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A COMPARATIVE AND CORELATIVE STUDY ON BODY COMPOSITION AND MOTOR PERFORMANCE OF 14 YEARS OLD BOYS OF FOUR DIFFERENT ALTITUDES OF DARJEELING DISTRICT

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ABSTRACT

The purpose of the study was to find out the difference in Body composition (skinfolds) and motor performance of 14 years old boys of Darjeeling. The samples are school students. Researcher had taken 100 male students each from Sukhia Pokhari Higher Secondary School (Alt.-7200 ft.), Trunbull higher Secondary school (Alt.-6700 ft.), Jnanpith High school (Alt.-3000 ft.) and Kadamtala High School(Alt.-430 ft.). Researcher had measured height and weight as personal data measured skinfolds of triceps, biceps, subscapular, supra spinale, iliac creast and medial calf for body composition. 50 mt. dash, shuttle run, standing broad jump and sit ups were motor performance parameters. It has been observed that there were significant differences in medial calf skinfold thickness, agility and strength endurance.

Keywords: Body composition, Motor performance, Male students.

Contribution/ Originality

This study contributes in the existing literature as very few anthropometrical researches had conducted in the hilly area of Darjeeling. This study uses new estimation methodology and tried to provide the unbiased and exact findings. It is a thrust area of research as there are differences in anthropometric and motor variation due to altitude difference. The paper's primary contribution is finding that how difference in anthropometric and motor difference occurs with increases or decreases in altitude and to set the physical education programme according to the need of the students living at different altitudes.

1. INTRODUCTION

The body fat percentage is a measure of fitness level, since it is the only body measurement which directly calculates a person's relative body composition without regard to height or weight. The widely used body mass index (BMI) provides a measure that allows the comparison of the

adiposity of individuals of different heights and weights. While BMI largely increases as adiposity increases, due to differences in body composition, it is not an accurate indicator of body fat; for example, individuals with greater muscle mass will have higher BMIs. The thresholds between "normal" and "overweight" and between "overweight" and "obese" are sometimes disputed for this reason.

In current contexts, Physical fitness is considered a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypokinetic diseases, and to meet emergency situations. American association of health physical education Recreation and dance adopted a new approach, physical fitness has now been dichotomized into two areas, and they are: Health related fitness and Motor fitness.

Body compositions including skin fold thickness are the determinant factor for physical performance especially in the activities where the total body has to be moved. In addition substantial amount of evidence are available to notify that length, breadth and girth of the body bone has an immense impact on physical performance and similarly high percentage of body fat not only serves as dead weight but it also reveals that the relative ability to supply oxygen to the working muscles thus cutting down on cardio-vascular endurance.

Motor Fitness refers to the ability of an athlete to perform successfully at their sport. It refers to the capability of an athlete to perform effectively at their particular sport. The components of motor fitness are: agility, balance, co-ordination, power which entails speed and strength and finally reaction time.

Here as narrated in the title 'altitude' means height. As we go up the hills we have to accompanied with various changes such as decrease in total barometric pressure, decrease in partial pressure in oxygen, decrease in density of air, cooler and dryer air, climatic change like low temperature, nature of daily activity, haemoglobin quantity etc. From various studies it has become clear that altitude has a great effect on physical as well as anthropometric status of the population.

As the body composition and motor fitness is discussed above now let us understand why we can expect the variation in above mention factors in different altitude. Firstly in this paper body composition means skin fold thickness i.e, fat present beneath the skin. Generally it is known that with increase in altitude temperatures decreases and in this study there are four different altitudes i.e, 430 ft., 3000 ft., 6700 ft. and 7200 ft. As we know that fat is used as insulator by human body we can aspect the thicker layer of fat with increase in altitude. Apart from this, genetic factor may also play a vital role in thicker skinfolds thickness in higher altitude. It will be very interesting if we get clues regarding anthropometric variation including pattern of growth, fat deposition etc. in respect of altitude from the study.

