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ANTHROPOMETRIC PROFILE OF COMPETITIVE SWIMMERS FROM PUNE: A COMPARATIVE STUDY

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Abstract:

This study investigated the development of a profile of body composition and size among competitive swimmers. A cluster sampling technique was used to select a sample from Deccan Gymkhana. The sample specifically included swimmers from the Under-17 (n – 12) and Under-19 (n – 12) age groups to focus on a particular stage of development. Data Collection Tools – Anthropometric measurements - Arm Length, Leg Length, Arm Circumference, Leg Circumference. Conclusion - Across all measured anthropometric variables specifically arm length, leg length, arm circumference, and leg circumference there were no statistically significant differences between competitive swimmers in the Under-17 and Under-19 age groups.

Keywords: *Competitive Swimmers, Body composition and size, Anthropometric Measurement*

Introduction: Swimming performance is affected by many factors, including biomechanics (movement efficiency) and energy use. A swimmer's energy level and body shape also influence their technique. While these principles apply to adult and elite swimmers, they must be adapted for younger swimmers, who have unique characteristics due to their growth and development. (Miriam Alves, 2022) Specific anthropometric profiles in athletes correlate strongly with the physiological demands of their respective sports. Elite endurance runners, for example, tend to present with lower overall body mass and reduced limb circumferences when compared to strength athletes like weightlifters or sprinters, who are characterized by superior muscle mass and a higher body mass index. (Geladas ND, 2005) Anthropometry—the scientific study of human body measurements and proportions—is crucial in sports science. It is used to identify talent, predict performance, optimize training, prevent injuries, and aid rehabilitation. By analysing a person's size, shape, and composition, anthropometry offers objective insights into how their physique matches the needs of specific sports. (Norton K, 2001) Elite swimmers typically possess physical advantages like longer torsos and larger extremities, which enhance propulsion and reduce water resistance. Specific proportions, such as a favourable torso-to-leg ratio, improve buoyancy and streamlining, while increased arm span contributes to stroke length and efficiency. (Geladas ND, 2005)

Does the body composition and size of competitive swimmers make a difference in their skills and techniques? Primarily, it aims to establish a local, sport-specific, physical benchmark for talent identification, training optimization, and performance enhancement. Develop a profile of body composition and size of competitive swimmers.

Method: This study investigated the development of a body composition and size profile among competitive swimmers. A cluster sampling technique was used to select a sample from the Deccan Gymkhana. The sample specifically included swimmers from the Under-17 (n = 12) and Under-19 (n = 12) age groups to focus on a particular stage of development.

Data Collection Tools –

Anthropometric

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Measurements Arm Length, Leg Length, Arm Circumference, Leg

Result:

Descriptive Statistical Analysis:

The mean and SD of Competitive Swimmers were calculated using descriptive statistical analysis, as shown in the right- and left-hand length test **Table 1.**

Test	Age Group	Mean	Std. Dev	Std. Error
Right Hand Length	**U17**	60.458	4.4897	1.2961
	U19	58.625	2.9839	.8614
Left Hand Length	**U17**	60.042	4.3561	1.2575
	U19	58.642	2.9327	.8466

Based on Table **1**, the U17 age group has a slightly larger average length for both the right hand (60.458) & left hand (60.042) compared to the U19 group. However, the U17 group also exhibited greater variability in their measurements, as shown by their higher standard deviations (4.4897 and 4.3561) compared to the U19 group. This higher variability in the U17 group is also reflected in the larger standard error, suggesting that the U17 sample mean is a less precise estimate of the true population mean compared with the U19 group.

To compare the right and left-hand length tests of competitive swimmers. An independent sample t-test was used, and the results are shown in **Table 2.**

Test	Age Group	t	df	Sig. (2-tailed)	Std. Error Diff	95% CI of the Difference	
						Lower	Upper
Right Hand Length	**U17**	1.178	22	.251	1.8333	1.5562	-1.3940
	U19	1.178	19.131	.253	1.8333	1.5562	-1.4223
Left Hand Length	**U17**	.924	22	.366	1.4000	1.5159	-1.7438
	U19	.924	19.272	.367	1.4000	1.5159	-1.7698

As shown in **Table 2,** a t-test was conducted to compare the right- and left-hand lengths between the U17 and U19 age groups. For both right-hand and left-hand length, the t-statistic was not statistically significant (p-values of .251 and .366, respectively, which are both greater than .05), suggesting that there was no statistically significant difference in hand length between the two age groups. The 95% confidence intervals for the mean difference included zero, further supporting the conclusion that the observed differences were not statistically significant.

