

## CROSS SECTIONAL ANALYSIS OF ANTHROPOMETRIC VARIABLES AMONG THE GIRLS OF 18 TO 23 YEARS OF AGE OF LUCKNOW UNIVERSITY

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### Abstract

The main purpose of the study was to make cross-sectional analysis of Anthropometric variables among the girls of 18 to 23 years of age of Lucknow University. For the purpose of this study, six hundred college going girls of between the age of 18 to 23 years of six age groups of different colleges of Lucknow University were randomly selected out of the total roll list of the academic session 2009-10. Two hundred subjects from each of the stream of education i.e. Arts, Science and Commerce were selected randomly as subjects for this study. From each age group hundred subjects were further selected as subjects of this study. The study was delimited to the selected Anthropometric variables such as Body Weight, Standing Height, Sitting Height, Leg Length and Arm Length. For analysis the data, descriptive and comparative statistics was used. The statistical analysis of data was done by using analysis of variance (ANOVA). The level of significance was set at 0.01. Significant difference was found among all selected variables among girls of 18 to 23 years age group.

**Keywords:** Height, Sitting Height, Arm Length and Leg Length.

### Introduction

Each individual grows in his unique way. The rate of growth differs not only from individual to individual but also within the same individual. It also varies from one period to another. An organism and its parts grow at rates which are different at different times. The body as a whole, as measured by height and weight, shows a pattern of growth rate that is fast in infancy, moderate during the pre-school period, slow during the elementary school years and fast in the beginning of adolescence. Furthermore, our entire body does not grow at the same rate at the same time. Different parts and sub-systems develop at different times.

Anthropometry measurements were of great concern for the first phase of the scientific era of measurements, which began in 1860's. Current interest in anthropometry focuses on three areas: growth measures, body type and body composition. The uses of such measures include classification, prediction of success in motor activities as well as assessment of obesity.

The teachers of physical education and coaches while selecting their teams for participation in tournaments give due consideration to various anthropometric measurements, such

as height, weight, arm length, leg length besides other aspects. It is believed that a certain type of physique is desirable for exhibiting top class performance. Physical educators or coaches while selecting players must give weightage to certain anthropometric measurements so that the sports women may be able to give top class performance after training.

Research involving anthropometric concerning sportswomen is very meager in India. We do not know the specific anthropometric characteristics of women sports persons participating in different sports. Hence, an attempt is made to find out the specific anthropometric characteristics of sportswomen participating in different sports.

Data or accurate information about women for sports purpose is either limited or not sufficiently available for people who are really interested in such matters. Although considerable material is available on health related physical fitness, motor fitness, growth pattern, psychological and anthropometrical variables of men, but very less researches have been done on girls or women. It is very important for the coaches and the teachers of physical education to understand the importance of Anthropometric variables.

### Research Methodology

For the purpose of this study, six hundred colleges going girls of between the ages of 18 to 23 years of six age groups of different colleges of Lucknow University were randomly selected out of the total roll list of the academic session 2009-10. Two hundred subjects from each of the stream of education i.e. Arts, Science and Commerce were selected randomly as subjects for this study. From each age group hundred subjects were further selected as subjects of this study. The study was delimited to the selected Anthropometric variables such as Body Weight, Standing Height, Sitting Height, Leg Length and Arm Length. For the study, the following criterion measures were selected: Body weight of the subjects was measured and corrected to the nearest kilogram using a standard weighing machine. Height of the subjects was measured in centimeters using a standard Martin type Anthropometer, Mfg by Sieber-Hegner, Switzerland. Arm length and Leg length were measured in centimeters using standard steel tape. The statistical analysis of data was done by using analysis of variance (ANOVA). For the analysis of data Descriptive Statistics was used. The level

of significance was set at 0.01. The data was analyzed by SPSS (Version 17).

### Results and Discussions

The findings pertaining to descriptive statistics and one way analysis of variance (ANOVA) for the various Anthropometric variables among the girls of 18 to 23 years of age of Lucknow University along with the least significant difference (L.S.D.) test for post-hoc test have been presented in table no. 1 to 5. It shows that there is fluctuation in body weight of girls of given age groups with maximum weight being recorded at the age of 19 years. It may be because of figure consciousness as well as health awareness.

To find out significant differences between different age groups i.e. 18 to 23 years among girls on Anthropometric variables one way analysis of variance i.e. ANOVA was applied.

TABLE 1  
ANALYSIS OF VARIANCE FOR BODY WEIGHT AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Source of Variance	df	Sum of Squares	Mean Squares	F Ratio
Between Groups	5	316.208	63.242	3.284*
Within Groups	594	11440.110	19.259	
Total	599	11756.318		

\*Table  $F_{.01}(5, 594) = 3.048$

The analysis of data presented in the table 1.1 clearly reveals that there are significant differences in the body weight of girls of 18 to 23 years of age as the obtained value of 'F' is 3.284 is significantly greater than the tabulated value of 3.048 at 0.01 levels.

