

CROSS-SECTIONAL ANALYSIS OF MOTOR FITNESS COMPONENTS IN CHILDREN FROM 14-17 YEARS OF AGE

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ABSTRACT

The present study was undertaken to cross sectionally analyse the motor fitness components in tribal children of 14 to 17 years of age. Two hundred and forty students boys with all age groups having equal representation of 60 subjects each, ranging in age between 14 to 17 years, studying in senior secondary Schools of Jabalpur District run by the Tribal Welfare Department of Madhya Pradesh were selected at random as subjects for this study. The subjects were tested within two months of their birth days. All the subjects were tested in pull-ups bent knee sit-ups for one minute, standing broad jump, 50 meter dash, shuttle run and 600 yard run/walk to collect data for various motor fitness components in boys. For testing the significance of difference among the mean in different motor fitness components of various age groups an analysis of variance was computed for each test item, separately. The level of significance chosen was .05. The analysis of data using analysis of variance and scheffe's test clearly revealed that difference exists among different age groups in selected motor fitness components and the performance of the subjects improved with age. Further more no significant improvement was found in case of 50 meter dash between ages fourteen and fifteen and fifteen and sixteen? Sit ups ages fourteen and fifteen; standing broad jump between ages fourteen and fifteen, fifteen and sixteen, pull ups ages fourteen and fifteen, and sixteen and seventeen/ shuttle run ages fourteen and sixteen and fifteen and sixteen? 600 yard run/walk between ages fourteen and fifteen, fourteen and sixteen and fifteen and sixteen,

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INTRODUCTION

The human body and its efficiency in different situations is perhaps the most important single factor in the history of mankind. According to Miller and Allen "People are designed for physical activity. In primitive age. Only fittest could survive the rest perhaps. People had to exert, sometime whole day, running after animals for their food, those who could not resist hostile weather died. Often they were closed and attacked by wild animals. Primitive people had to run, climb and jump in order to meet their day to day needs and escape constant threats to their lives. Those who could not perform these motor fitness components satisfactorily got finished. There were frequent fight with different groups of people. All these demand ~ a real powerful and agile body.

The primitive games were taken from human activities and were means of preparing youths for adult life. Though physical fitness in primitive society was must for survival yet physical activities like games and dances etc. were not so organised. The organised activities started later when people went for settled life.

Nixon and Cozens described early men as physical educators. They developed physical skills involving running, jumping, throwing and climbing etc, in youth for survival components of physical fitness used by primitive men are used even today. Nexon and Jewett stated a "sound mind in a sound body" is a short but full description of a happy state in this word; he, that has these two, has little more to wish for..

Modern civilization has made life soft and luxurious. The diminished physical efforts and artificial life is responsible for physically weak population people today, lack both strength and endurance. The average man spends more time in attending his automobiles than in attending his body.

Modern age is an age of technology which inhibits physical activity. Machines are used to perform much of our work and we are forced to lead a sedentary life. Our life span is increasing but physical fitness is deteriorating. Most of our leisure time is also passed in a very inactive way sitting before television .

As in primitive society the fitness is very much essential in modern age also. However, the reasons for the two are entirely different. Today fitness is needed for top level performance in sporting activities and maintaining good health Now a days the level of competitions have reached the nerve breaking stage only superbly fit athletes, players or team can think of achieving success at high levels .

School children need optimum physical fitness. In physical education curriculum fitness programme must have its due place and children must be encouraged. Many complexes are easily overcome by success in physical activities. In childhood and adolescence periods, most often physical inaptitude creates inferiority complex in an individual. Athletic success can help in getting rid of it and enhances ones self esteem which ultimately depends upon the degree of physical fitness of that individual⁸.

An effectiveness of many physical performances is related to various basic traits found in boys and girls including their maturation, body size and physique type. Many of these traits are related to heredity. Others much as body weight, have hereditary implication but may also be affected by environmental influences, including the nature and amount of exercise nutritional practices and health habitué.