In case of motor performance we can expect better performance of higher altitude students in case of 50 meter dash, agility and shuttle run because in hill areas i.e, in high altitudes people have to walk ups and down the narrow roads for their daily livelihood including their daily school. So for their daily works they need more strength than plain i.e, low altitude counterparts. Apart from these the haemoglobin level is high in high altitudes as haemoglobin carries oxygen so increase in

haemoglobin means increase in performance. But in case of sit ups it can be predicted that lower altitude students may have more strength endurance as because they have comparatively shorter upper part than high altitude counterparts.

2. METHODS

2.1. Purpose of the Study

The purpose of the study was to find out the difference in body composition and motor performance of 14 years old school going male adolescents.

2.2. The Subjects

One hundred twelve schools going male students from four different altitudes were selected randomly as the subject of study. The altitudes were 430 feet, 3000 feet, 6700 feet and 7200 feet respectively. The age of the subjects was 14 years.

2.3. Criterion Measures

Researcher had measured age, height and weight as personal data and measured the following parameters;

Table-1. Criterion measures

Personal Data	Skin-Folds	Motor Fitness Variables
1. Age 2. Height 3. weight	1.Triceps, 2.Biceps, 3.Subscapular, 4.Supra spinale, 5.Iliac creast, 6.Medial calf	1. 50 mt. dash 2. Standing broad jump 3. Sit ups 4.Shuttle run

3. RESULT AND DISCUSSION

Table-2. Mean and S.D of height and weight of four different altitudes

Age 13		Height		Weight	
	N	Mean	SD	Mean	SD
Sukhiapokhori HS School	25	1.52	0.077	41.12	6.790
Trunbull HS School	25	1.56	0.074	43.04	7.684
Jnanpith High School	25	1.57	0.054	42.88	4.790
Kadamtala High School	25	1.58	0.065	44.20	7.118

From the above table it was found that the mean height of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 1.52 mt., 1.56 mt, 1.57 mt. and 1.58 mt. Similarly the mean weights were 41.12 kg., 43.04 kg., 42.88 kg. and 44.20 kg.

Table-3. Mean and S.D of skinfold measurements of four different altitudes

Altitude	N	Biceps Mean	SD	SEm (±)	CD (P=0.05)	Triceps Mean	SD	SEm (±)	CD (P=0.05)
Age 13									
Sukhiapokhori HS School	25	2.04	0.476	0.110	NS	4.27	1.422	0.247	NS
Trunbull HS School	25	2.24	0.688	0.110	NS	4.46	1.466	0.247	NS
Jnanpith High School	25	2.03	0.346	0.110	NS	3.92	0.686	0.247	NS
Kadamtala High School	25	2.03	0.619	0.110	NS	3.57	1.203	0.247	NS
		Sub Scapular				Supra Spinale			
Age 13									
Sukhiapokhori HS School	25	3.67	1.121	0.181	NS	3.16	1.277	0.266	NS
Trunbull HS School	25	3.78	1.014	0.181	NS	3.51	1.512	0.266	NS
Jnanpith High School	25	3.59	0.737	0.181	NS	3.44	0.844	0.266	NS
Kadamtala High School	25	3.76	0.681	0.181	NS	3.49	1.557	0.266	NS
		Iliac Creast				Medial Calf			
Age 13									
Sukhiapokhori HS School	25	3.99	1.722	0.327	NS	3.48	0.905	0.214	0.600
Trunbull HS School	25	4.64	2.341	0.327	NS	4.61	1.699	0.214	0.600
Jnanpith High School	25	4.12	0.850	0.327	NS	3.26	0.584	0.214	0.600
Kadamtala High School	25	4.39	1.229	0.327	NS	3.50	0.735	0.214	0.600

Table-4. Analysis of variance of skinfold measurements

Source	Biceps Sum of Squares	df	Mean Square	F	Sig.	Triceps Sum of Squares	df	Mean Square	F	Sig.
Altitude	.781	3	.260	.866	.462	11.620	3	3.873	2.544	.061
Error	28.860	96	.301			146.169	96	1.523		
Total	463.530	100				1801.280	100			
Source	Sub Scapular Sum of Squares	df	Mean Square	F	Sig.	Supra Spinale Sum of Squares	df	Mean Square	F	Sig.
Altitude	.556	3	.185	.225	.879	2.046	3	.682	.387	.763
Error	79.014	96	.823			169.284	96	1.763		
Total	1447.830	100				1326.650	100			
Source	Iliac Creast Sum of Squares	df	Mean Square	F	Sig.	Medial Calf Sum of Squares	df	Mean Square	F	Sig.
Altitude	6.428	3	2.143	.803	.495	27.826	3	9.275	8.089	.000
Error	256.220	96	2.669			110.079	96	1.147		
Total	2098.770	100				1515.800	100			