Since 'F' ratio was found to be significant, further post hoc test was applied to find out the differences between each age group. The data is presented in table no. 2.

TABLE 2  
POSTHOC COMPARISON (LSD TEST) FOR WEIGHT AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Age Group (in years)						M.D.	C.D.
18	19	20	21	22	23		
48.53	48.57					-0.04	-0.06
48.53		48.17				0.36	0.54
48.53			49.82			-1.29	-1.89
48.53				49.27		-0.74	-1.08
48.53					50.17	-1.64	-2.56
	48.57	48.17				0.4	0.66
	48.57		49.82			-1.25	-2.04
	48.57			49.27		-0.7	-1.14
	48.57				50.17	-1.6	-2.85
		48.17	49.82			-1.65	-2.84
		48.17		49.27		-1.1	-1.89
		48.17			50.17	-2	-3.84
			49.82	49.27		0.55	0.91
			49.82		50.17	-0.35	-0.64
				49.27	50.17	-0.9	-1.66

\*Significant at 0.01 level of significance

It is evident from the table that the mean comparisons of LSD Post hoc test of body weight among given all age-groups were significant as their respective mean deviations were greater than their respective values of critical difference.

The descriptive analysis of Standing height of 18 to 23 years of age groups is presented in table 2.

TABLE 2  
ANALYSIS OF VARIANCE FOR STANDING HEIGHT AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Source of Variance	df	Sum of Squares	Mean Squares	F Ratio
Between Groups	5	124.873	24.975	1.764*
Within Groups	594	8410.620	14.159	

\*Table  $F_{.01}(5, 594) = 3.048$

The analysis of data presented in the table 2.1 clearly reveals that there are no significant differences in the standing height of girls of 18 to 23 years of age, as the obtained value of 'F' is 1.764, is significantly less than the tabulated value of 3.048 at 0.01 levels. Since 'F' ratio was not found to be significant, further post hoc test was not applied to find out the differences between each age group.

TABLE 3  
ANALYSIS OF VARIANCE FOR SITTING HEIGHT AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Source of Variance	df	Sum of Squares	Mean Squares	F Ratio
Between Groups	5	135.613	27.123	4.133*
Within Groups	594	3898.220	6.563	

\*Table  $F_{.01}(5, 594) = 3.048$

The analysis of data presented in the table 3.1 clearly reveals that there are significant differences in the sitting height of girls of 18 to 23 years of age, as the obtained value of 'F' is 4.133, is significantly greater than the tabulated value of 3.048 at 0.01 levels. Since 'F' ratio was found to be significant, further post hoc test was applied to find out the differences between each age group. The data is presented in table no. 3.1.1.

TABLE 3  
POSTHOC COMPARISON (LSD TEST) FOR SITTING HEIGHT AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Age Group (in years)						M.D.	C.D.
18	19	20	21	22	23		
80.14	79.5					0.64	1.27
80.14		78.86				1.28	3.14
80.14			78.66			1.48	3.83
80.14				79.21		0.93	2.47
80.14					79.33	0.81	2.23
	79.5	78.86				0.64	1.32
	79.5		78.66			0.84	1.81
	79.5			79.21		0.29	0.64
	79.5				79.33	0.17	0.38
		78.86	78.66			0.2	0.56
		78.86		79.21		-0.35	-1
		78.86			79.33	-0.47	-1.4
			78.66	79.21		-0.55	-1.7
			78.66		79.33	-0.67	-2.17
				79.21	79.33	-0.12	-0.41

\*Significant at 0.01 level of significance

It can be observed from the table 3.1.1. that the mean comparison of LSD Post hoc test of Sitting Height among the

age-groups of 20 and 22 years, 20 and 23 years, 21 and 22 years, 21 and 23 years, 22 and 23 years were found significant as respective mean deviations -0.35, -0.47, -0.55, -0.67 and -0.12 were greater than the values of critical difference i.e. -1, -1.4, -1.7, -2.17 and -0.41 respectively. However, Post Hoc test mean comparison of sitting height among the age-group of 18 and 19 years, 18 and 20 years, 18 and 21 years, 18 and 22 years, 18 and 23 years, 19 and 20 years, 19 and 21 years, 19 and 22 years, 19 and 23 years, 20 and 21 years were not significant as their respective mean deviations were lower than their respective values of critical difference.

TABLE 4  
ANALYSIS OF VARIANCE FOR LEG LENGTH AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Source of Variance	df	Sum of Squares	Mean Squares	F Ratio
Between Groups	5	77.975	15.595	3.250*
Within Groups	594	2850.490	4.799	

\*Table  $F_{.01}(5, 594) = 3.048$

The analysis of data presented in the table 4.1 clearly reveals that there are significant differences in the leg length of girls of 18 to 23 years of age as the obtained value of 'F' was 3.250, is significantly greater than the tabulated value of 3.048 at 0.01 levels.

