

Research Article

Investigation Of Muscular Strength Among School Boys And Girls With Different Age Categories

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ABSTRACT

The study was undertaken to analyze the muscular strength among players of school boys and girls of three age groups studying at various schools of Cuddalore district, Tamil Nadu India. To achieve the purpose of the study one hundred and eighty (180) players were selected comprised of ninety boys and ninety girls from among the three age categories of U-14, U-17 and U-19. Thus, the study comprised of ninety players under the category of boys with thirty players in each age group of U-14, U-17 and U-19. Similarly, ninety players were in the category of girls with thirty players in each of the age group U-14, U-17 and U-19. The age of the subjects ranging between 12 to 19 years were selected as subjects. The data collected from U-14, U-17, U-19 players for both gender boys and girls players on muscular strength was measured by using one-minute push-ups, the data were statistically analysed by using 2 x 3 factorial ANOVA (gender x categories). Whenever, the obtained 'F' ratio value for interaction effect was found to be significant, the simple effect test was applied as follow test. In all cases, the 0.5 level of confidence was fixed to test the level of significance which was considered as an appropriate. The results of the study showed that the players under boys category were significantly better in muscular strength. The result also revealed that the muscular strength was significantly better for BU-19 and BU-17 as compared to BU-14 players whereas there was no significant difference between BU-19 and BU-17 players. Further, GU-19 players have showed significantly better in muscular strength as compared to GU-17 and GU-14 players whereas there was no significant difference in muscular strength between GU-14 and GU-19, GU-17 and GU-19 players.

Key Words: Health-related physical fitness, muscular Strength, boys and girls

INTRODUCTION

Physical fitness is an important indicator of a child's or adolescents overall health. The public's interest in fitness evaluation has grown in recent years. (Cvejic, et al., 2013). The importance of physical fitness to overall health has been well documented. Physical fitness is a basic requirement for all activities in our society. (Bazyar & Shabani, 2014). Keeping in view the fact that childhood physical fitness has important health consequences during adulthood. Health-related physical fitness should not only consider gender and age of school children, but also selected sociodemographic and behavioral factors, especially socioeconomic class and leisure activities (Guedes et al., 2002). Indicated the improper development of muscular endurance in boys which may be due to their habitual life style for an attractive physical

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appearance. Down fall of body fat percent was observed among boys in 8 to 13 years of age groups and Sharpe rise in body fat percentage was showed after the age of 14 years to 17 years of age. Worldwide health organizers have been reported the importance of the contribution of health education and physical Fitness in the development of total fitness among children (Dutt., 2005).

Muscular strength is the ability to exert force or the ability to do work against resistance. Muscular strength is inversely connected with incidence of hypertension, mortality and diabetes mellitus, these associations are independent with cardio respiratory fitness (Macera CA. 2009). The benefits of habitual resistance exercise are well documented and include increases in muscle hypertrophy and muscular strength (Dons B, et al., 1979). Physical activity spectrum, chronic exercise training increases muscle strength and function and enhances the ability of the muscles to resist fatigue in healthy individuals and patients of all ages (Bishop D, et al., 2011). Physical fitness is also a stronger predictor of total and abdominal obesity than physical activity for children and adolescents. Strength can be defined as the maximum force produced by a muscle or muscles at any given speed. Muscular endurance is very important for people playing sports and who have to sustain an activity for long periods of time. (Hussey J et al., 2007). Muscular strength is currently considered a marker of health and well-being and a predictor of mortality and the expectancy of being able to live independently. Some studies have shown an inverse association between muscular strength and the incidence of metabolic syndrome. Likewise, poor, upper- and lower-body strength levels in older people are related to functional limitations, whereas high muscular strength levels provide protective effects against disability (Castro-Pinero et., al 2009).

There is growing evidence to support the benefits of muscular strength and endurance in children muscular strength and endurance are domains of health-related fitness, which also include body composition, aerobic fitness, and flexibility (Ervin et al., (2014). Muscular strength and endurance are becoming an increasingly researched component of health-related fitness in children (Moliner et al., 2010). Optimal levels of muscular strength and endurance may help improve motor development and relates to a lower incidence of physical activity and sport-related injuries (Myer et al., 2011). Some studies have linked higher levels of muscular strength and endurance to lower prevalence of cardio-metabolic disease risk factors (Peterson et al., 2014). Optimal levels of muscular strength and endurance may help improve motor development athletic performance and may have a protective effect on the incidence of sport-related injuries such as low back pain (Behringer et al., 2011).