An important aspect of the organic area has to do with growth and development. Although growth and development in general follow a pattern, there are wide variations and differences within this pattern while growth is generally viewed as increase in height, weight and size/ development has to do more with functioning of body man.

There are many factors which influence growth basically heredity furnishes the frame of reference for times along which growth and development takes place. Important as heredity is in the growth and development of the individual, there are wide limits within which environmental factors may become influential. Perhaps heredity does set the boundaries but environment and the impact of nature dictate how one falls within these limits. Environmental factors which can significantly influence the growth and development are: nutrition climate, outdoor living, fresh air, sunshine, exercise and rest.

The dominance of different components of motor fitness is not uniform in various activities of game and sports. There are certain activities in which speed is dominating factors, in some sports strength dominates whereas in a large number of activities endurance is limiting factors. Therefore, after assessing the variation among components of motor fitness of children, the teacher of physical education will be in a better position to group the children according to their ages for effective participation in physical education activities.

Therefore, the study of Learner is highly specific to the learning situation for the most effective assessment of the learner. Each teacher must individually measure and evaluate the characteristics and ability of the group for which he is responsible.

The sequence of physical growth and the sequence of development in gross motor performance are concurrent developmental phenomenon. It is, therefore believed that knowledge of these sequences and their relationship would assist the teacher of physical education to provide activities conducive to the pupil various test items but no objective measure was available to make sure that each child performed to his maximum while under going to test,

The purpose of the present study was undertaken to cross sectionally analyse the motor fitness components in tribal children of 14 to 17 years of age.

METHODOLOGY

Selection of Subjects

Boys studying in various senior Secondary School of Jabalpur District Tribal Welfare Department of Madhya Pradesh were selected as the subjects of the study. The subjects were classified into age groups after obtaining the data of birth of each boys from the school records. Sixty Boys in each age group from 14 to 17 years were selected at random.

Criterion Measures

1. Number of correctly executed push-ups,
2. Maximum number of correctly executed bent-knee sit-ups in one minute.
3. Time taken to shuttle a distance of ten meters four - times recorded to the nearest 1/10 of second.
4. Maximum distance jumped and recorded to the nearest centimeter in standing broad jump.
5. Time taken to run a distance of 50 meters as fast as possible recorded to the 1/10th of a second.
6. Time taken to run/walk a distance of 600 yards recorded to the nearest 1/10th of a second.

Procedure

The test were administered to the subjects at the play ground of their schools during morning and evening playing hours. Before administering the test subject were given proper warming up under the supervision of the research scholar.

Scoring of Data

All the subjects were tested on pull ups. Bent knee sit ups, standing Broad Jump, 50 meter Dash, shuttle run and 600 yard Run/Walk Test and the Scoring of data for each test was done as follows-

Number of correctly executed pull ups, maximum number of correctly executed bent knee sit-ups in one minute, time to shuttle a distance of ten meter four times recorded nearest to 1/10th of a second, maximum distance jumped and recorded to the nearest centimeter, time taken to run a distance of 50 meter as fast as possible recorded 1/10th of a second, time taken to run/walk a distance of 600 yards recorded to nearest 1/10th of a second, were recorded each of the subjects as his score in each test. For the purpose of making comparison among various age groups raw scores were directly used,

Statistical Analysis

For finding out the significance of difference of means among the various age groups an analysis of variance (F ratio) was used which was followed by Scheffe's Test of post-hoc comparison »s to determine the significance of difference between paired means.

Reliability of Data

Sixty subjects were selected at random from all the age groups taken together and the reliability of performance in different components of various age groups on each test item separately was established by using test-retest method* The tests were repeated on two days with an interval of one day in between the reliability co-efficient of test-retest scores are presented in Table 1.

