
SHORT COMMUNICATION

Status of Physical Fitness Index (PFI %) and Anthropometric Parameters in Residential School Children Compared to Nonresidential School Children

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Abstract:

Background: Physical fitness is the prime criterion for survival, to achieve any goal and to lead a healthy life. Effect of exercise to have a good physical fitness is well known since ancient Vedas. Physical fitness can be recorded by cardiopulmonary efficiency test like Physical Fitness Index (PFI %) which is a powerful indicator of cardiopulmonary efficiency. Regular exercise increases PFI by increasing oxygen consumption. Residential school children are exposed to regular exercise and nutritious food under the guidance. *Aims and Objectives:* Our study is aimed to compare the physical fitness index status and anthropometric parameters in Residential Sainik (n=100) school children compared to Non-Residential (n=100) school children (aged between 12-16 years) of Bijapur. *Material and Methods:* PFI was measured by Harvard Step Test [1]. The Anthropometrical parameters like Height (cms), Weight (Kg), Body Surface Area (BSA in sq.mts), Body Mass Index (BMI in Kg/m²), Mid Arm Circumference (cms), Chest Circumference (cms) and Abdominal Circumference (cms) were recorded. *Results:* Mean score of PFI(%), Height(cms), Weight(Kg), BSA(sq.mts), BMI(Kg/m²), Mid Arm Circumference(cms), Chest Circumference (cms) and Abdominal Circumference (cms)

were significantly higher (p=0.000) in Residential school children compared to Non Residential school children. In conclusion regular exercise and nutritious diet under the guidance increases the physical fitness and growth in growing children.

Key words: PFI, Residential school children, Non Residential school children, BSA, BMI

Introduction:

Determination of Physical Fitness Index (PFI) is one of the important criteria to assess the cardiopulmonary efficiency of a subject [1]. The American Alliance for Health, Physical, Education Recreation and Dance (AAHPERD) recommended this test to study health related physical fitness programme in youth [2].

Physical fitness is defined as ability to carry out daily tasks with vigour and alertness without undue fatigue with ample energy to enjoy leisure time pursuits, to meet unusual situations and unforeseen emergencies [3].

Regular physical exercise is known to have beneficial effects on health. Realizing the fact that diseases are related to lack of fitness, a need to counteract a sedentary lifestyle with planned physical activity through sports and formal exercise is required. This led to the establishment of minimum fitness standards in the USA public schools [4].

In our country, we are getting acquainted with the modern amenities at a very fast rate. So, we are neglecting the natural physical activities. The present attractive education system has helped to improve the educational standards. But, the non active sedentary stressful life has made the youth physically unfit. Now, the time has come to consider about the physical fitness and exercise in the adolescent age group. Realizing this fact, educationalists have recommended minimal physical exercise in the curriculum [5].

The age between 12 and 16 years, the physique is changing. During this period of growth height, weight and maximum aerobic capacity will reach their peak. So, to achieve good fitness in children sports programme should be arranged [6].

The exercise will help to attain maximum physical fitness due to development of muscle and cardio-respiratory strength as well as endurance of the children. The advantages of physical fitness are many, like increase in the level of intelligence, tolerance, activity and social behavior [6].

Physically fit children can easily adapt to the stressful conditions. Their neuromuscular tension is less. They do not suffer from easy fatigability. Nutrition through diet provides necessary energy substrates, vitamins and minerals which in turn provide enzymes that catalyze energy production.

In residential schools like Sainik School Physical training/NCC, games of ≥ 2 hours/day for 6 days in a week are practiced. Physical Training by qualified Army PT Instructors, Cross Country and Games like Hockey, Football, Volleyball, Basketball, Handball, and Athletics - are

compulsory. Contrary to this in Non residential schools regular exercises are not compulsory [7, 8]. Also in residential schools nutrition is supplemented under the guidance of dieticians.

Thus the objectives of the present study were to show the effects of regular exercise and nutrition on growing children by comparing the PFI and anthropometric parameters of residential and non-residential school children involving a larger sample size.

Material & Methods:

For this study 200 healthy boys in the age range of 12 to 16 years from residential (Sainik) and non-residential (Banjara) schools of Bijapur city, North Karnataka were included. These students were divided into two groups. First group consisted of 100 boys from residential (Sainik) school of Bijapur city, North Karnataka, who were undergoing regular Physical training/NCC, games of ≥ 2 hours/day for 6 days in a week and second group consisted of 100 boys from non-residential (Banjara) school of Bijapur city, North Karnataka, who were not undergoing regular Physical exercise. Daily only students of non-residential (Banjara) school of Bijapur were coming to school by bus and also this school students were not involved in many sports activities as compared to residential sainik school students. The students suffering from cardiopulmonary disorders, endocrine disorders, presence of obesity, anemia and any chronic disease were excluded in this study. Written consent was taken from parents and principals of both the schools as students were minor. The ethical clearance for the study was obtained from the ethical com-

mittee of BLDE University. Physical fitness index and physical anthropometric parameters such as height, weight, body surface area, body mass index, mid arm circumference, chest and abdominal circumferences were measured at the school campus during working hours between 12 noon to 2 pm during resting period. Physical fitness is assessed by cardiopulmonary efficiency test like Physical Fitness Index.