Table-5. Least Significant Difference and Multiple Comparisons for skinfold measurement

(I) Altitude	(J) Altitude	Biceps		Triceps	
		Mean Difference (I-J)	Sig.	Mean Difference (I-J)	Sig.
Sukhiapokhori HS School	Trunbull HS School	-0.200	0.200	-0.192	0.584
	Jnanpith High School	0.008	0.959	0.348	0.321
	Kadamtala High School	0.004	0.979	0.700*	0.048
Trunbull HS School	Jnanpith High School	0.208	0.183	0.540	0.125
	Kadamtala High School	0.204	0.191	0.892*	0.012
Jnanpith High School	Kadamtala High School	-0.004	0.979	0.352	0.316
		Sub Scapular		Supra Spinale	
Sukhiapokhori HS School	Trunbull HS School	-0.112	0.663	-0.356	0.346
	Jnanpith High School	0.076	0.768	-0.280	0.458
	Kadamtala High School	-0.088	0.732	-0.336	0.373
Trunbull HS School	Jnanpith High School	0.188	0.466	0.076	0.840
	Kadamtala High School	0.024	0.926	0.020	0.958
Jnanpith High School	Kadamtala High School	-0.164	0.524	-0.056	0.882
		Iliac Creast		Medial Calf	
Sukhiapokhori HS School	Trunbull HS School	-0.656	0.159	-1.136*	0.000
	Jnanpith High School	-0.128	0.782	0.212	0.486
	Kadamtala High School	-0.404	0.384	-0.020	0.947
Trunbull HS School	Jnanpith High School	0.528	0.256	1.348*	0.000
	Kadamtala High School	0.252	0.587	1.116*	0.000
Jnanpith High School	Kadamtala High School	-0.276	0.552	-0.232	0.446

From the above table it was found that the mean biceps thickness of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 2.04 mm., 2.24 mm., 2.03 mm. and 2.03 mm. As there was slight difference in biceps thickness among the 14 years boys of four different altitudes, analysis of variance was conducted in which "F" value found shows no significant difference. Further L.S.D was conducted to know whether the difference may occur in between the groups, which show no significant difference.

It was found from the study of Chakrabarty and Bharati (2008) that the average biceps skinfold thickness of 14 year old Shabar Tribal Adolescents of Orissa was 3.2 mm. with S.D of 0.6 and for Bengali Boys of Nimta, West Bengal it was 4.6 mm. with S.D of 1.7 (Mukhopadhyay et al., 2005).

In biceps skinfold difference was there but was not stastically significant. These might be due to genetic factors and same food habit provide by government in the school.

From the above table it was found that the mean triceps thickness of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 4.27 mm., 4.46 mm., 3.92 mm. and 3.57mm. Though Critical difference was not significant in tricep skinfold thickness among the boys of four different altitudes, analysis of variance was conducted in which "F" value (2.544) shows no significant difference. So further L.S.D was conducted to know in which groups the difference lies and it was found that between Group-I and Group-IV and between Group-II and Group-IV the triceps thickness was significantly different from each other at 0.05 levels.

It was found from the study of Fryar et al. (2012), the average triceps skinfold thickness of 14 year old adolescents of united states was 12.9 mm. with SEM of 0.83, for Shabar Tribal Adolescents of Orissa it was 5.6 mm. with S.D of 1.8 (Chakrabarty and Bharati, 2008) and for Bengali Boys of Nimta, North 24 Parganas, West Bengal it was 7.3 mm. with S.D of 2.4 (Mukhopadhyay et al., 2005).

It was found that with increase in altitude thickness increases although altitude-6700 ft. male students had thickest triceps skinfolds which may be due to genetic factors. Apart from this, thicker triceps fat saves body from low temperature may be supporting aspect.

