

A Research on Anthropometric Characteristics and Motor Fitness Components of School Going Students

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Abstract – Physical fitness is an important marker of health that enables people to carry out activities of daily living with vigour and alertness but without undue fatigue and with sufficient reserve to enjoy active leisure pursuits and to meet unforeseen emergencies. Especially, due to scientific findings that the onset of civilization diseases (e.g., obesity, cardiovascular disease) begins in childhood and that physical fitness tracks (at least) into young adulthood, the regular monitoring and promotion of physical fitness in children is risen up to a public health issue. In relation to the evaluation of a child's physical fitness over time (i.e., development) the use of longitudinally-based percentile values is of particular interest due to their underlined dedication of true physical fitness development within subjects. The purpose of the present study was to compare the selected anthropometric and motor fitness variables namely Height, Weight, Body Mass Index (BMI), Speed, Agility, Explosive strength and Cardio-respiratory endurance (VO2max) between Secondary and Higher Secondary level Students. The study was conducted on 60 school level male students [30 Secondary level Students and 30 Higher Secondary level Students]. They were randomly selected from Kendriya Vidyalaya, M.G. Railway Colony, Bangalore. The age of subjects ranged between 14-18 years. In the present study Height, Weight, BMI, Speed, Agility, Explosive strength and Cardio-respiratory Endurance (VO2max) were chosen as the variables for the study. All the variables were measured using standard tests. Descriptive Statistics and independent t-test were used to calculate the data. The result of the study showed that there was significant difference between Secondary and Higher Secondary level Students in comparison to their Height, Weight, B.M.I, explosive strength and VO2max.

INTRODUCTION

Physical fitness is characterized by people's ability to carry out daily activities with vigour and alertness but without undue fatigue and with sufficient reserve to enjoy active leisure pursuits and to meet unforeseen emergencies. Furthermore, physical fitness can be understood as an integrated measurement of all the functions - cardiorespiratory, musculoskeletal, endocrine-metabolic, psychological – and structures involved in the performance of daily physical activity as well as sports-related physical exercise. In relation to the intensive research efforts to combat the public health burden of civilization diseases such as obesity, depression and cardiovascular disease, physical fitness of children was recently highlighted as a key factor of individual's lifelong health.

More specifically, a large amount of studies underline the crucial role of sufficient levels of cardiorespiratory, musculoskeletal, and motor fitness (e.g., balance, coordination) on children's physical, mental,

cognitive, and social capability. Additionally, longitudinal analysis from childhood over adolescence into young adulthood revealed both that children's physical fitness tracks into young adulthood and that the physical fitness status predicts health outcomes over this time frame. Beside the positive impact of physical fitness on health, there has been public concern about youth physical fitness status, particularly since the new millennium. A bulk of studies resumed that the physical fitness of children decreased within the last decades and that differences between the fit and the unfit children increased further.

Physical fitness is in part genetically determined (e.g., sex, distribution of muscle fibers types), but it can also be immensely influenced by lifestyle factors. These factors can be crucial in enhancing and maintaining physical fitness during childhood. Thus, knowledge about their impact on physical fitness in children ought to be of significant interest for

coaches, teachers and politicians that are entrusted with fostering children's physical fitness.

Anthropometric and Motor Fitness Ability are essential not only in terms of general health but also as a special physical requirement for competitive sports certain highly specialized and demanding occupation. It is universally accepted that success in various activities of games and sports mainly depends upon the Physical Fitness of its participants. Anthropometric measurements are used to assess the size, shape and composition of the human body. To fully assess the status of the human body we need to utilize various anthropometric measurement, which includes systematic measurement of the size, shape and composition of the human body. This is a fairly easy term to recall if you remember that the prefix 'anthropo' refers to 'human' and 'metric' refers to 'measurement'. Anthropometric measurements are useful in many fields. For example, athletes understand that the body size and composition are important factors in sports performance. Sports coaches can also use these measurements to monitor an athlete's body to ensure they stay in peak physical shape.

Health care professionals rely on body measurements to evaluate a subject's overall health. For example, body mass index, (BMI) is a measurement of a person's weight-to-height ratio. Health care providers, insurance companies and government agencies use BMI to determine if a person is underweight, overweight or obese.

