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Comparative differentials among the adolescents of low and high altitude with regard to their health related physical fitness

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Abstract

Health-related physical fitness refers to those components of physical fitness that are associated with health of a person. The ability to perform daily activities with vigour and having traits associated with lower risk of developing chronic diseases is a demonstration of health-related physical fitness. Physiological factors like cardio-respiratory endurance, muscular strength, and flexibility are the common measures of Health-related fitness which play an important role in carrying out day to day tasks and effects working efficiencies of an individual. The purpose of this study was to differentiate between the adolescents of low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude with their levels of Health related Physical Fitness. For the study a total of 1000 school going male adolescents comprising (N=500) from low altitude and (N=500) from high altitude were purposively selected. To assess the level of Health related Physical Fitness of the subjects the components of Cardio-Respiratory Endurance (assessed through Nine minute run/walk test), Flexibility (measured through Sit and reach test), Muscular strength and endurance (assessed through flexed knee sit ups in 60 seconds test), Skin fold measurement (measured through triceps and sub scapular area by skin fold clipper) were worked out and compared by using descriptive statistics and 't'-test. The level of significance was set at 0.05. Findings of the study concluded that the adolescents belonging to low altitude are significantly better on flexibility and muscular strength & endurance than the adolescents of high altitude.

Keywords: Health-related physical fitness, cardio-respiratory endurance, muscular strength, and flexibility, body composition

Introduction

Physical fitness of the human body is like a fine-tuning to an engine. It helps us to utilize our full potential. Fitness enables us to look, feel and do our best. Stating more specifically; it is "The ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure-time activities and meeting emergency demands (Singh & Singh, 2012) [8]. It refers to a set of attributes that people or an individual have with respect to their ability to perform physical activity. Further, Health-related physical fitness refers to those components of physical fitness that are associated with health. The ability to perform daily activities with vigour and having traits associated with lower risk of developing chronic diseases is a demonstration of health-related physical fitness. Physiological factors like cardio-respiratory endurance, muscular strength, and flexibility are the common measures of Health-related Physical Fitness (Sauka *et al.*, 2011) [7].

The risk of osteoporosis, risk of coronary artery disease and non/insulin-dependent diabetes increases with the lower level of physical fitness. Research studies suggest that these diseases begin to develop in childhood itself (Volbekiene & Griuciute, 2007) [11]. At the same time, the statistics illustrates the rising burden of non-communicable diseases globally. Obesity has been declared as global epidemic by WHO. Further an increasing prevalence of cardiovascular and metabolic diseases like hypertension, stroke, diabetes mellitus, hypercholesterolemia in both adults and children have also been reported by CDCP and WHO (2009). A number of studies have indicated an increase in prevalence of overweight children and adolescents that has doubled between 1976 and 1994 to 13% and further rose to 15% in 2000. And a major cause that has been identified is high-calorie diets and physical inactivity (PI).

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The trend is alarming given the fact that the chronic diseases have their antecedents in childhood itself. The adverse consequence of pediatric overweight and obesity has raised alarming calls for broad-based public health strategies to prevent diseases. For availing substantive results with respect to health, current guidelines recommend at least 2.5 hours of moderate-intensity or 1.25 hours of vigorous-intensity aerobic physical activity per week. In addition, moderate or high-intensity muscle strengthening activities for all major muscle groups 2- 3 days a week provides extra health benefits (Saha & Haldar, 2012) [6]. Thus better understanding for the changes in physical fitness is required to make fitness promotion interventions even more effective and thereby improve the health of children at present and for future (Volbekiene & Griuciute, 2007) [11].

Aim and Objectives of the Study

The present study aimed to compare the Health related Physical Fitness of the adolescents living in low and high altitude in order to investigate with their level of different components of Health related Physical Fitness

Hypothesis of the Study

There would be significant differences between the adolescents of low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude on Health related Physical Fitness (i.e. Cardio-respiratory Endurance, Muscular Strength and Endurance, Flexibility and Skin fold measurements (triceps and sub scapular area)

Method and Procedure

Comparative study was designed to see the differences between the adolescents of low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude. For the purpose of the study N=10000 school going (11th and 12th standard) male adolescents comprising 500 from low altitude and 500 from high altitude government and private schools were selected purposively. For the purpose of the present investigation, the following components of Health Related Physical Fitness were selected:

- Cardio-Respiratory Endurance
- Flexibility
- Muscular Strength and Endurance
- Skinfold Measurement

To assess with their level of components of Health Related Physical Fitness, Nine minute run/walk test for Cardio-Respiratory Endurance, Sit and Reach test for Flexibility, Flexed knee sit ups in 60 seconds for Muscular Strength and Endurance and Skin fold test of Triceps and Sub scapular area for body fatness/leanness were administered and score for each component was recorded in order to compare the Health Related Physical Fitness of the selected subjects. To assess the level of Health related Physical Fitness of the subjects the components of Cardio-Respiratory Endurance Flexibility, Muscular strength and endurance Skin fold measurement were worked out and compared by using descriptive statistics and 't'-test. To check the differences between the selected areas of adolescents the level of significance was set at 0.05.

Findings and Discussion

The data collected from the subjects were analyzed statistically with the help of descriptive statistics and 't'-test in order to compare the school going male adolescents of low (Chandigarh & Dehradun) and high (Shimla & Srinagar)

altitude on the components of Health related Physical Fitness. The results have been presented in tables from 1 to 4.

Difference between low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude male Adolescents on Cardio-Respiratory Endurance

Table 1: Mean, SD and 't'- Value With Regard To the Low (Chandigarh & Dehradun) and High (Shimla & Srinagar) Altitude Adolescents on Cardio-Respiratory Endurance

| Altitude | N | Mean | Std. Deviation | t-value | p-value |
|----------|-----|---------|----------------|---------|---------|
| Low | 500 | 1501.63 | 249.62 | 1.439 | .151 |
| High | 500 | 1529.50 | 296.42 | | |

$p < 0.01^{**}$

The descriptive results in table-1, have shown that high altitude adolescents were having mean score of 1529.50 and SD = 296.42 which in comparison to the low altitude adolescents were higher who obtained the mean score of 1501.63 and SD = 249.62, the difference between these two altitude adolescents have been not found to be significant ($p < 0.01$ and t-value being 1.439). These results revealed that the high altitude adolescents were having slightly higher level of Cardio- Respiratory Endurance as compared to the low altitude adolescents. Similar study conducted by Saha & Haldar, 2012 [6] on rural & urban population and they found that rural area performed better on cardio-respiratory endurance.

Difference between low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude male Adolescents on Flexibility

Table 2: Mean, SD and 't'-Value With Regard To the Low (Chandigarh & Dehradun) and High (Shimla & Srinagar) Altitude Male Adolescents on Flexibility

| Altitude | N | Mean | Std. Deviation | t-value | p-value |
|----------|-----|-------|----------------|---------|---------|
| Low | 500 | 28.06 | 7.47 | 7.567 | .0001** |
| High | 500 | 24.02 | 7.61 | | |

$p < 0.01^{**}$

The descriptive results in table-2, have shown that low altitude adolescents had obtained higher mean score of 28.06 and SD = 7.47 as compared to the mean score of 24.02 and SD=7.61 by the high altitude male adolescents. The difference between these two zones adolescents have been found to be significant ($p < 0.01$ and t-value being 7.567). These results showed that the low altitude adolescents were having significantly higher level of Flexibility as compared to the high altitude male adolescents. The low levels of flexibility are especially of concern for the associated risks to low back pain and higher incident of postural problem, besides a possible explanation for the low school performance.

Difference between low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude male Adolescents on Muscular Strength and Endurance

Table 3: Mean, SD and 't'-Value With Regard To the Low (Chandigarh & Dehradun) and High (Shimla & Srinagar) Altitude Male Adolescents on Muscular Strength And Endurance

| Altitude | N | Mean | Std. Deviation | t-value | p-value |
|----------|-----|-------|----------------|---------|---------|
| Low | 500 | 30.58 | 8.56 | 16.029 | .0001** |
| High | 500 | 22.08 | 6.25 | | |

$p < 0.01^{**}$

The descriptive results in table-3, have shown that low altitude male adolescents were having mean score of 30.58 and SD = 8.56 which in comparison to the high altitude male adolescents were higher who obtained the mean score of 22.08 and SD = 6.25, the difference between these two altitude zones adolescents have been found to be significant ($p < 0.01$ and t-value being 16.029). These results revealed that the low altitude male adolescents were having significantly

higher level of Muscular Strength and Endurance as compared to the high altitude male adolescents. Similarly, rural area performed better on Muscular Strength and Endurance founded by Saha & Haldar, 2012 [6].

