ASSESSMENT OF FLEXIBILITY AMONG TRAINED AND UNTRAINED ADOLESCENT BOYS LIVING AT DIFFERENT ALTITUDES

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Abstract

The purpose of the study was to assess the flexibility among trained and untrained adolescent boys living at different altitudes of Kashmir region. To achieve the purpose of the study three hundred sixty (360) adolescent boys living at different altitudes of Kashmir region India were randomly selected as subjects .These were divided into two groups trained and untrained, one hundred eighty (180) adolescent boys were selected from trained group and one hundred eighty (180) were selected from untrained group with an age of the subjects were ranged from 13 – 18 years were selected as subjects .The data collected from high, moderate and low altitude adolescent boys for both trained and untrained groups on selected variable flexibility was measured by using sit and reach test and were statically analysed by using 2x3 factorial ANOVA (Group x Altitude) 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 level of the significance was fixed at 0.05 for the test which was considered as an appropriate. The result of the study show that the trained adolescent boys brought significant increase of flexibility on moderate altitude and low altitude have significantly showed increased in flexibility as compared to the trained adolescent boys of high altitude. The result also reveals that the increase in flexibility is significantly more for moderate altitude as compared to low altitude adolescent boys. And also untrained adolescent boys brought significant increase on flexibility of moderate altitude and low altitude adolescent boys have significantly showed increased flexibility as compared to high altitude untrained adolescent boys. Whereas for flexibility there was no significant difference between low and high altitude as compared to moderate altitude adolescent boys.

Key Words*: flexibility, trained and untrained, adolescent boys. high altitude, low altitude, moderate altitude*

Introduction

Physical Fitness

Physical fitness is the ability to carry out day to day task with vigor and alertness without undue fatigue and with ample energy to enjoy leisure time pursuit and to meet unusual situation and unforeseen emergencies. **Chakravarthi and Srinivasan (2015**). Fitness concept in elementary physical education center on children's understanding of fitness as good health, and a working knowledge of activities that promote a healthy level of fitness. **George et al., (2001)**. A physical state of well-being that provides the foundation of tasks of daily living, a degree of protection against hypokinetic disease and a basic necessity for participation of sports. **Plowman and smith (2013**). A capacity developed through exercise that enables one to perform the essential activities of daily living, engage in an active leisure lifestyle and have sufficient energy remaining to meet the demands of unexpected events. **Hoffman (2009)**. As mentioned by **John (1990**), The concept of physical fitness dominates much of current thinking and research in the field of physical education. Each person has a certain level of physical fitness at which he can live most efficiently. A fit man is well adapted to the environment; his mind and body are in harmony and can meet the normal demands made on him, both mentally and physically without undue fatigue. The high level of physical fitness produces significant effects on the working of the human being. **Kumar, (2013**). Physical fitness is essential for everyone to stay active throughout their lives. A healthy body houses a healthy mind. One of the major advantages and answers to the question of why physical fitness is necessary is that it has an effect on your inner self. Regular physical activity has always been credited with 5 increasing physical fitness. But it is said that what influences our physical self also affects our psychological and emotional self, and that physical activity enhances both mental and physical fitness **Rath, S.S., (2018).**

Altitude

It is the vertical distance of an object above some datum plane, such as sea level or a reference point on the surface of earth. Based on arterial oxygen content and its physiological effects on performance decrements, altitude exposure is classified as low altitude, moderate altitude, high altitude, very high altitude and extreme altitude. Altitude or height sometimes known as depth is defined based on the context in which it is used (aviation, geometry, geographical survey, sport, atmospheric pressure, and many more). As a general definition,

altitudeis a distance measurement, usually in the vertical or "up" direction, between a reference datum and a point or object. The reference datum also often varies according to the context. Although the term altitudeis commonly used to mean the height above sea level of a location, in geography the term elevation is often preferred for this usage. The connection of decreased ambient oxygen to altitude illness and performance decrements provides a categorization of altitude coverage based upon arterial oxygen contented and its physiological effects. From the sea level to 1525 meters is considered as low altitude. Moderate altitude starts from 1525 meters to 2440 meters, where arterial haemoglobin infiltration is normally above (92%) any effects of altitude are soft and temporary. High altitude starts from 2441 meters to 4270 meters, **Plowman and Smith, (2013).**