Since 'F' ratio was found to be significant, further post hoc test was applied to find out the differences between each age group. The data is presented in table no. 5.

TABLE 5  
POSTHOC COMPARISON (LSD TEST) FOR LEG LENGTH AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Age Group (in years)						M.D.	C.D.
18	19	20	21	22	23		
73.3	74.12					-0.82	-2.32
73.3		73.66				-0.36	-1.01
73.3			74.13			-0.83	-2.41
73.3				73.99		-0.69	-2.08
73.3					74.41	-1.11	-3.38
	74.12	73.66				0.46	1.45
	74.12		74.13			-0.01	-0.03
	74.12			73.99		0.13	0.76
	74.12				74.41	-0.29	-1.01
		73.66	74.13			-0.47	-1.53
		73.66		73.99		-0.33	-1.13
		73.66			74.41	-0.75	-2.6
			74.13	73.99		0.14	0.5
			74.13		74.41	-0.28	-1.02
				73.99	74.41	-0.42	-1.62

\*Significant at 0.01 level of significance

It is evident from the table that the mean comparison of LSD Post hoc test of leg length among the age-groups of 18 and 19 years, 18 and 20 years, 18 and 21 years, 18 and 22 years, 18 and 23 years, 19 and 21 years, 19 and 23 years, 20 and 21 years were found significant as their respective mean deviations were greater than their respective values of critical difference. On the other hand, Post hoc test mean

comparison of leg length among the age groups of 19 and 20 years, 19 and 22 years, 21 and 22 years were not significant as their respective mean deviations 0.46, 0.13, 0.14 were lower than the values of critical difference i.e., 1.45, 0.76, 0.5 respectively.

TABLE 6  
ANALYSIS OF VARIANCE FOR ARM LENGTH AMONG GIRLS OF 18 TO 23 YEARS OF AGE GROUPS OF LUCKNOW UNIVERSITY

Source of Variance	Df	Sum of Squares	Mean Squares	F Ratio
Between Groups	5	19.733	3.947	.765*
Within Groups	594	3063.840	5.158	

\*Table  $F_{.01}(5, 594) = 3.048$

The analysis of data presented in the table 5.1. clearly reveals that there are no significant differences in the arm length of girls of 18 to 23 years of age, as the obtained value of 'F' is .765, is significantly less than the tabulated value of 3.048 at 0.01 levels.

Since 'F' ratio was not found to be significant further post hoc test was not applied to find out the differences between each age group.

### Conclusions

It may be concluded that there is an increase in the body weight between the age groups of 18 to 19, 20 to 21 and 22 to 23 years. Whereas decrease of bodyweight is noticed between the age groups of 19 to 20 and 21 to 22 years. It may be further concluded that the girls of 19 years of age have the maximum bodyweight of 61 kg followed by girls of 18 and 21 years with an average body weight of 60 kg. The range between the minimum and maximum bodyweight is found to be approximately 20 kg.

It may be concluded that there is a gradual increase in the standing height between the age groups of 18 to 23 years except 19 to 20 years. It may be further concluded that the girls of 18 years of age have the maximum standing height of 165 cm followed by the girls 19 and 21 years with an average standing height of 165 cm. The range between the minimum and maximum standing height is found to be approximately 21 cm.

It is observed that that there is a gradual decrease in the sitting height between the age groups of 18 to 19, 19 to 20 and 20 to 21 years. Whereas a gradual increase in the sitting height is noticed between the age groups of 21 to 22 and 22 to 23 years. It may be further concluded that the girls of 19 years of age have the maximum sitting height of 88 cm followed by the girls of 18 and 20 years with an average sitting of 87 cm. The range between the minimum and maximum sitting height is found to be approximately 13 cm.

It may be concluded that there is an increase in the leg length between the age groups of 18 to 19, 20 to 21 and 22 to 23 years. Whereas decrease of leg length is noticed between the age groups of 19 to 20 and 21 to 22 years. It may be further concluded that the girls of 19 years of age have the maximum leg length of 82 cm followed by the girls of 18 and 21 years

with an average leg length of 81 cm. The range between the minimum and maximum leg length is found to be approximately 12 cm. In case of leg length, it is found from the analysis that the leg length of girls did not increase after 19 years.

It may be concluded that there is a decrease in the arm length between the age groups of 18 to 19, 19 to 20, 20 to 21 and 22 to 23 years. Whereas a gradual increase of arm length is noticed between the age groups of 21 to 22 years. It may be further concluded that the girls of 19 years of age have the maximum arm length of 82 cm followed by the girls of 18 and 21 years with an average arm length of 78 cm. The range

between the minimum and maximum arm length is found to be approximately 12 cm.

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