METHODOLOGY

The purpose of this study was to find out the significant difference between boys and girls of the different age groups (Under-14, Under-17, Under-19 Players). The selected muscular strength was selected as criterion variable. To achieve the purpose of the present study one hundred and eighty (180) school boys and girls players of different age categories (Under-14, Under-17, Under-19 Players) studying in the various schools of cuddalore district, Tamil Nadu India were randomly selected as subjects. Among the selected ninety boys (thirty boys Under-14, thirty boys Under-17 and thirty boys Under-19 players) and selected ninety girls (thirty girls Under-14, thirty girls Under-17 and thirty girls Under-19 players) with the age of the subjects ranging between 12 to 19 years were selected as subjects. The data collected from Under-14, Under-17 and Under-19 players for both gender boys and girls players on muscular strength was measured by using one minutes push-ups, the data were statistically analyzed by using 2 x 3 factorial ANOVA (gender x categories). Whenever, the obtained 'F' ratio value for interaction effect was found to be significant, the simple effect test was applied as follow up test. In all cases, he 0.5 level of confidence was fixed to test the level of significance which was considered as appropriate.

RESULT OF THE STUDY

TABLE – I

MEAN AND STANDARD DEVIATION OF MUSCULAR STRENGTH AMONG GENDER (B & G) OF DIFFERENT AGE CATEGORIES (U-14, U-17, U-19 PLAYERS)

Gender / Ages		Under- 14	Under- 17	Under- 19	Combined
Boys	Mean	19.90	25.70	28.63	24.74
	SD	3.51	3.18	3.01	
Girls	Mean	15.03	17.66	20.73	17.81
	SD	2.23	2.38	2.62	
Combined	Mean	17.46	21.68	24.68	

Table – I indicates that the mean and standard deviation value of muscular strength among boys under-14 players was 19.90 ± 3.51 and girls under -14 players was 15.03 ± 2.23 with combined mean value of 17.46. The boys under-17 players mean and standard deviation values on muscular strength were 25.70 ± 3.18 and girls under-17 players were 17.66 ± 2.38 with combined mean value of 21.68. The boys under-19 players mean and standard deviation values of muscular strength were 28.63 ± 3.01 and girls under-19 players was 20.73 ± 2.62 with combined mean value of 24.68. The combined mean value of boys under-14, under-17 and under-19 players mean values were 24.74. The combined mean value of girls under-14, under-17 and under-19 players mean values were 17.81.

TABLE – IA

TWO FACTOR ANOVA FOR MUSCULAR STRENGTH OF GENDER (B & G) OF DIFFERENT AGE CATEGORIES U-14, U-17 AND U-19 PLAYERS

Source of Variance	Sum of squares	Df	Mean squares	'F' ratio
Factor A (Gender)	2163.20	1	2163.20	264.05
Factor B (Age categories)	1577.21	2	788.60	96.26
Factor A & B (Interaction)	96.23	2	48.11	5.87
Residual	1425.46	174	8.19	-

*Significant at 0.05 level of confidence.

(The required table value for significant at .05 level of confidence with df 1, and 174 is 3.05).

Table I-A shows that the obtained 'F' ratio value on muscular strength was 264.05 for factor-A (Gender - boys and girls players) irrespective of their under-14, under-17 and under-19 players which was greater than the table value of 3.05 with df 1 and 174 required for significance at .05 level of confidence. The results of the study indicated that there was a significant difference between boys and girls players irrespective of their under-14, under-17 and under-19 players on muscular strength.

Test and Boys	19.90	25.70	28.63	1184.37	2	592.18	72.30
Test and Girls	15.03	17.66	20.73	488.31	2	244.15	29.81
Error				1425.46	174	8.19	

* Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence with df 2 and 174 were 3.05 respectively).

Table I-C revealed that the obtained 'F' ratio value on muscular strength was 72.30 for players under the age category boys of U-14, U-17 and U-19 and it was higher than the table value of 3.05 for significance at .05 level of confidence for df 2 and 174. This shows that there is a significant difference on muscular strength among the players of under-14, under -17 and under-19 boys. Similarly, the obtained 'F' ratio value on muscular strength was 29.81 for players under the age category girls of U-14, U-17 and U-19 and it was higher than the table value of 3.05 for significance at .05 level of confidence for df 2 and 174. This shows that there is a significant difference on muscular strength among the girls players of three different age categories of under-14, under -17 and under-19.

