

# Comparative Study on Leg length and Leg Explosive Strength of 12-16 Years Boys

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**Abstract:** In this study an attempt has been made to find out the comparative changes on leg length and leg explosive strength of 12 to 16 years boys. The subjects of the present study were selected randomly from the school of Naihati Narendra Vidyaniketan, 24 Pgs (N), WB. Thirty students of each age group's i.e.; 150 boy's students were randomly selected for this purpose. The criteria measured in this article were leg length and leg explosive strength. The data on the leg length and leg explosive strength were analyzed by applying ANOVA to find out significant differences if any among the five age groups. Significant results were found in leg length and leg explosive strength.

**Key words-** leg length and leg explosive strength, Height & weight, 12- 16 years boys.

## Introduction

Morphological characteristics have an important role to play in the performance of various physical activities. Research findings shows that performance is significantly related to body weight, height, arm length, thigh and calf circumference and other parameters [1-2]. Sexual maturation should be used to assess the extent of biological growth and development and the individual nutritional needs of adolescents in place of chronological age. Children grow at different rates at different ages, and different children also develop at different rates, so there will be early and late developers. Not only are the rates of growth different, but also the changes in the body proportions can vary, and this will directly affect the ability to perform. A sound knowledge of processors of growth and development will enable coaches and physical education teaches who are working with children, to organize the training programs that will be more beneficial to the children from a physical and psychological perspective [5, 6].

## The Purpose of the study

- 1) To observe the leg length status of 12 - 16 years boys.
- 2) To observe the jumping ability status of the said group of boys.
- 3) To analysis and compare the age wise differences, if any, the leg length and leg explosive strength among the 12 - 16 years boys.
- 4) To study the relationship between leg length and leg explosive strength of the said age groupboys.

## Methodology

### Subjects

The subjects of the present study were selected randomly from the school Naihati Narendra Vidyaniketan, 24 Pgs (N), WB. Thirty students of each age group's i.e. total 150 male students were selected for this purpose. According to facilities available and on the basis of contact with the school authorities the subjects were selected randomly.

### Criterion Measured

Parameters	Measured by
1) Height (cm)	Stadiometer
2) Weight (kg)	Weighing machine (Portable)
3) Leg length (cm)	Standard measurement technique
4) Leg explosive strength	Standing Broad Jump

## Statistical Procedure

The data on the height, weight, leg length and leg explosive strength were analyzed by applying ANOVA to find out significant differences if any among the age groups.

## Results & Discussion

Discussions were made on the basis of the findings of the present study and compared with available literatures. The level of significance to assess the statistical values obtained was set at 0.05 and also 0.01 level of confidence.

## Height

**Table-1: Mean and SD of height (cm.) among the five groups (12, 13, 14, 15 & 16 year"s boys).**

Age of subjects	Mean	SD
12 years	145.23	6.45
13 years	150.91	12.93
14 years	151.03	5.95
15 years	155.94	5.60
16 years	160.10	4.35

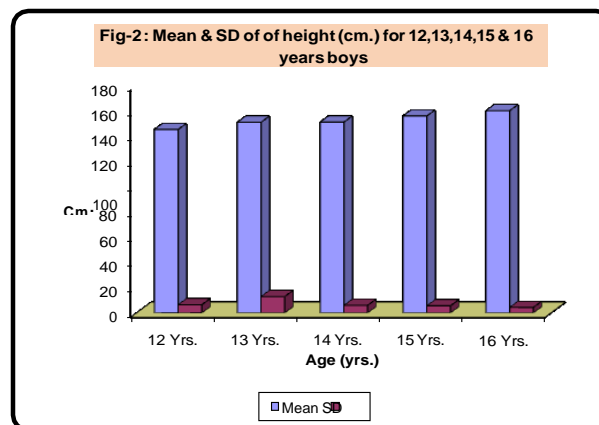
**Table-2: Analysis of variance among the five age groups for height (cm.)**

Source of variance	SS	df	MS	F
Between Groups	3582.66	4	895.67	<b>14.93**</b>
Within Groups	8461.27	141	60.01	
Total	12043.93	145		

\* Sig. at 0.05 levels

\*\* Sig. at 0.01 levels, NS –Not significant.

$F_{0.05(4,141)} = 2.44$ ,  $F_{0.01(4,141)} = 3.96$

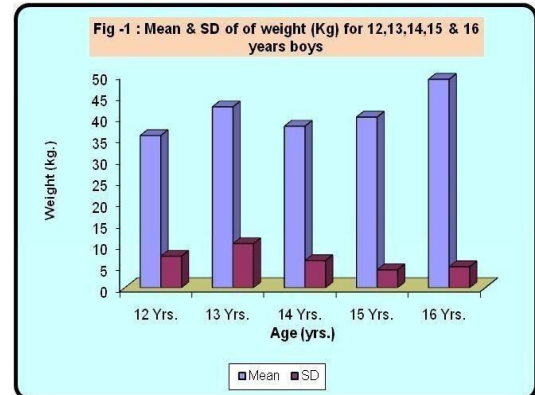


Higher the age higher was the height. Teeple and Massey (1976) had shown that the average height of 10, 11 and 12 years old boys were 143.6, 147.6 and 152.4 cm respectively.