Similarly the mean sub scapular skinfold thickness of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 3.67 mm., 3.78 mm., 3.59 mm. and 3.76 mm. Though Critical difference was not significant in sub scapular skinfold thickness among the 13 years boys of four different altitudes, analysis of variance was conducted in which "F" value (.225) shows no significant difference. So further L.S.D was conducted to know whether the difference lies in between any group or not and it was found that there was no significant difference between any group.

It was found from the study of Fryar et al. (2012), the average sub scapular skinfold thickness of 14 year old adolescents of united states was 11 mm. with SEM of 0.68, for Shabar Tribal Adolescents of Orissa it was 7 with S.D of 1.6 (Chakrabarty and Bharati, 2008) and for Bengali Boys of Nimta, North 24 Parganas, West Bengal it was 9.3 mm. with S.D of 3.7 (Mukhopadhyay et al., 2005).

Sub scapular skinfold thickness difference was not significant but difference may be due to genetic factors.

Similarly the mean supra spinale skinfold thickness of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 3.16 mm., 3.51 mm., 3.44 mm. and 3.49 mm. Though Critical difference was not significant in supra spinale skinfold thickness among the boys of four different altitudes, analysis of variance was conducted in which "F" value (.387) shows no significant difference. So further L.S.D was conducted to know whether the difference lies in between any group or not and it was found that there was no significant difference between any group.

It was found from the study of Oyewale et al. (2010) that the average supra spinale skinfold thickness of 13-15 years old adolescents of Zaria, Nigeria was 0.48 cm with S.D of 0.15.
Supra spinale thicknesses differ but are not statistically significant. This difference may be due to genetic factors.

From the above table it was found that the mean Iliac creast skinfold thickness of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 3.99 mm., 4.64 mm., 4.12 mm. and 4.39mm. As there was slight difference in Iliac creast thickness among the 14 years boys of four different altitudes, analysis of variance was conducted in which "F" value found shows no significant difference. Further L.S.D was conducted to know whether the difference may occur in between the groups, which show no significant difference.

It was found from the study of Chakrabarty and Bharati (2008) that the average Iliac creast skinfold thickness of 14 year old Shabar Tribal Adolescents of Orissa was 5.7 mm.with S.D of 1.5 and for Bengali Boys of Nimta, North 24 Parganas, West Bengal it was 9.5 mm. with S.D of 4.3 (Mukhopadhyay et al., 2005).

Iliac creast thicknesses differ but are not statistically significant. This difference may be due to genetic factors.

Similarly the mean medial calf skinfold thickness of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 3.48 mm., 4.61 mm., 3.26 mm. and 3.50 mm. As Critical difference was significant in medial calf skinfold thickness among the boys of four different altitudes, analysis of variance was conducted in which "F" value (8.089) shows significant difference. So further L.S.D was conducted to know where the difference lies and it was found that there was significant difference between Group-I and Group-II, between Group-II and Group-III and between Group-II and Group-IV.

It was found from the study of Mukhopadhyay et al. (2005) that the average medial calf skinfold thickness of 14 year old Bengali Boys of North 24 Parganas, W. Bengal was 8.4 mm. with S.D of 2.2.

Medial calf skinfolds significantly vary in age group 14. Males residing at an altitude of 6700 feet had thicker skinfolds. This may be due to genetic factors. Apart from this thicker fat layer had been accumulated by body to save itself from severe cold which occurs with increase in altitude.

Table-6. Mean and S.D of motor performance

Altitude	N	Shuttle Run				50 mt.dash			
		Mean	SD	SEm (±)	CD (P=0.05)	Mean	SD	SEm (±)	CD (P=0.05)
Age 13									
Sukhiapokhori HS School	25	11.93	0.817	0.118	0.331	8.60	0.466	0.088	NS
Trunbull HS School	25	11.18	0.470	0.118	0.331	8.66	0.402	0.088	NS
Jnanpith High School	25	10.62	0.474	0.118	0.331	8.45	0.333	0.088	NS
Kadamtala High School	25	11.67	0.521	0.118	0.331	8.77	0.529	0.088	NS
		Standing Broad Jump				Sit Ups			
Sukhiapokhori HS School	25	1.70	0.179	0.032	NS	15.00	3.617	0.581	1.629
Trunbull HS School	25	1.76	0.187	0.032	NS	17.48	2.330	0.581	1.629
Jnanpith High School	25	1.72	0.128	0.032	NS	15.48	2.163	0.581	1.629
Kadamtala High School	25	1.72	0.129	0.032	NS	20.76	3.257	0.581	1.629