TABLE 1
RELIABILITY COEFFICIENT OF TEST-RETEST SCORES OF VARIOUS TEST ITEMS

S.NO.	Tests	Correlation Coefficient
1.	Pull ups	.90*
2	Sit ups	.89*
3	Standing Broad Jump	.84*
4	600 Yards Run/Walk	.79*
5	50 Meter Dash	.81*
6.	Shuttle Run	.84*

RESULTS AND DISCUSSION

For testing the significances of difference among the means in different Motor components of various age groups an analysis of variance was computed for each test item separately, as the mean differences in all the criterion variables showed significant t- ratio. To find which of the differences among the paired means were statistically significant, the Scheffe's test was applied and the data pertaining to this is presented in Table 2-13.

TABLE 2
ANALYSIS OF VARIANCE OF THE MEAN DIFFERENCES OF DIFFERENT AGE GROUPS ON SPEED

Sources of Variance	df	Sum of Squares	Mean Square	F-ratio
Within Groups	3	102.25	0.43	13.12*
Between Groups	236	17.04	6.68	

*Significant at .05 level, $F_{.05}(3,236)=2.68$

It is evident from Table 2 that the significant difference existed among the means of various age groups children on speed, as the F-ratio of 13.12 was high than the required value $F_{.05}(2,236)=2.68$. In order to find out, which of the differences among the paired means were statistically significant the Scheffes's Test was applied and data pertaining to this have been presented in Table 3

TABLE 3
SIGNIFICANCE OF DIFFERENCES BETWEEN THE ORDERED PAIRED MEANS ON
SPPED FOR DIFFERENT AGE GROUPS

Mean Scores					
14 Years	15 Years	16 Years	17 Years	Paired Mean Difference	C.I.
8.39	8.37	-	-	0.05	0.04
8.39	-	8.33	-	0.06*	0.04
8.39	-	-	7.75	0.64*	0.04
-	8.37	8.33	-	0.04	0.04
-	8.37	-	7.75	0.62*	0.04
-	-	8.33	7.75	0.58*	0.04

*Significant at .05 level

TABLE 4
ANALYSIS OF VARIANCE OF THE MEAN DIFFERENCES OF DIFFERENT AGE
GROUPS ON ABDOMINAL STRENGTH

Sources of Variance	df	Sum of Squares	Mean Square	F-ratio
Within Groups	3	5720.14	24.14	49.38*
Between Groups	236	3591.00	1197.00	

*Significant at .05 level, $F_{.05}(3,236) = 2.68$

It is evident from Table 4 that the significant difference existed among the means of various age groups children on abdominal strength, as the F-ratio of 49.38 was high than the required value $F_{.05}(2,236) = 2.68$. In order to find out, which of the differences among the paired means were statistically significant the Scheffes's Test was applied and data pertaining to this have been presented in Table 5

TABLE 5
SIGNIFICANCE OF DIFFERENCES BETWEEN THE ORDERED PAIRED MEANS ON
ABDOMINAL STRENGTH FOR DIFFERENT AGE GROUPS

Mean Scores					
14 Years	15 Years	16 Years	17 Years	Paired Mean Difference	C.I.
16.57	18.80	-	-	2.23	2.43
16.57	-	23.13	-	6.56*	2.43
16.57	-	-	26.58	10.01*	2.43
-	18.80	23.13	-	4.33*	2.43
-	18.80	-	26.58	7.78*	2.43
-	-	23.13	26.58	3.45*	2.43

*Significant at .05 level

TABLE 6
ANALYSIS OF VARIANCE OF THE MEAN DIFFERENCES OF DIFFERENT AGE GROUPS ON LEG POWER

Sources of Variance	df	Sum of Squares	Mean Square	F-ratio
Within Groups	3	202170.80	856.65	11.82*
Between Groups	236	30375.60	10125.20	

*Significant at .05 level, $F_{.05}(3,236) = 2.68$

It is evident from Table 6 that the significant difference existed among the means of various age groups children on leg power, as the F-ratio of 11.82 was high than the required value $F_{.05}(2,236) = 2.68$. In order to find out, which of the differences among the paired means were statistically significant the Scheffes's Test was applied and data pertaining to this have been presented in Table 7