Anthropometric and physical fitness characteristics provides important information about normality of body size, health condition, and body shape. Human body proportions give us information about the growth of each body segment. The goal of most studies has been to identify the level of physical fitness characteristics at different ages; to evaluate anthropometric characteristics for talent identification or for the level of body development; to calculate the proportional ratios in predicting some diseases; or to evaluate the harmony of the body. All are important to screening for health risks, especially for metabolic and cardiovascular diseases (De Lorenzo et al, 2013; Ashwell&Hsieh, 2005). Additionally, physical activity is an important means to reduce and control weight and diverse health risk factors). It is interesting to study some of these characteristics in the students of the faculty of Physical Education and Sports, as they will be the next generation of teachers who will educate the younger generation about having an active life style and good health.

The benefits of sports participation on physical and mental health are widely recognized. Sports participation not only positively influences anthropometric measures like body weight and body composition, children's health also improves in terms of physical fitness which can be considered one of the most important markers of health. In addition, sports participation at a young age positively

contributes to the development of the child's motor coordination since involvement in physical activity provides more opportunities to learn and refine motor skill executions. In children who are actively involved in sports, differences in levels of physical fitness and motor coordination can partly be explained by the amount of hours spent within the sport. For example, Fransen and colleagues found a positive effect of the amount of training hours per week on flexibility (sit and reach), explosive leg power (standing broad jump) and motor coordination (Körperkoordinationstest für Kinder) in 10 to 12 year old boys.

In addition to the positive influence on the child's general physical profile, involvement in sport is also associated with the development of sport-specific characteristics. The well-documented comparison between adolescent athletes from different types of sports makes it clear that each sport is, to some extent, unique in terms of physical prerequisites, e.g.,. For example, soccer players demonstrate high levels of both upper and lower body strength for sport-specific actions including throwing-in and kicking the ball, while height is the key ingredient to make it to the top in volleyball, and motor coordination appears to be crucial in gymnastics. These sport-specific characteristics make it possible to discriminate between athletes of different sports. A discriminant analysis of anthropometric variables and physical fitness characteristics among adolescent female figure skaters, swimmers, volleyball players and tennis players, showed that figure skaters can be discriminated from the other athletes based upon their lower body mass and height, fewer push-ups and lower maximal girth of the biceps. Similarly, Pion and colleagues studied the discriminative power of 22 anthropometric, physical fitness and motor coordination measurements and reported a 96.4% correct classification for 141 adolescent Flemish boys into nine different sports. In sum, the unique characteristics of elite adolescent athletes from different sports have been widely demonstrated, thereby providing important information from the viewpoint of talent detection, identification, and development. However, most of these studies have focused on adolescent and adult athletes that have already benefitted from a considerable training history that has at least in part shaped their current anthropometric, physical fitness and motor coordination profile. The question remains to what degree these specific characteristics are already present in children with a limited training history.

BODY MASS INDEX IN RELATION TO MOTOR FITNESS

The term motor fitness is most often used synonymously with physical fitness by the coaches but it is very important for the physical education students to understand the basic difference between physical fitness and motor fitness. Physical fitness is used to denote only the five basic fitness components (muscular strength, muscular endurance,

cardiovascular endurance, freedom from obesity and flexibility), whereas motor fitness is a more comprehensive term, which includes all the ten fitness components including additional five motor performance components (power, speed, agility, balance and reaction time), important mainly for success in sports. In other word, motor fitness refers to the efficiency of basic movements in additional to the physical fitness.

Physical educators, exercise physiologists, and physicians have proposed many tests to demonstrate the effect of such programs. These tests have generally been labeled "Motor Fitness Test" "Physical Fitness Tests" and "Cardiovascular Tests". Additional tests have been developed by many colleges and universities. With so many groups and individuals promoting different fitness test, the practitioner may easily become confused especially when the same items appears in both motor and physical fitness tests. Thus one might ask whether there is a difference between motor fitness and physical fitness. Are the dimensions of fitness equally relevant to all the people of all ages? Obviously, the nature of fitness- what it means to the participant the type of fitness activities selected, the intensity and duration of exercise- varies with aging among school children through adulthood, the middle age, and old age. In other words, fitness is specific to the needs of different populations. This is reflected in the perennial question. "Fitness for what?"

