-2.99000*	.013
	3	4	1.30667	.642
		5	-1.87000	.277
	4	5	-3.17667*	.007

The maximum mean difference in left hand grip strength group1 vs group5 ((-14.46kg p≤0.01) was observed. The minimum mean difference in left hand grip strength group2 vs group4 (-5.96kg p≤0.01) was observed (Table 4).
Thus, it was observed that right hand grip strength and left hand grip strength was more of heavy weight category junior free style wrestlers than lightweight category junior free style wrestlers.

Table 4. Scheffe Posthoc Multiple Comparisons of Right-hand grip and Left-hand grip Strength among different groups of junior free style wrestlers

Dependent Variable	(I) Group 1 (50kg) Group 2 (55kg) Group 3 (60kg) Group 4 (66kg) Group 5 (74kg)	(J) Group 1 (50kg) Group 2 (55kg) Group 3 (60kg) Group 4 (66kg) Group 5 (74kg)	Mean Difference (I-J)	Sig.
Right hand grip strength (Kg)	1	2	-1.03333	.971
		3	-2.40000	.588
		4	-6.60000*	.000
		5	-13.36667*	.000
	2	3	-1.36667	.921
		4	-5.56667*	.006
		5	-12.33333*	.000
	3	4	-4.20000	.075
		5	-10.96667*	.000
	4	5	-6.76667*	.000
Left hand grip strength (Kg)	1	2	-1.93333	.814
		3	-4.23333	.117
		4	-7.90000*	.000
		5	-14.46667*	.000
	2	3	-2.30000	.696
		4	-5.96667*	.006
		5	-12.53333*	.000
	3	4	-3.66667	.234
		5	-10.23333*	.000
	4	5	-6.56667*	.002

Conclusion

It was concluded that shoulder width (biacromial breadth), pelvic width (biilliac breadth), right hand grip strength and left hand grip strength was more of heavy weight category than lightweight category junior free style wrestlers. These findings underscore the heterogeneous nature of muscular strength attributes within the junior freestyle wrestling population, emphasizing the need for individualized training approaches tailored to specific group characteristics. By recognizing and

accounting for these differences, coaches and trainers can better optimize training regimens to enhance performance outcomes for junior freestyle wrestlers.

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