



**INVESTIGATION OF UPPER BODY STRENGTH AND  
ENDURANCE AMONG BOYS AND GIRLS  
CHILDREN OF TRIBAL REGION**

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**ABSTRACT**

The purpose of the study was to compare and investigate the upper body strength and endurance of boys and girls school children of West Bengal five hundred sixty one and eleven boys and girls (Two hundred sixty one boys and Two hundred fifty girls) children ranging ages between 13 to seventeen years studying in middle schools, high schools and higher secondary schools of West Bengal were randomly selected for the present investigation. To find out the significance of difference among the means on push-ups component of health fitness in different age groups, The mean, SD, and F-ratio were computed. The results of the study concluded that the upper body strength and endurance improved among boys and girls with advancement of age. But the differences were found between boys and girls children of thirteen to seventeen years of age in their upper body strength and endurance, The boys were better than girls in their upper body strength and endurance in all age groups.

Key words: School, Boys, Girls, Children, Push-ups, strength, Endurance, Age groups,

## 1. INTRODUCTION

Physical fitness could be a dynamic construct and is continually growing in importance to standard of living and health. It is important to live fitness each as associate outcome of physical activity and as a intercessor of physical activity's impact on illness morbidity, mortality and injury. The measurement of fitness ought to become associate vital a part of police investigation systems that track physical activity and risks for illness or injury (Dishman, Washburn & Heath, 2004).

Muscular strength and endurance is the ability of a muscle or muscle group to execute continual contractions over a amount comfortable to cause muscular fatigue, or to maintain a particular percentage of the most voluntary contraction for a chronic amount (ACSM, 2005)

The push-up is more closely associated with penalization than anything. It was most favorite among education teachers and drill instructors. Though, its use in strength and conditioning regimens was in frequent. In an earlier time, the push-up was largely regarded as a live of a man's strength and fitness. In more present a lot of this name has been passed on to the bench press, but the push-up's passing misses the nice chance to master a entranceway movement to at least one of the foremost biological process progressions altogether of fitness ( Glassman, 2003).

A push-up is a common calisthenics exercise performed in a very prone position by raising and lowering the body exploitation the arms. Push-ups exercise the pectoral muscles, triceps, and anterior deltoids, with ancillary advantages to the rest of the deltoids, serratus anterior, coracobrachialis and the midsection as a full. Push-ups are a basic exercise used in civilian coaching and training or education and unremarkably in military physical training. They are a typical sort of penalization employed in the military, school sport, or in some martial arts disciplines.

Push-ups promotes shoulder stability and range of motion in the joint. This position and mobility transfers to a upward and downward arm swing with a smart elbow drive. Doing pushups with the elbows flared out promoted associate unstable and internally turned shoulder position. This poor position surfaces as a stiff and inefficient forward and backward arm swing when you run, where the elbows drive across the body (Helming,2014).

The push-up mainly encourage to develop the muscles of the chest, arms, and shoulders, which required support from alternative muscles results in a wider vary of muscles integrated into the exercise (American Council on Exercise, 2011) .

Push-ups are extensively used for the development of upper body strength, power and muscular endurance in fitness settings. There are many principal exercises in fitness, which are used by strength and conditioning experts to train athletes in sports, such as baseball (Hammer,2009), boxing (Wallace and Flanagan, 1999), and martial arts (La Bounty, et.al. 2011); and they play a prominent role in the basic training programs of the United States Military (Popovich, et.al. 2000). Although, the load during a push-up is limited by an individual's body weight and anthropometry, many biomechanical variations of the exercise can be performed to change muscle activity, which may be lesser or greater to develop the muscles. These variations most often change the hand and foot positions, which impacts muscle recruitment patterns and joint stresses (Chuckpaiwong and Harnroongroj, 2009).

The push-up has long been advocated as a means to assess the muscular endurance of the upper body particularly. A variety of push-up tests are commonly employed as part of a fitness assessment. These tests have been validated across a wide range of populations (Wood and Baumgartner, 2004).

Contreras et.al., (2012) concluded that Push-ups can be an excellent exercise for improving muscle strength and endurance. It is imperative that practitioners possess adequate knowledge of push-up variations in order to optimize the challenge on the target musculature without compromising proper form and risking injury.

Vishen and Sen (2015) concluded that the effective improvement of upper body performance was observed through dynamic and plyometric push up training among male cricket players.

The purpose of the study was to compare and investigate the upper body strength and endurance of boys and girls children of West Bengal

## 2.METHODOLOGY

### 2.1 Selection of Subjects

Five hundred and eleven boys and girls (Two hundred sixty one boys and two hundred fifty girls) children ranging ages between 13 to seventeen years studying in middle schools, high schools and higher secondary schools of West Bengal were randomly selected for the present investigation. They were randomly selected. Their age records were collected from school records. and tested on push-ups within one month of their birthdays.