Adolescence

The word adolescence is derived from adolesce mean to grow to maturity. This is a period of maturity the individual has develop physically intellectually emotionally and socially to a full man. Further development is only nominal. His IQ has practically reached its height his physical Charteris tics have been developed emotionally he has become what he has to be for the whole life. It's very crucial period of once life the growth achieved the experience gained responsibility felt and relationship developed at this stage destine the complete future of an individual **Kanwar, (2007).** Adolescence covers the age group 11-20 and distinction is made between early adolescence (11-14) middle adolescence (15-17) and late adolescence (18-20) the world health organisation defines adolescence as the period from 10 -19 years age **Ayeras et al., (2007**).Adolescence end with the achievement of complete physical maturity or adulthood i.e. at about 17/18 years in case of girls and at about 18/19 years in case of boys **Srivastava, (2006)**

Flexibility

It is the capability of a person or the stretching ability, elasticity, and mobility by which an athlete can achieve his maximum range of stretch. But as a scientific term flexibility means Much more than what is conveyed by any of these terms. But can be derived as the greater range of amplitude. the two important qualities of muscles and ligaments are stretching and elasticity through which the stretch and regain their initial position without having any adverse effect on the concerned tissue. Limberness denotes the capability of a muscle to stay in a condition of low stress there by allowing for smooth and simple action of the limbs. mobility pertains to the degree of movement possible in different planes at a joint. The four terms stretching elasticity mobility and suppleness, are having important role in flexibility also are

the part and parcel of flexibility these characterize diverse ability by which the person to execute movements with greater amplitude. flexibility is measured by determining the range of movement possible at a joint **Singh, (1991).** Flexibility is the ability of a particular muscle or muscle group to move freely through a complete range of motion. It is important in terms of variety of athletic success, but also in terms of the capacity to carry out everyday life activities which is very important from the point of view of public health **Ruiz (2006)**. The ability to move the body joints through a maximum range of motion without undue strain. you are flexible when your muscles are long enough and your joints are free enough to allow adequate movement. examples of people with good flexibility include dancers and gymnasts **Miller, (2006**)

Methodology

The purpose of this study was to find out the significant difference of trained and untrained adolescent boys living at different altitudes. The flexibility was selected as a criterion variable. To achieve the purpose of the study three hundred sixty(360) adolescent boys living at different altitudes of Kashmir region India were randomly selected as subjects .These were divided into two groups trained and untrained, one hundred eighty(180) adolescent boys were selected from trained group and one hundred eighty (180) were selected from untrained group with an age of the subjects were ranged from 13 – 18 years were selected as subjects .The data collected from high, moderate and low altitude adolescent boys for both trained and untrained groups on variable such as flexibility was measured by using sit and reach test and were statically analysed by using 2x3 factorial ANOVA (Group x Altitude) 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 level of the significance was fixed at 0.05 for the test which was considered as an appropriate.

Result of The Study

Table – I
Mean and Standard Deviation of Flexibility Among Trained and Untrained Adolescent Boys Living at Different Altitudes

Groups /Altitude		High Altitude	Moderate Altitude	Low Altitude	Combined
Trained	**Mean**	11.23	14.32	12.14	12.56
	SD	1.15	2.89	1.79	
Untrained	**Mean**	9.95	12.01	11.31	11.09
	SD	0.93	2.02	1.38	
Combined	**Mean**	10.59	13.16	11.72	

Table – I indicates that the mean and standard deviation value of Flexibility between high altitude trained adolescent boys and high altitude untrained adolescent boys were 11.23 ±1.15 and 9.95. ±0.93 with combined mean value of 10.59. The moderate altitude trained adolescent boys and moderate altitude untrained adolescent boys mean and standard deviation values on Flexibility were 14.32 ± 2.89 and 12.01± 2.02 with combined mean value of 13.16 The low altitude trained and untrained adolescent boys mean and standard deviation values on flexibility were 12.14 ± 1.79 and 11.31 ± 1.38 with combined mean value of 11.72. The combined mean value on Flexibility of high, moderate and low altitude trained adolescent boys was 12.56 The combined mean value on Flexibility of high moderate and low altitude untrained adolescent boys was 11.09. And were graphically represented in fig.1

Graphical Representation of Mean and Standard Deviation on Flexibility Between Trained and Untrained Adolescent Boys Living at Different Altitudes.