Physical Fitness Index:

By using Modified Harvard Step Test (HST) [1]: The test was done on Modified Harvard Steps of 33 cms height. PFI was calculated by using following formula.

Physical fitness Index (%) (PFI %) [9]

$$\text{PFI} = \frac{\text{Duration of exercise in seconds}}{2(\text{pulse } 1+2+3)} \times 100$$

Procedure: The Subject was advised to step up on the modified Harvard steps of 33 cms height once every two seconds (30 per minute) for 5 minutes, a total of 150 steps. At one, three and five minutes during the test, pulse rate was recorded as -

- (a) PR1 (Pulse Rate 1) – 1 min after exercise
- (b) PR2 (Pulse Rate 2) – 3 min after exercise.
- (c) PR3 (Pulse Rate 3) – 5 min after exercise.

Recording of Physical Anthropometry:

1. Height (in cms): This was measured with the subject in standing position without foot wear to nearest to 0.1cms.

2. Weight (in kgs): The subject was weighed with a standard machine with minimum of clothing, to nearest to 0.1 kgs.

3. Body Surface Area (Square meters): This was calculated in each subject by using Dubois Nomogram.

4. Body Mass Index (Kilogram/meter²): This was calculated for each subject from his height and weight by using formula BMI = Wt in Kg divided by Ht in m²

5. Mid Arm Circumference (MAC in cms): It was measured in the right arm by the non stretchable tape, where the girth of the muscle was maximum (Mid Arm).

6. Chest Circumference (CC in cms): It was measured at deep inspiration position at the level of the nipple, with minimum clothing, with the help of a non stretchable tape.

7. Abdomen Circumference (Abd C in cms): It was measured at the level of umbilicus, with minimum clothing, with the help of a non stretchable tape.

Statistical analysis- All values were presented as Mean and Standard Deviation. Comparison of mean values of parameters between group I and group II were done by 'Z' test [10].

Table 1: Comparison of PFI between Group I (Residential School) and Group II (Non-Residential School)

Parameters	Group I	Group II	Z Values	P Values
PFI	54.96±8.38	44.75±5.05	10.44	0.00001***

Values expressed are (mean ± SD), *p<0.05 significant, **p<0.01 Highly significant, ***p<0.001 very highly significant

It was observed from table I that, Mean PFI (%) in Group I was higher (p=0.000) than that of Group II.

Table 2: Comparison of Anthropometric Parameters between Group I (Residential School) and Group II (Non-Residential School)

Parameters	Group I	Group II	Z Values	p Values
Height (cms)	160.31±7.64	150.3±6.84	9.70	0.0002***
Weight (cms)	44.35±6.78	39.31±8.08	4.77	0.0002***
MAC (cms)	21.68±2.31	20.27±6.98	1.91	0.05*
CC (cms)	74.17±6.45	66.82±6.20	8.26	0.0002***
Abd C (cms)	62.54±5.89	58.92±9.08	3.34	0.0002***
BSA (sq mt)	1.43±0.13	1.28±0.14	7.89	0.0002***
BMI (kg/mt2)	18.26±1.80	17.52±3.46	1.90	0.05*

Values expressed as (mean ± SD), *p<0.05 significant, **p<0.01 Highly significant, ***p<0.001 very highly significant

It was observed from table II that Mean Height (cms), Weight (kgs), Chest Circumference (cms), Abdominal Circumference (cms), Mid Arm Circumference (cms), BMI (kg/m²) and BSA (m²) in Group I were higher than that of Group II.

Discussion:

Several studies have established that physical fitness is necessary to carry out daily task. The effect of regular exercise is known to have beneficial effect on health. Importance of physical fitness has been mentioned in the history of mankind including Vedas. Yet, physiology of exercise is a recent advancement and is an open field for research [4].

In our country, there are residential and non-residential schools. Residential schools like Sainik School, Navodaya School and many others have implemented regular exercise training by qualified trained persons for their students. Nutritious food is also provided under the guidance of qualified dieticians and doc-

tors in such schools. In non-residential schools, education is being provided but regular exercises are not monitored and no dieticians are there to guide for the nutrition for the students.

In this study the mean PFI (%) for Group I has been significantly higher as compared to Group II, indicating that students of residential (trained) school have had higher physical fitness than that of students of non-residential (untrained) school. This may be due to regular physical exercise and training of residential school children. Result of this study is similar to the Chatterjee *et al* study (2001) [11]. Their study also has reported higher PFI score among trained (athletics) than those untrained (non-athletics) comprising of female subjects only. The analysis of the anthropometric parameters like Ht, Wt, BSA, BMI, MAC, CC and Abd C in both groups differ. Group I shows a very highly significant increase in all the parameters (p=0.000) compared to Group II.

Increase in anthropometric parameters indi-

cates significance of regular physical exercise given to them. Also nutritious food may be one of the contributing factors in attainment of such growth [12]. Thus, variation in anthropometric parameters is related to physical exercise and nutritious food [13].

Conclusion: We conclude from our study that the physical fitness and anthropometric parameters are higher in the Residential than those of the Non-Residential group. So, regular exercise and nutritious diet under the guidance increases the physical fitness and growth in growing children. Therefore, regular exercise under the guidance can be undertaken as a part of curriculum to gift physically fit youth of the country.

Acknowledgement- The authors would like to express their gratitude to all the subjects and Principals of both the schools for their valuable co-operation.

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