To find out the significant difference among the paired mean differences Scheffe's test was applied and the results are presented in Table 1-D

TABLE - ID

SCHEFFÉ S TEST FOR THE DIFFERENCE ON MEAN VALUES OF MUSCULAR STRENGTH AMONG GENDER (BOYS & GIRLS) DIFFERENT AGE CATEGORIES(U-14, U-17,U-19 PLAYERS)

Gender	DIFFERENT AGE CATEGORIES				
	Under-14	Under-17	Under-19	MD	C.I
Boys	19.90	25.70		5.8	3.90
	19.90		28.63	8.73	3.90
		25.70	28.63	2.93	3.90
Girls	15.03	17.66		2.63	3.90
	15.03		20.73	5.7	3.90
		17.66	20.73	3.07	3.90

* Significant at 0.05 level of confidence

Table – 1D shows that the mean difference on muscular strength between BU-14 and BU-17, BU-14 and BU-19, BU-17 and BU-19 were 5.8, 8.73 and 2.93 respectively. Out of the former two F ratios were higher than the confidence interval of 3.90 required for significant at 0.05 level. The result indicates that the muscular strength was better for BU-19 and BU-17 as compared to BU-14 but there was no significant difference between the players BU-19 and BU-17 age category boys.

The results of the study also shows that the mean difference on muscular strength between GU-14 and GU-17, GU-14 and GU-19, GU-17 and GU-19 were 2.63, 5.7 and 3.07 respectively. Out of these the two F ratios were lower than the confidence interval of 3.90 required for significant at 0.05 level. The result indicates that the muscular strength was better for GU-19 as compared to GU-17 and GU-14 but there was no significant difference between the players GU-14 and GU-17, GU-17 and GU-19 age category girls.

DISCUSSION OF THE STUDY

The results of the study showed that the players under boys category were significantly better in muscular strength. The result also revealed that the muscular strength was significantly better for BU-19 and BU-17 as compared to BU- 14 players whereas there was no significant difference between BU-19 and BU-17 players. Further, GU-19 players have showed significantly better in muscular strength as compared to GU- 17 and GU-14 players whereas there was no significant difference in muscular strength between GU- 14 and GU- 19, GU-17 and GU-19 players. There are many studies in support of findings of the present study. (Al-Asiri & Shaheen, 2015), have proved the results revealed variable relationships among tests significant improvement muscular strength endurance were recorded in girls aged from 11 to 15 years. Relationships between muscular endurance differed among all age groups. (Nayana Nimkar et al., 2020), have examined the study of results indicated significant differences (p value < 0.05) in male category across all the age groups. Whereas, in female category there were only 3 significant differences (out of 10) found between age 14 – 15, 14 – 13 and 14 – 11. It shows that the muscular strength endurance for male students changed significantly across these 5 years as compared to female students, which were found to be more consistent. Muscular strength endurance for male students was greater in all terms than the female students. (Huang et al., 2010) have found the results of study significantly improved muscular endurance, jump and distance run was evident in boys and girls with higher BMIs in each age group. Slopes of decline with increasing BMI varied by age group and sex. Relationships became parabolic for the three fitness items with age and peaks of the parabola were sharper in adolescent boys than girls. Relationships for the sit and reach contrasted with the other tests and differed among age groups and between sexes. (Pena Reyes et al., 2003), have conducted study significant improved explosive power (standing long jump) and abdominal strength and endurance (timed sit-ups) were better in urban than in rural children without and with adjustment for age and body size. Urban-rural differences in running speed (dash) and flexibility (sit and reach) varied by age group and sex. The size advantage of urban children does not necessarily translate into better levels of performance- and health-related physical fitness.

CONCLUSION

The results of the study showed that the players under boys category were significantly better in muscular strength. The result also revealed that the muscular strength was significantly better for BU-19 and BU-17 as compared to BU- 14 players whereas there was no significant difference between BU-19 and BU-17 players. Further, GU-19 players have showed significantly better in muscular strength as compared to GU- 17 and GU-14 players whereas there was no significant difference in muscular strength between GU- 14, and GU- 19, GU-17 and GU-19 players.