The importance of an optimal level of physical fitness as a reflection of certain aspects of health was demonstrated by the work of Kraus and Raab (1961) on hypo-kinetic diseases, or diseases directly related to a lack of exercise. These physicians identified low back pain, foot problems, abdominal posies, obesity, hypertension, and degenerative cardiovascular diseases as conditions produced by sedentary lifestyles in our affluent, tension-producing society. Thus the concept of physical fitness does convey a meaning of healthful living. Because heart disease, stroke and circulatory disorders are still primary causes of poor fitness is highly relevant for all people. Sedentary people suffer a higher incidence of coronary heart diseases than active persons . Thus attaining a desirable level of physical fitness is an important aspect of preventive medicine because physical inactivity appears to be related to the coronary heart disease. Recent longitudinal data shows that Harvard alumni who expend 2000 calories a week in vigorous exercise during their life span will increase the quality of life as well as live one or more years longer than sedentary persons. For most young participants however a physical fitness test is one that attempts to measure the efficiency of both the muscular and cardiovascular systems. Body Mass Index (BMI) is a ratio of total body weight to height. Several ratios have been proposed, but one used most frequently. Weight (in kilograms) divided by height (in meters) square [(kg/m^2)]. Calculated BMI

can then be compared against standard value to determine whether the individual has acceptable body weight, is overweight, or is obese. Risk of increased mortality from high values of body mass index (BMI) is described by a J – shaped curve. BMI value from 15 to 25 represents no excess mortality risk and over 40 a high risk of great mortality. 2, m htkg weight.

METHODOLOGY

Subjects:

Sixty (60) School level male students were randomly selected from Kendriya Vidyalaya, M.G. Railway Colony, Bangalore including thirty (30) Secondary students(S) and thirty (30) Higher Secondary students(HS). The age of the students ranged between 14-16(± 1) and 16-18(± 1) years respectively.

Variables:

Anthropometric components namely weight, height and BMI and Motor Fitness components namely Speed, Agility and VO₂max were selected as the parameters for the study.

Test and Criterion Measures:

All the variables were measured by using standard test.

Statistics:

Descriptive Statistics and independent t-test were used to calculate the data. The level of significance was set at 0.05.

RESULTS

The result of the study showed that the Higher Secondary Students were significant than the Secondary level Students by Weight (4.228), Height(4.418), BMI(2.559), SBJ(2.185) respectively. But VO₂max (4.145) of Secondary Students were significantly better than the Higher Secondary level Students. There is no significant difference between the Secondary and Higher Secondary level students with respect to Speed (0.894) and Agility (1.887).

The results obtained from the present study can be summarized as follows –

1. Weight(S) < Weight (HS)
2. Height(S) < Height (HS)
3. BMI (S) < BMI (HS)
4. SBJ (S) < SBJ (HS)
5. Agility (S) > Agility (HS)
6. Speed (S) > Speed (HS)

7. VO2 (S) > VO2 (HS)

DISCUSSION

According to medical science height and weight increases accordingly (for a healthy person i.e. a person having a well-defined physique and who is not under any kind of medical attention) up to a certain age and then it remains stagnant for a prolonged time period with irregular fluctuation from the mean value and then after a age both falls. The results obtained in column 1 and 2 are in accordance as both category subjects are in adolescence and the higher secondary students have their mean age greater than the secondary students. Generally up to age 16 (± 1) heights grow more than weight hence a lower BMI is obtained. After that weight increase dominates over the height increase. The BMI value however indicates that Higher Secondary students are healthier than the Secondary students. Result obtained in point 3 is thus in accordance. Standing broad jump (SBJ) is the parameter which needs enormous muscular strength (especially of leg). So, SBJ values for higher secondary students must be greater than the Secondary students. Point 4 is in agreement with the above analysis.

CONCLUSION

In a first conclusive step, the generated percentile values provide an objective opportunity to estimate children's physical fitness within the frame of physical education (e.g., age and sex-specific grading of motor performance) and further to detect children with specific fitness characteristics (low fit or high fit) that may be indicative for the necessity of preventive health promotion or long term athlete development. In this regard, physical fitness testing should be considered as an instrument to encourage increase physical activity and exercise and not be an end in itself. One of the strengths of the present study is the large sample size, which made it possible to explore a large number of sports. In addition, unlike many other studies, the focus was on the anthropometric, physical fitness and motor coordination characteristics of children participating in a wide range of sports regardless of their level of sports participation. Despite the large sample size, some sports were not well represented. Therefore, the authors chose to combine sports based on common characteristics. From the viewpoint of talent identification and development it is favorable to focus on an individual sport, rather than on groups of sports.

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