Grassi et al. (2006) studied the relations between aerobic fitness and somatic growth of Italian adolescents and found that standing height was significantly increased with age. Comparing the observation of other leading researchers with the findings of the present study it may be concluded that 12 years boys were relatively smaller in height than other four groups.

**Weight****Table-3: Mean and SD of weight (Kg.) among the five groups (12, 13, 14, 15 & 16 year's boys).**

Age of subjects	Mean	SD
12 years	35.83	7.43
13 years	42.57	10.39
14 years	38.02	6.41
15 years	40.17	4.23
16 years	49.06	4.96

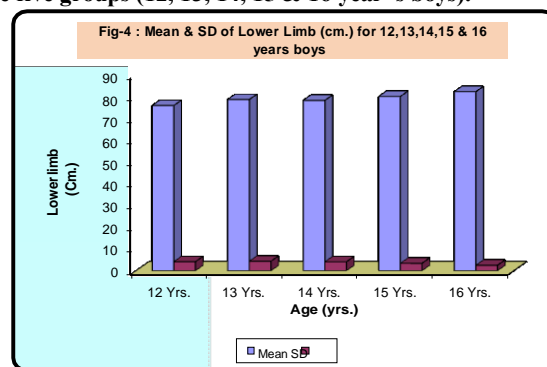
**Table-4: Analysis of variance among the five age groups for weight (Kg.)**

Source of variance	SS	df	MS	F
Between Groups	2850.87	4	712.72	<b>14.24**</b>
Within Groups	7058.42	141	50.06	
Total	9909.29	145		

Barabas and Eiben (1993) observed that 10, 11, 12 years old Hungarian boys carried the weight of 36.16, 35.39 and 39.49 Kg. Teeple and Massey (1976) found that the mean weight of 10, 11 and 12 years old boys were as 36.3, 39.5 and 44.3 Kg. respectively. Shephard (1982) had shown that the average body mass of 10, 11 and 12 years boys as 32.6, 35.2 and 38.3 Kg. Higher the age, higher was the body weight. So except 13 years boys, the present study was in close proximity to other researchers. It may further be inferred that body weight was related to the age of the subjects. Analyzing all the relevant data and statistical treatment it appeared that 13 years boys had significantly higher body weight than other three groups except 16 years boys.

**Leg Length****Table-1: Mean and SD of leg length (cm.) among the five groups (12, 13, 14, 15 & 16 year's boys).**

Age of subjects	Mean	SD
12 years	75.87	4.17
13 years	78.65	4.37
14 years	78.23	4.11
15 years	80.03	3.43
16 years	82.23	2.54



**Table-2: Analysis of variance among the five age groups for Leg length (cm.)**

Source of variance	SS	df	MS	F
Between Groups	618.85	4	154.71	<b>10.64**</b>
Within Groups	2050.55	141	14.54	
Total	2669.41	145		

\* Sig. at 0.05 levels

\*\* Sig. at 0.01 levels, NS –Not significant.

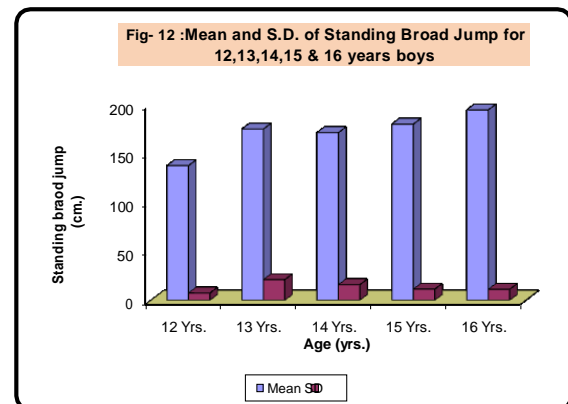
 $F_{0.05 (4,141)} = 2.44$ ,  $F_{0.01 (4,141)} = 3.96$ 

From table-1 it was observed that the mean of height of the lower limb of 16 years boys was relatively higher than 12, 13, 14 and 15 years boys. Higher the age higher was the lower limb length. But the lower limb of the 13 years and 14 years boys group more or less same because in weight 13 years groups had better score than 14 years boys group. From table-6 it was observed that the mean of height of the lower limb of 16 years boys was relatively higher than 12, 13, 14 and 15 years boys. Higher the age higher was the lower limb length. But the lower limb of the 13 years and 14 years boys group more or less same because in weight 13 years groups had better score than 14 years boys group. After statistical analysis it was observed from table-2 that F value 10.64 was significant at both levels. Higher the age higher was the lower limb length. Sixteen years boys were relatively be higher than other groups.