### 2.2 Testing Procedure:

Purpose -To measure higher body strength and Endurance. Equipment: Gymnasium mat and stopwatch.

Procedure: The test position varies between boys and girls. The male participant in the common place “up” position. The hands were shoulder width apart whereas the feet were unbroken along. The back was straight, with head up, with the participant using the toes as the important purpose. Female participants adopted a changed “knee push-up” position, with legs together, lower leg in contact with mat with ankles plantar flexed. The back kept straight, hands shoulder width apart and head command up. On the ‘go’ command, each participant began the push-up by bending the elbows and lowering the entire body as a unit till the higher arms were parallel to the bottom. Each participant lowered their bodies till their chins and abdomen touches the mat. The participant returned to the beginning position by raising the entire body till the arms were absolutely extended. The body remained straight and moved as a unit for the entire repetition.

Scoring: The maximal range of push-ups performed consecutively in one minute while not rest was counted as the score.

## 3. RESULTS

To find out the significance of difference among the means on push-ups component of health fitness in different age groups, one way mean, SD, t-ratio and one way Analysis of Variance (ANOVA) were computed and data pertaining to this has been presented in Table 1 to 6.

**TABLE 1**  
**DESCRIPTIVE STATISTICS ON PUSH-UPS COMPONENT OF PHYSICAL**  
**FITNESS OF BOYS AND GIRLS AGED THIRTEEN TO**  
**SEVENTEEN YEARS**

| Age (yrs) | M     | SD   | M     | SD   |
|-----------|-------|------|-------|------|
| 13        | 7.77  | 1.71 | 11.63 | 1.52 |
| 14        | 13.56 | 2.52 | 10.74 | 2.17 |
| 15        | 14.94 | 2.77 | 12.70 | 2.77 |
| 16        | 16.57 | 3.18 | 14.91 | 2.97 |
| 17        | 19.31 | 3.77 | 18.03 | 3.52 |

The mean scores of push-ups component of health fitness of boys and girls children of West Bengal aged 13 to 17 years have been presented in above table.

**TABLE 2**  
**ANALYSIS OF PUSH-UPS COMPONENTS OF PHYSICAL FITNESS OF BOYS FROM THIRTEEN TO SEVENTEEN YEARS OF AGE**

| Sex  | SOV            | df  | SSs     | MS     | F-value |
|------|----------------|-----|---------|--------|---------|
| Boys | Between Groups | 4   | 2481.32 | 620.33 | 30.54*  |
|      | Within Groups  | 256 | 5199.02 | 20.31  |         |

\*Significant at .05 level,  $F_{.05}(4,256) = 2.39$

It is evident from table 2, that the significant difference was found among boys of different age groups on push-ups component of physical fitness, as the obtained F-values of 104.87 was much higher than the required  $F_{.05}(4, 506) = 2.39$

As the F-ratio on push-ups component of physical fitness was found to be significant, the Scheffe's Test of Post-hoc Comparison was applied to find out the significance of difference between ordered paired means of different age group and data pertaining to this, has been presented in table 3.

**TABLE 3**  
**SIGNIFICANCE OF DIFFERENCES BETWEEN ORDERED PAIRED MEANS FOR BOYS FROM THIRTEEN TO SEVENTEEN YEARS OF AGE ON PUSH-UPS**

| 13   | 14    | 15    | 16    | 17    | MD     | C.I. |
|------|-------|-------|-------|-------|--------|------|
| 7.77 | 13.56 | -     | -     | -     | 5.79*  | 1.25 |
| 7.77 | -     | 14.94 | -     | -     | 7.17*  |      |
| 7.77 | -     | -     | 16.57 | -     | 8.80*  |      |
| 7.77 | -     | -     | -     | 19.31 | 11.54* |      |
| -    | 13.56 | 14.94 | -     | -     | 1.38*  |      |
| -    | 13.56 | -     | 16.57 | -     | 3.01*  |      |
| -    | 13.56 | -     | -     | 19.31 | 5.75*  |      |
| -    | -     | 14.94 | 16.57 | -     | 1.63*  |      |
| -    | -     | 14.94 | -     | 19.31 | 4.37*  |      |
| -    | -     | -     | 16.57 | 19.31 | 2.74*  |      |

\*Significant at .05 level

The data in table 3 clearly reveals that mean differences between thirteen - fourteen followed by fifteen, sixteen and seventeen; between fourteen - fifteen followed by sixteen and seventeen; between fifteen - sixteen followed by seventeen; between sixteen - seventeen years of age boys were found statistically significant, as the confidence intervals were lesser than the mean differences. The data clearly indicate that shoulder strength and endurance improved with age.