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Descriptive Statistical Analysis:

The mean and SD of Competitive Swimmers were calculated under descriptive statistical analysis, as shown in the below right and left leg length test **Table 3.**

Test	Age Group	Mean	Std. Dev	Std. Error
Right Leg Length	**U17**	92.875	5.8314	1.6834
	U19	92.458	4.1966	1.2115
Left Leg Length	**U17**	93.375	6.0382	1.7431
	U19	92.483	4.3444	1.2541

Based on Table **3**, the average right and left leg lengths were slightly greater for the U17 age group than for the U19 group. The U17 group had a mean right and left leg lengths of 92.875 and 93.375 cm, respectively, while the U19 group had means of 92.458 and 92.483 cm, respectively. Additionally, the U17 group showed more variability in its measurements, as indicated by a larger standard deviation for both legs compared to the U19 group. The standard errors for the U17 group are also larger, suggesting a higher degree of uncertainty in their sample means as estimates of the true population means.

To compare the right and left leg length in Competitive Swimmers. An independent-sample t-test was used, as shown in **Table 4.**

Test	Age Group	t	df	Sig. (2-tailed)	Std. Error Diff	95% CI of the Difference	
						Lower	Upper
Right Leg Length	**U17**	.201	22	.843	.4167	2.0740	-3.8845
	U19	.201	19.984	.843	.4167	2.0740	-3.9098
Left Leg Length	**U17**	.415	22	.682	.8917	2.1474	-3.5617
	U19	.415	19.982	.682	.8917	2.1474	-3.5879

As shown in **Table 4,** a t-test was conducted to compare the right and left leg lengths between the U17 and U19 age groups. For both right and left leg lengths, the significance value (p-value) was not statistically significant (.843 and .682, respectively, both greater than the common threshold of .05), suggesting that there was no statistically significant difference in leg length between the two age groups. The 95% confidence intervals for the mean difference also include zero, further supporting the conclusion that any observed differences are likely due to chance and are not statistically significant.

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Descriptive Statistical Analysis:

The mean and SD of Competitive Swimmers were calculated using descriptive statistical analysis, as shown in the below right- and left-hand circumference test. **Table 5.**

Test	Age Group	Mean	Std. Dev	Std. Error
Right Hand Circumference	**U17**	27.925	3.2781	.9463
	U19	27.675	5.2337	1.5108
Left Hand Circumference	**U17**	27.8958	3.51713	1.01531
	U19	27.6500	5.18415	1.49654

Based on the table, the average circumference of both the right and left hands was slightly larger in the U17 group than in the U19 group. However, the U19 group showed greater variability in both measurements, as indicated by their larger standard deviations. This increased variability in the U19 group was also reflected in a larger standard error, suggesting that the sample mean for the U17 group was a more precise estimate of the true population mean.

To compare the right and left-hand circumference test of Competitive Swimmers. An independent sample t-test was used, and the results are shown in **Table 6.**

Test	Age Group	t	df	Sig. (2-tailed)	Std. Error Diff	95% CI of the Difference	
						Lower	Upper
Right Hand Circumference	**U17**	.140	22	.890	.2500	1.7827	-3.4471
	U19	.140	18.480	.890	.2500	1.7827	-3.4884
Left Hand Circumference	**U17**	.136	22	.893	.24583	1.80844	-3.50465
	U19	.136	19.356	.893	.24583	1.80844	-3.53458

As shown in **Table 6,** a t-test was conducted to compare the right- and left-hand circumferences between the U17 and U19 age groups. For both right-hand and left-hand circumferences, the significance value (p-value) is not statistically significant (.890 and .893, both greater than the common threshold of .05), suggesting that there is no statistically significant difference in hand circumference between the two age groups. The 95% confidence intervals for the mean difference also included zero, which further supports the conclusion that any observed differences are likely due to chance and are not statistically significant.