TABLE 7
SIGNIFICANCE OF DIFFERENCES BETWEEN THE ORDERED PAIRED MEANS ON LEG POWER FOR DIFFERENT AGE GROUPS

Mean Scores					
14 Years	15 Years	16 Years	17 Years	Paired Mean Difference	C.I.
155.48	162.62	-	-	7.14	14.47
155.48	-	176.85	-	21.37*	14.47
155.48	-	-	191.06	35.58*	14.47
-	162.62	176.85	-	14.23	14.47
-	162.62	-	191.06	28.44*	14.47
-	-	176.85	191.06	14.21	14.47

*Significant at .05 level

TABLE 8
ANALYSIS OF VARIANCE OF THE MEAN DIFFERENCES OF DIFFERENT AGE GROUPS ON ARM AND SHOULDER STRENGTH

Sources of Variance	df	Sum of Squares	Mean Square	F-ratio
Within Groups	3	2498.85	10.58	78.35*
Between Groups	236	2486.85	828.95	

*Significant at .05 level, $F_{.05}(3,236) = 2.68$

It is evident from Table 8 that the significant difference existed among the means of various age groups children on arm and shoulder strength, as the F-ratio of 78.35 was high than the required value $F_{.05}(2,236) = 2.68$. In order to find out, which of the differences among the paired means were statistically significant the Scheffes's Test was applied and data pertaining to this have been presented in Table 9

TABLE 9
SIGNIFICANCE OF DIFFERENCES BETWEEN THE ORDERED PAIRED MEANS ON
ARM AND SHOULDER STRENGTH FOR DIFFERENT AGE
GROUPS

Mean Scores					
14 Years	15 Years	16 Years	17 Years	Paired Mean Difference	C.I.
6.55	7.43	-	-	0.88	1.61
6.55	-	13.26	-	6.71*	1.61
6.55	-	-	13.53	6.98*	1.61
-	7.43	13.26	-	5.83*	1.61
-	7.43	-	13.53	6.10*	1.61
-	-	13.26	13.53	0.27	1.61

*Significant at .05 level

TABLE 10
ANALYSIS OF VARIANCE OF THE MEAN DIFFERENCES OF DIFFERENT AGE
GROUPS ON AGILITY

Sources of Variance	df	Sum of Squares	Mean Square	F-ratio
Within Groups	3	207.09	0.88	13.78*
Between Groups	236	36.36	12.12	

*Significant at .05 level, $F_{.05}(3,236) = 2.68$

It is evident from Table 10 that the significant difference existed among the means of various age groups children on agility, as the F-ratio of 13.78 was high than the required value $F_{.05}(2,236) = 2.68$. In order to find out, which of the differences among the paired means were statistically significant the Scheffes's Test was applied and data pertaining to this have been presented in Table 11.

TABLE 11
SIGNIFICANCE OF DIFFERENCES BETWEEN THE ORDERED PAIRED MEANS ON
AGILITY FOR DIFFERENT AGE GROUPS

Mean Scores					
14 Years	15 Years	16 Years	17 Years	Paired Mean Difference	C.I.
11.79	11.73	-	-	0.06	0.46
11.79	-	11.64	-	0.15	0.46
11.79	-	-	10.87	0.92*	0.46
-	11.73	11.64	-	0.09	0.46
-	11.73	-	10.87	0.86*	0.46
-	-	11.64	10.87	0.77*	0.46

*Significant at .05 level

TABLE 12
ANALYSIS OF VARIANCE OF THE MEAN DIFFERENCES OF DIFFERENT AGE GROUPS ON CARDIOVASCULAR ENDURANCE

Sources of Variance	df	Sum of Squares	Mean Square	F-ratio
Within Groups	3	19.66	0.08	6.35*
Between Groups	236	31.64	0.55	