Table-7. Analysis of variance of motor performance

Source	Shuttle Run					50 mt. dash				
	Sum of Squares	df	Mean Square	F	Sig.	Sum of Squares	df	Mean Square	F	Sig.
Altitude	25.085	3	8.362	24.169	.000	1.403	3	.468	2.431	.070
Error	33.214	96	.346			18.464	96	.192		
Total	12936.46	100				7448.583	100			
	Standing Broad Jump					Sit Ups				
Altitude	.049	3	.016	.647	.587	513.720	3	171.24	20.269	.000
Error	2.401	96	.025			811.040	96	8.448		
Total	300.289	100				30840.000	100			

Table-8. LSD, Multiple Comparisons for motor performance

(I) Altitude	(J) Altitude	Shuttle Run		50 mt. dash	
		Mean Difference (I-J)	Sig.	Mean Difference (I-J)	Sig.
Sukhiapokhori HS School	Trunbull HS School	0.7492*	.000	-0.0584	0.639
	Jnanpith High School	1.3100*	.000	0.1540	0.217
	Kadamtala High School	0.2552	.128	-0.1748	0.162
Trunbull HS School	Jnanpith High School	0.5608*	.001	0.2124	0.090
	Kadamtala High School	-.4940*	.004	-0.1164	0.350
Jnanpith High School	Kadamtala High School	-1.0548*	.000	-0.3288*	0.009
		Standing Broad Jump		Sit Ups	
Sukhiapokhori HS School	Trunbull HS School	-0.0588	0.192	-2.4800*	0.003
	Jnanpith High School	-0.0168	0.708	-0.4800	0.561
	Kadamtala High School	-0.0132	0.769	-5.7600*	0.000
Trunbull HS School	Jnanpith High School	0.0420	0.350	2.0000*	0.017
	Kadamtala High School	0.0456	0.311	-3.2800*	0.000
Jnanpith High School	Kadamtala High School	0.0036	0.936	-5.2800*	0.000

From the above table it was found that in the age group of 14, the mean time of shuttle run of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 11.93 seconds, 11.18 seconds, 10.62 seconds and 11.67 seconds. As there was critical difference in shuttle run among the 14 years boys of four different altitudes, analysis of variance was conducted in which "F" value (24.169) found shows significant difference so, further L.S.D was conducted to know where the difference lies in between the groups and it was found that there was significant difference between Group-I and Group-II, between Group-I and Group-III, between Group-II and Group-III, between Group-II and Group-IV and between Group-III and Group-IV.

It was found from the study of P.K. Paul (2013), the average shuttle run speed (m /sec) of 14 year old male students of 24 Pgs (N), West Bengal was 11.20 sec with S.D of .46 and worldwide average shuttle run speed was 11.517 with S.D of 1.323 (Old *et al.,* 2006). Analysing the result of

shuttle run it may be concluded that the present study has close proximity to Paul (2013) and Old et al. (2006).

There were significant differences in shuttle run among four different altitudes. Male students residing at an altitude of 3000 feet showed best performance which may be due to genetic factor. Among four altitudes, these altitude male were more laborious as they depend on agriculture for their livelihood resulting in well developed calf muscle.

In 50 mt. dash there was significant difference in age group 15 and 16 only. Students residing at highest altitude (7200 ft.) showed better performance which may be due to genetic factor. Apart from these physiological factors like high haemoglobin content, increase in blood etc may be supporting factors.

Similarly the mean value of 50 meter run of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 8.60 seconds, 8.66 seconds, 8.45 seconds and 8.77 seconds. Though there was no critical difference in 50 meter run among the 14 year boys of four different altitudes, analysis of variance was conducted in which "F" value (2.431) found shows no significant difference so further L.S.D was conducted to know whether the difference occurs in between the groups and it was found that there was significant difference between Group-III and Group-IV.