Difference between low (Chandigarh & Dehradun) and high (Shimla & Srinagar) altitude male Adolescents on Skin fold measurement

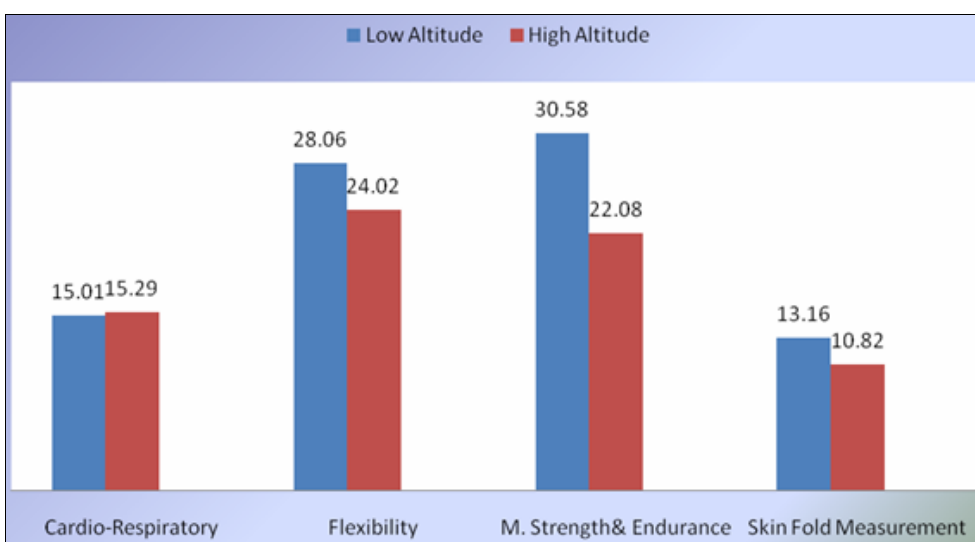
Table 4: Mean, SD and 't'-Value With Regard To the Low (Chandigarh & Dehradun) and High (Shimla & Srinagar) Altitude Male Adolescents on Skin Fold Measurement

| Altitude | N | Mean | Std. Deviation | t-value | p-value |
|----------|-----|-------|----------------|---------|---------|
| Low | 500 | 13.16 | 5.59 | 6.166 | .0001** |
| High | 500 | 10.82 | 5.14 | | |

$p < 0.01$ **

The descriptive results in table-4, have shown that low altitude male adolescents had obtained higher mean score of 13.16 and SD = 5.59 as compared to the mean score of 10.82 and SD=5.14 by the high altitude male adolescents. The difference between these two altitude zones adolescents have been found to be significant ($p < 0.01$ and t-value being 6.166).

These results revealed that the high altitude adolescents were having significantly higher level of Skin Fold Measurement as compared to the low altitude adolescents. Revealed from the results it was clear that percent body fat was better for 13 years boys followed by 14 years, 16 years and 15 years boys respectively (Ramajayam, M. & Gopinath, V. 2013) [5].



Graph 1: The outcome of above result might be due to the geographical, physiological and cultural differences among adolescent of low & high altitude

Conclusion

In the present study, the low altitude (Chandigarh & Dehradun) adolescents were found to have significantly higher level of health related physical fitness (Flexibility, Muscular strength & endurance) as compared to high altitude (Srinagar & Shimla) adolescents. However, no significant difference has been observed between low altitude and high altitude (Srinagar & Shimla) adolescents on Cardio-Respiratory Endurance. The outcome of above result might be due to the geographical, physiological and cultural differences among adolescent of low & high altitude. It is concluded from the above findings that adolescent from the low altitude better on Flexibility, Muscular strength & endurance, whereas, adolescent from the high altitude better on Skinfold measurement. Therefore the set hypothesis stands accepted with regard to the Health related Physical Fitness of the adolescents living in low and high altitude majorly for all the components of Health related Physical Fitness i.e. Flexibility, Muscular Strength and Endurance, Skin fold measurement, except the Cardio-Respiratory Endurance which slightly fell to be accepted as significant.

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