Fig -1

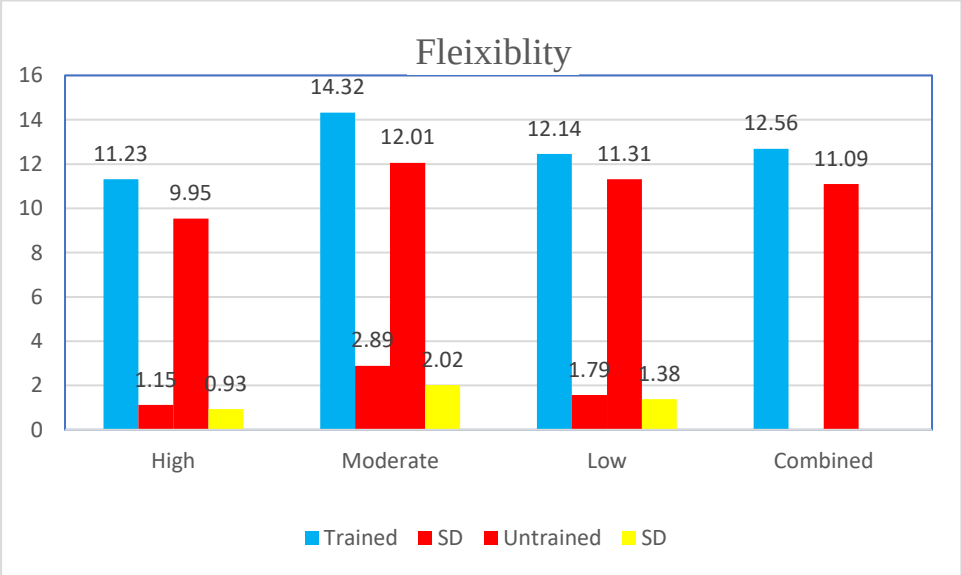

Table – I-A
Two Factor ANOVA For Flexibility of Groups (T& Ut) And Different Altitudes of Adolescent Boys

Source of Variance	Sum of squares	df	Mean squares	'F' ratio
Factor A (Group)	194.48	1	194.48	58.77
Factor B (Alttest)	399.20	2	199.60	60.31
Factor A & B (Interaction)	34.42	2	17.21	5.20
Residual	1171.45	354	3.17	

**Significant at 0.05 level of confidence. The required table value for significant at 0.05 level of confidence with df 1 and 354 is 3.84*

Table I-A shows that the obtained 'F' ratio value on Flexibility was 58.77for factor-A (Group-trained and untrained) irrespective of their altitude difference low moderate and high which was greater than the table value of 3.84with df 1 and 354 required for significance at 0.05 level of confidence. The result shows that significant difference exist between trained and untrained irrespective of different altitudes of adolescent boys on Flexibility.

The obtained 'F' ratio value on Flexibility was 60.31 for factor-B different altitudes low, moderate high irrespective of trained and untrained adolescent boys which was greater than the table value of 2.99 with df 2 and 354 required for significance at 0.05 level of confidence. The results show that significant difference exist among different altitude low moderate and high irrespective of group (trained and untrained) on Flexibility.

The obtained 'F' ratio value on Flexibility 5.20 for interaction [AB factor - (Group x altitude) was also greater than the table value of 2.99 with df 2 and 354 required for significance at 0.05 level of confidence. Since, the obtained 'F' ratio for the interaction effect was found significant, the simple effect (SE) test was applied as follow up test and it is presented in Table I-B.

TABLE I-B.
Simple Effect for Groups (Trained and Untrained) Adolescent Boys Living at Different Altitudes on Flexibility

Source of variance	Trained	Untrained	Sum of squares	Df	Mean square	F-Ratio
Group and high Alttude	11.23	9.95	49.15	1	49.15	14.89
Group and moderate Altitude	14.32	12.01	160.08	1	160.08	48.50
Group and low Alttude	12.14	11.31	20.66	1	20.66	6.26
Error			1123.29	354	3.17	

**Significant at .05 level of confidence. The table value required for significance at 0.05 level of confidence with df 1 and 354 was 3.84).*

Table I-B shows that the obtained 'F' ratio values on Flexibility is 14.89, 48.50 and 6.26 for (group and high altitude test), (group and moderate altitude) and (group and high altitude) respectively was greater than the table value of 3.84 with df 1 and 354 required for significance at .05 level of confidence. The results show that significant difference exist between high, moderate. and low alt-test adolescent boys on Flexibility.