It was found from the study of Paul (2013), the average 50 mt. run speed (m /sec) of 14 year old male students of 24 Pgs (N), West Bengal was 8.36 sec with S.D of .72.

In 50 mt. dash there was no significant difference but still Students residing at altitude III (3000 ft.) showed better performance which may be due to genetic factor. Apart from these physiological factors like high haemoglobin content, increase in blood etc may be supporting factors.

From the above table it was found that in the age group of 14, the mean lengthwise coverage of standing broad jump of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 1.70 meter, 1.76 meter, 1.72 meter and 1.72 meter. As there was no critical difference in standing broad jump among boys of four different altitudes, analysis of variance was conducted in which "F" value (.647) found shows no significant difference so, further L.S.D was conducted to know whether the difference lies in between the groups and it was found that there was no significant difference between any groups.

It was found from the study of Paul (2013), the average standing broad jump of 14 year old male students of 24 Pgs (N), West Bengal was 171.37 cm with S.D of 15.92. and for Macedonian school children it was 180.5 cm with S.D of 28.07 (Gontarev et al., 2014). Analysing the result of standing broad jump it may be concluded that the present study has close proximity to Paul (2013).

In standing broad jump, there were no significant difference but Altitude-6700 ft. male students had greater explosive strength which may be due to genetic factors. Apart from this it may be due to well developed calf muscle shaped while walking up and down the hilly roads.

Similarly the mean value of sit ups of Group-I (7200 ft.), Group-II (6700 ft.), Group-III (3000 ft.) and Group-IV (430 ft.) were 12.00, 17.48, 15.48 and 20.76. As there was critical difference in

sit ups among the boys of four different altitudes, analysis of variance was conducted in which "F" value (20.269) found shows highly significant difference so further L.S.D was conducted to know where the difference lies in between the groups and it was found that there was significant difference between Group-I and Group-II, between Group-I and Group-IV and between Group-II and Group-III, between Group-II and Group-IV and between Group-III and Group-IV.

Subjects residing at lowest altitude (430 ft.) showed better performance which may be due to genetic factors. Apart from this it may be due to shorter upper body as upper body part decrease with decrease in altitude.

Table-9. Correlation between body composition and motor performance

		Age 14			
		MT 50	**SBJ**	**S UPS**	**S Run**
Biceps	"r" value	0.324	-.470*	-0.213	0.199
	Probability	0.115	0.018	0.307	0.340
Triceps	"r" value	0.098	-.542**	-0.055	0.236
	Probability	0.640	0.005	0.794	0.257
SScapular	"r" value	0.107	-0.158	-0.027	0.070
	Probability	0.610	0.451	0.899	0.738
SSpinale	"r" value	0.241	-0.096	-0.121	0.063
	Probability	0.246	0.648	0.565	0.764
ICreast	"r" value	0.068	-0.190	0.035	0.041
	Probability	0.747	0.363	0.869	0.846
MCalf	"r" value	0.121	-.410*	-0.004	0.026
	Probability	0.565	0.042	0.986	0.900

50 meter dash has no significant correlation with any skinfold thickness. In between standing broad jump and body composition, there was significant correlation with biceps, triceps and medial calf.

In case of correlation between sit ups and body composition it was found that there was no statistically significant correlation. In case of correlation between shuttle run and body composition it was found there was no statistically significant correlation with skinfolds.

4. CONCLUSION

From above findings following conclusions can be drawn;

1. There is a significant difference in medial calf skinfold thickness. Group-II (6700 ft.) boys have thickest medial calf than remaining groups. Significant difference was found between Group-I and Group-II, between Group-II and Group-III and between Group-II and Group-IV.

2. In agility Group-III (3000 ft.) boys were superior than other groups.

3. In 50 meter dash Group-III (3000 ft.) boys shows superior performance and statistically significant difference was observed between Group-III and Group-IV.

4. In explosive strength Group-II (6700 ft.) boys shows superior performance than other groups but were not statistically significant.

5. In strength endurance Group-IV (430 ft.) boys were superior to other three groups.

6. There was significant correlation of S.B. jump with biceps, triceps and medial calf.

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