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Descriptive Statistical Analysis:

Mean, Std. Deviation, Std. The error of Competitive Swimmers was calculated using descriptive statistical analysis, as shown in the right and left leg circumference test **Table 7.**

Test	Age Group	Mean	Std. Dev	Std. Error
Right Leg Circumference	U17	50.650	5.6161	1.6212
	U19	51.108	4.4808	1.2935
Left Leg Circumference	U17	50.467	5.4791	1.5817
	U19	51.250	4.0597	1.1719

Based on the table, the average circumference for both the right and left legs is slightly larger in the U19 age group compared to the U17 age group. However, the U17 group shows greater variability in their measurements, as indicated by their larger standard deviations. This increased variability in the U17 group is also reflected in a larger standard error, suggesting that the sample mean for the U19 group is a more precise estimate of the true population mean.

To compare the right and left leg circumference of Competitive Swimmers. An independent sample t-test was used, as shown in **Table 8.**

Test	Age Group	t	df	Sig. (2-tailed)	Std. Error Diff	95% CI of the Difference	
						Lower	Upper
Right Leg Circumference	U17	-.221	22	.827	-.4583	2.0740	-4.7596
	U19	-.221	20.966	.827	-.4583	2.0740	-4.7719
Left Leg Circumference	U17	-.398	22	.695	-.7833	1.9685	-4.8658
	U19	-.398	20.281	.695	-.7833	1.9685	-4.8860

As shown in **Table 8,** A t-test was conducted to compare the right and left leg circumference between the U17 and U19 age groups. For both right and left leg circumference, the significance value (p-value) is not statistically significant (.827 and .695 respectively, both greater than the common threshold of .05), suggesting there is no statistically significant difference in leg circumference between the two age groups. The 95% confidence intervals for the mean

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difference also include zero, which further supports the conclusion that any observed differences are likely due to chance and are not statistically significant.

Discussion:

This finding suggests that while there may be slight differences in the average measurements between the groups, these differences are not large enough to be considered meaningful from a statistical standpoint. This contrasts with the introductory information which states that athletes often exhibit specific anthropometric profiles that are key to their sport, such as elite swimmers having longer torsos and larger hands and feet.

Conclusion:

The anthropometric measurements, which included arm length, leg length, arm circumference, and leg circumference, revealed no statistically significant differences between the Under-17 and Under-19 competitive swimmer age groups.

References:

1. *Geladas ND, N. G. (2005). Somatic and physical traits affecting sprint swimming performance inyoung swimmers. Int J Sports Med. , 26(2):139-144.*
2. *Gil, S. &. (2007). Anthropometric and physiological characteristics of young soccer players according to their playing position: relevance for the selection process. Journal of Strength and Conditioning Research , 438-445.*
3. *Miriam Alves, D. D.-B. (2022). How Anthropometrics of Young and Adolescent Swimmers Influence Stroking Parameters and Performance? A Systematic Review. University of Porto, Portugal: Int. J. Environ. Res. Public Health .*
4. *Norton K, O. T. (2001). Anthropometrica: A textbook of body measurement for sports and health courses. . Sydney: UNSW Press.*
5. *Pelayo, M. S. (1996). Correlations with stroking characteristics and anthropometric patric characteristics in freestyle swimming. Clair Tourney Journal of Applied Biomechanics,, 197-206.*
6. *Putra et al. Rahayu T, K. W. (2020). The importance of paying attention to anthropometrics in the selection athletes. International Conference on Science and Education and Technology (ISET 2019).*
7. *Sammoud S, N. A. (2018). 100-m breaststroke swimming performance in youth swimmers: the predictive value of anthropometrics. Pediatric Exercise Science., 393–401.*
8. *William G. Thorland, c. O. (1983). Anthropometric characteristics of elite adolescent competitive swimmers. Human Biology,, 735 – 748.*
9. *Wilmore JH, C. D. (2005). Physiology of sport andexercise. 3rd ed. Champaign: IL: Human Kinetics.*

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