. **Table I-C**

Simple Effect Scores for Different Altitudes (High, Moderate &Low) Adolescent Boys and Groups (Trained and Untrained) On Flexibility

Source of variance	Mean			Sum of squares	Df	Mean squares	F -ratio
	High Altitude	Moderate Altitude	Low Altitude				
Altitude and trained	11.23	14.32	12.14	302.57	2	151.28	45.84
Altitude and untrained	9.95	12.01	11.31	131.66	2	65.83	19.94
Error				1123.29	354	3.17	

***** Significant at 0.05 level of confidence. *The table value required for significance at 0.05 level of confidence with df 2 and 354 were 2.99 respectively*

Table I-C also revealed that the obtained 'F' ratio value on Flexibility was 45.84and 19.94 for different altitudes (low, moderate and high) trained and untrained adolescent boys which was greater than the table value of 2.99 with df 2 and 354 required for significance a 0.05 level of confidence. The Flexibility performance differs among different altitudes (low, moderate and high) trained and untrained adolescent boys. To find out the mean differences Scheffe's test was applied. Table I-D

Table I-D

Scheffĕ *S* Test for The Difference on Mean Values of Flexibility Among Groups (Trained and Untrained) Adolescent Boys Living at Different Altitudes

Groups	Different Altitudes				
	High Alttest	Mod Alttest	Low Alttest	MD	CI
Trained	11.23	14.32		3.09*	0.91
	11.23		12.14	0.91*	0.91
		14.32	12.14	2.18*	0.91
Untrained	9.95	12.01		2.06*	0.91
	9.95		11.31	1.36*	0.91

		12.01	11.31	0.7	0.91

Table – VI shows that the mean difference between trained high altitude and trained moderate altitude adolescent boys, trained high altitude and trained low altitude adolescent boys, boys trained moderate and trained low altitude adolescent boys are 3.09, 0.91 and 2.18, respectively on Flexibility of group trained and different altitudes. which are greater than the confidence interval value of 0.91 at 0.05 level of confidence. untrained high altitude and untrained moderate altitude adolescent boys, untrained high altitude and untrained low altitude adolescent boys, boys untrained moderate and untrained low altitude adolescent boys are 2.06, 1.36 and 0.7, respectively on Flexibility of group untrained and different altitudes. which are greater than the confidence interval value of 0.91 at 0.05 level of confidence the results of the study shows that the (trained high altitude and trained moderate altitude adolescent boys) had significant increase in Flexibility as compared to the (trained low altitude). The result also reveals that the increase in Flexibility is significantly more for trained moderate altitude boys) as compared to trained low altitude). Also, (untrained moderate altitude and untrained low altitude) had significant increase in Flexibility as compared to the (untrained high altitude). The result also reveals that the increase in Flexibility is significantly more for (trained moderate altitude) as compared to (untrained adolescent boys).

Discussion of the study

The result of the study shows that trained adolescent boys brought significant increase on flexibility of moderate altitude and low altitude as compared to high altitude trained adolescent boys. The result also reveals that the increase in flexibility is significantly more for moderate altitude as compared to low altitude trained adolescent boys and also untrained adolescent boys brought significant increase on flexibility of untrained moderate altitude and untrained low altitude boys have significantly showed increased flexibility as compared to untrained high altitude adolescent boys .There are many studies in support of findings of present study .

Andreasi et al., (2010) have proved that there was significant difference found on flexibility among school boys and girls under-14 and under-17 age groups. **Huang et al., (2010)** have proved that there was significant difference found on, flexibility among different age groups of boys and girls 9-10, 11-12, 13-15, and 16-18 years. **Lehmhard et al., (1992)** have proved that there was significant difference found on flexibility, among under-14 boys and girls. **Catley et al., (2013)** have proved that there was significant difference found on flexibility, cardiovascular endurance, muscular strength and muscular endurance among 12 to 17 years boys and girls.

Pena Reyes et al., (2003) have proved that there was significant difference found on flexibility muscular strength and muscular endurance among under-12 and under-14 urban and rural school boys and girls. **Narelle et al., (2013)** have proved that there was significant difference found on cardio-respiratory endurance, flexibility, muscular fitness among school male and female students.

Conclusion

The result of the study show that the trained adolescent boys brought significant increase on flexibility of moderate altitude and low altitude have significantly showed increased in flexibility as compared to the trained adolescent boys of high altitude. The result also reveals that the increase in flexibility is significantly more for moderate altitude as compared to low altitude adolescent boys .And also untrained adolescent boys brought significant increase on flexibility of moderate altitude and low altitude adolescent boys have significantly showed increased flexibility as compared to high altitude untrained adolescent boys .Whereas for flexibility there was no significant difference between low and high altitude as compared to moderate altitude adolescent boys .

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