### Standing Broad Jump

**Table-3: Mean and SD of SBJ (cm.) among the five groups (12, 13, 14, 15 & 16 year's boys).**

Age of subjects	Mean	SD
12 yrs.	137.67	7.39
13 yrs.	175.10	21.19
14 yrs.	171.37	15.92
15 yrs.	180.13	11.43
16 yrs.	194.65	11.27

**Table-4: Analysis of variance among the five age groups for weight (Kg.)**

Source of variance	SS	df	MS	F
Between Groups	50887.69	4	12721.92	<b>62.03 **</b>
Within Groups	28919.68	141	205.10	
Total	79807.38	145		

Higher the age higher was the leg explosive strength, except 14 years boys group. Ellis et al. (1975), Kansal (1982), Halder et al. (1987) found a significant increase on performance for all physical performance tests from 10 through 16 years of age [2]. The largest percentage increase occurred between 14 and 15 years for Standing Broad Jump. Clarke (1971) studied to determine the role of anthropometric variables on performance in standing broad jump of 42 college women, aged 18 to 23 years. Age had been found to be positive and significant relationship with performance of standing broad jump. The mean scores among the five groups were not equal. ANOVA was calculated in Table-9(A) and „F“ value was 62.03 which were found statistically significant. Therefore, from the mean difference it can conclude that in Standing Broad Jump for leg explosive strength performance 16 years boys were better than other four groups. It may not be out of place to mention that the mean height, weight and lower limb length of 16 years group were significantly higher than that of 12, 13, 14 and 15 years respectively. This morphological status had played significant role in motor performance of the higher age groups. Slaughter et al. (1982) observed that the average broad jump performance of 11.0-11.9 years old American boys were 60 inches (152.4cm.) [4].

So, from the findings of the present study it may be concluded that leg explosive Strength of boys increases with the increase in age except 14 years which corroborates with the findings of Chatterjee et al. (1992). Malina and Bouchard (1985) had also reported that shorter stature had a negative influence of jumping ability [7]. The rapid increase in strength is largely limited to maximum strength and explosive strength. Some other factors like social and economic factors; intensity of habitual physical activity, participation in extramural and physical education program etc. might be the underlying reason which affected strength performances of lower extremities.

In modern sports, the anthropometric measurement and their relationship with various motor abilities are an important guide for coaches for classification and selection of sportsperson according to their age, ability etc. From this it may be concluded that morphological characteristics have an important role to play in the performance of various physical activities. Extensive studies available around the periphery were also insufficient to bridge the gap in the knowledge of the influence of multifarious factors on physical and motor performance development of the adolescent boys between 12-16 years of age. Furthermore, due to lack of tests as well as norms based on State variation were not readily available in India, which was a matter of great concern, while dealing with the developing the evaluation process of the secondary examination, the development of Physical Education extension program and also the selection of the talented boys for sports.

## Conclusions

### Height-

- Significant difference existed in height among the five groups and higher the age group, higher was the height.
- Height was related to the age of the subjects. 16 years boys were relatively higher than other four groups. Height of the groups may be arranged as 16>15>14>13>12.

### Weight-

- Significant difference existed in body weight among the five groups and higher the age, higher was the body weight.
- 13 years boys had significantly higher body weight than 12, 14, 15 years boys group except 16 years boys group.

### Leg Length-

- Height of the lower limb increased in proportion with the age of the subjects.
- 13 years boys had significantly higher height of the lower limb than other two groups except 15 and 16 years boys and the pattern was similar to the sitting height.

### Leg Explosive Strength

- Higher the age, higher was the leg explosive strength except 14 years boys group. Maximum spurt were observed in 13 years group.
- Mean difference between the groups in respect of standing broad jump was highly significant. Jumping ability of the groups may be arranged as 16>15>13>14>12.

## Recommendations

1. The present study was delimited only to male students; the same type of study may be made with female students.
2. Similar investigation may be done using different growth and motor performance parameters other than those used in the study. Psychological and Physiological parameters which were not considered in the present study.
3. Similar study may be conducted on large samples and age groups other than those used in the study.
4. A comparative study can be undertaken using the same parameters of Indian and foreign subjects.
5. Similar study may be done using tribal and non tribal boys and girls.
6. An interested researcher may prepare norms on height and weight for various age group boys on the basis of valid tests, on boys and girls of each district of West Bengal for proper evaluation.

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