REFERENCES

1. Al-Asiri, Afaf A. M. Shaheen, Zahra A (2015), Body Mass Index and Health Related Physical Fitness in Saudi Girls and Adolescents Aged 8-15 Years, *Open Journal of Therapy and Rehabilitation*, Vol.3 No.4, 116- 125 201
2. Bazyar, Fazel and Shabani, Ramin, (2014). Differences in Health-Related Physical Fitness Status Among Elementary School Girls in Croatia. *Annals of Applied Sport Science*; 2:4:23-32,
3. Behringer M, Vom Heede A, Matthews, M, (2011). Effects of Strength Training on Motor Performance Skills in Children and Adolescents: A Meta-Analysis. *Pediatr Exerc; Sci* 23:186–206.
4. Bishop D., Girard O., Mendez-Villanueva A. (2011). “Repeated-sprint ability – part II: recommendations for training”. *Sports Med*; 41, 741–756.
5. Castro-Pinero, J., González-Montesinos, J. L., Mora, J., Keating, X. D., Girela-Rejón, M. J., Sjöström, M., & Ruiz, J. R. (2009). Percentile values for muscular strength field tests in children

- aged 6 to 17 years: influence of weight status. *The Journal of Strength & Conditioning Research*; 23(8), 2295-231
6. Dons B, Bollerup K, Bonde-Petersen F, Hancke S. (1979). "The effect of weight-lifting exercise related to muscle fiber composition and muscle cross-sectional area in humans". *Eur J ApplPhysiolOccup Physiol*;40(2): 95–106.
 7. Dragan Cvejic, Tamara Pejovic, Sergej Ostojic. (2013). Assessment of Physical Fitness in Children and Adolescents *Facta Universitatis Series: Physical Education and Sport*; 11 (2), pp. 135-145
 8. Dutt, Sunil. (2005). Health Related Physical Fitness of Boys Aged 8 To 18 Years, *Journal of Exercise Science and Physiotherapy*; 1(1 & 2), 12-22.
 9. Ervin. R.B. Fryar C. D. C.Y. Wang, I.M. Miler, C.L. Ogden. (2014). Strength and Body Weight in U.S. Children and Adolescents. *Pediatrics*; 134, pp. e782-e789.
 10. Guedes DP, Guedes JERP, Barbosa DS, Oliveira JA. (2002). Habitual Physical Activity and Health-Related Physical fitness in Adolescents, *Rev Bras Cienc Mov*; (10), pp. 12– 21.
 11. Huang. YC & Robert M. Malina, (2010). Body Mass Index and Individual Physical Fitness Tests in Taiwanese Youth Aged 9-18 Years, *International Journal of Pediatric Obesity*, Volume 5- Issue 5, 404- 411.
 12. Hussey J, Bell C, Bennett J, O'Dwyer J, Gormley J. (2007). Relationship between the intensity of physical activity, inactivity, cardiorespiratory fitness and body composition in 7-10-year-old Dublin children. *British Journal of Sports Medicine*; 41:311-6.
 13. Macera CA. (2009). "Muscular strength and mortality in men". *Clin J Sport Med*;19(2):150–151.
 14. Maria Eugenia Pena Reyes , Swee Kheng Tan, Robert M Malina, (2003). Urban-Rural Contrasts in the Physical Fitness of School Children in Oaxaca, Mexico, *Am J Hum Biol*. Nov-Dec;15(6):800-13
 15. Moliner-Urdiales D, Ruiz JR, Ortega FB. (2010). Secular Trends in Health-Related Physical Fitness in Spanish Adolescents: The AVENA And HELENA Studies. *J Sci Med Sport*; 13:584588,
 16. Myer G.D., A.D. Faigenbaum, D. Chu. (2011). Integrative Training for Children and Adolescents: Techniques and Practices for Reducing Sports-Related Injuries and Enhancing Athletic Performance, *Phys. Sports med*; 39, pp. 74-84
 17. Nayana Nimkar, T.K. Bera, Amrita shish Bagchi, Ravi Narnolia, (2020). Abdominal Muscular Strength Endurance: Normative Reference Values for Children 11 to 15 Years of Age, *Indian Journal of Public Health Research & Development*, February; Vol. 11, No. 02, 686- 691
 18. Peterson M.D., W.A. Saltarelli, P.S. Visich, P.M. Gordon, (2014). Strength Capacity and Cardio-Metabolic Risk Clustering in Adolescents, *Pediatrics*; 133. pp. e896-e903