*Significant at .05 level, $F_{.05}(3,236) = 2.68$

It is evident from Table 12 that the significant difference existed among the means of various age groups children on cardiovascular endurance, as the F-ratio of 6.35 was high than the required value $F_{.05}(2,236) = 2.68$. In order to find out, which of the differences among the paired means were statistically significant the Scheffes's Test was applied and data pertaining to this have been presented in Table 13

TABLE 13
SIGNIFICANCE OF DIFFERENCES BETWEEN THE ORDERED PAIRED MEANS ON CARDIOVASCULAR ENDURANCE FOR DIFFERENT AGE GROUPS

Mean Scores					
14 Years	15 Years	16 Years	17 Years	Paired Mean Difference	C.I.
2.26	2.20	-	-	0.06	0.11
2.26	-	2.18	-	0.08	0.11
2.26	-	-	2.05	0.21*	0.11
-	2.20	2.18	-	0.02	0.11
-	2.20	-	2.05	0.15*	0.11
-	-	2.18	2.05	0.13*	0.11

*Significant at .05 level

DISCUSSION

The analysis of data using analysis of variance (F-ratio) and scheffe's test of post-hoc comparison, shows that difference exists among different age groups an selected motor fitness components and performance of subjects on various components shows improvement with the increase of age.

Further more, no significant, improvement was noticed in following variables with respect to age. In case of 50 meter dash between ages fourteen and fifteen and fifteen and sixteen, sit ups ages fourteen and fifteen, standing broad jump ages fourteen and fifteen, fifteen and sixteen. Pull ups between ages fourteen and fifteen and sixteen and seventeen, shuttle run ages fourteen and fifteen fourteen and sixteen and fifteen and sixteen; 600 yards run/walk ages fourteen and fifteen* fourteen and sixteen and fifteen and sixteen.

Increase in body weight would normally reflect increases in the amount of muscle tissue. This increase in muscle tissue coupled with increase lever length resulting from growth in height should result in greater power and thus increase in motor achievement. Growth in height in school years is apparently reflected adequately by increase in weight. With this constant increase in body size and strength, it is also to be expected that there are also consistent improvement in the basic skills of running, jumping, and throwing as the age increases.

Speed with which an individual can run depends upon the length of stride and frequency of stride, steady increase in body size and its components increases in level, length and strength provide increase length and tempo to the running stride. it is also in part, a reflection of an increase in ability to run greater distances with increasing age.

Agility depends upon number of factors, namely strength, running speed and speed of movement, balance and coordination, since the above motor components increases with age, thing in turn also increase agility.

Therefore improvement of performance in events dominated by strength, speed and endurance may be attributed to the reasons given above.

CONCLUSIONS

Within the limitations of the present study following conclusions may be drawn:

1. Performance of boys ranging in age between fourteen and seventeen years in Motor fitness components increased with increase in age.
2. Boys of fourteen, fifteen and sixteen years can be grouped together in activities requiring, running speed and leg power.
3. In activities requiring change of body position and direction with speed and cardiovascular endurance the boys between age groups of fourteen to sixteen can be classified together.
4. In activities requiring abdominal strength in boys of fourteen and fifteen years can participate together.
5. Activities involving holding supporting and pulling of body in hanging situation the boys of fourteen and fifteen and sixteen and seventeen can be grouped together.

RECOMMENDATIONS

In the light of the conclusions drawn above, it may be recommended that Age can be used as an effective basis for classification of tribal boys ranging in age between fourteen to seventeen years for participation in various physical education activities dominated by Motor fitness components. A longitudinal project on tribal students extended from age fourteen year to 18 years involving both the sexes may be under-taken so that the effect of growth and development on various motor fitness components, within each sex and between the sexes may be identified. A similar study may be undertaken involving different anthropometric measurements, i.e. height, weight and measurements of different parts of the body in addition to the age of the subject.

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