**TABLE 4**  
**ANALYSIS OF PUSH-UPS COMPONENTS OF PHYSICAL FITNESS OF GIRLS FROM THIRTEEN TO SEVENTEEN YEARS OF AGE**

| Sex   | SOV            | df  | SSs     | MS     | F-value |
|-------|----------------|-----|---------|--------|---------|
| Girls | Between Groups | 4   | 3135.01 | 783.75 | 42.18*  |
|       | Within Groups  | 245 | 4553.05 | 18.58  |         |

\*Significant at .05 level,  $F_{.05}(4,245) = 2.39$

It is evident from table 4, that the significant difference was found among girls children of different age groups on push-ups component of physical fitness, as the obtained F-values of 42.18 much higher than the required  $F_{.05(4,495)}=2.40$

As the F-ratio on push-ups component of physical fitness was found to be significant, the Scheffe's Test of Post-hoc Comparison was applied to find out the significance of difference between ordered paired means of different age group and data pertaining to this, has been presented in table 5 and depicted in figure 7.

**TABLE 5**  
**SIGNIFICANCE OF DIFFERENCES BETWEEN ORDERED PAIRED MEANS**  
**FOR GIRLS FROM THIRTEEN TO SEVENTEEN YEARS OF AGE**  
**ON PUSH-UPS**

| 13    | 14    | 15    | 16    | 17    | MD    | C.I. |
|-------|-------|-------|-------|-------|-------|------|
| 11.63 | 10.74 | -     | -     | -     | 0.89  | 1.17 |
| 11.63 | -     | 12.70 | -     | -     | 1.07  |      |
| 11.63 | -     | -     | 14.91 |       | 3.28* |      |
| 11.63 | -     | -     | -     | 18.03 | 6.40* |      |
| -     | 10.74 | 12.70 | -     | -     | 1.96* |      |
| -     | 10.74 | -     | 14.91 |       | 4.17* |      |
| -     | 10.74 | -     | -     | 18.03 | 7.29* |      |
| -     | -     | 12.70 | 14.91 | -     | 2.21* |      |
| -     | -     | 12.70 | -     | 18.03 | 5.33* |      |
| -     | -     | -     | 14.91 | 18.03 | 3.12* |      |

\*Significant at .05 level

The data in table 5 clearly indicates that mean differences between thirteen - fourteen followed by fifteen were not found statistically significant, as the confidence intervals were higher than the mean differences. The significant differences were observed among girls between fourteen – fifteen followed by sixteen and seventeen; between fifteen - sixteen followed by seventeen; between sixteen - seventeen years of age were found statistically significant, as the confidence intervals were lesser than the mean differences. The data clearly indicate that shoulder strength and endurance improved with advancement age,

#### 4. DISCUSSION

Descriptive statistics on push-ups component of fitness of boys and girls aged 13 to seventeen years indicated that the boys in age of fourteen to seventeen years were found higher than girls. This may be attributed to the dearth of food nutrients area unit cultural beliefs regarding foods, poverty, and lack of awareness ( Zwiren, 1993). But the women in age of 13 years were found to possess additional shoulder strength than boys.

The results of one way analysis of variance (ANOVA) for boys of various age teams on push-ups element of fitness expressed vital variations on higher body strength and endurance. The Scheffe's Test of Post-hoc Comparison showed that higher body strength and endurance. Improved with advancement of age. But the vital variations exhibited by the boys in their shoulder strength between 13 - fourteen followed by fifteen, sixteen and seventeen; between

fourteen - fifteen followed by sixteen and seventeen; between fifteen - sixteen followed by seventeen; between sixteen – seventeen years of age boys.

The results of one way analysis of variance (ANOVA) for girls of totally different age teams on push-ups element of fitness conjointly expressed the numerous variations on higher body strength and endurance.. The Scheffe’s Test of Post-hoc Comparison showed that higher body strength and endurance. improved with advancement of age. But the vital variations exhibited by the women in their shoulder strength between 13 – fourteen followed by fifteen weren't found statistically vital. The vital variations were discovered among women between fourteen - fifteen followed by sixteen and seventeen; between fifteen - sixteen followed by seventeen; between sixteen - seventeen years more matured were found statistically significant.

## 5. CONCLUSIONS

1. Dissimilarity was observed among boys and girls children of different age groups on push-ups component of physical fitness.
2. Improvement was seen in their upper body strength and endurance among boys and girls with advancement of age.
3. Statistically differences were found between boys and girls children of thirteen to seventeen years of age on push-ups component of fitness,

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