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Altitude training effect on selected physical fitness components among college men students

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Abstract
The purpose of the study was to find out the effect of altitude training on selected physical fitness components such as strength endurance and cardio respiratory endurance. To achieve this purpose of the study, thirty men students studying in Kingston Engineering College, Katpadi, Vellore District, Tamil Nadu, India were selected as subjects at random. The age of the subjects were ranged from 18 to 20 years. The selected subjects were divided into two equal groups of fifteen subjects each, such as altitude training group (Group I) and control group (Group II). The altitude training group (Group I) underwent their respective training programme for three days per week for twelve weeks.
Group II acted as control in which they did not undergo any special training programme apart from their regular physical education programme. All the subjects of two groups were tested on selected criterion variable such as strength endurance and cardio respiratory endurance at prior to and immediately after the training programme by using bend knee sit ups and cooper's 12 min run / walk test respectively. The analysis of covariance (ANCOVA) was used to analysis the significant difference, if any in-between the groups. The level of significant to test the 'F' ratio obtained by the analysis of covariance was tested at. 05 level of confidence, which was considered as an appropriate. The results of the study revealed that there was a significant difference between altitude training group and control group on selected physical fitness components such as strength endurance and cardio respiratory endurance. Significant improvements on selected criterion variables were also noticed due to altitude training.

Keywords: Physical fitness, pulse rate, non-sportsmen, Sirsa

Introduction
Altitude training has been used by endurance athletes and is now common practice for many different types of athletes, since the early 1970's, Athletes travel to altitude to experience changes in the availability of oxygen and the potentially beneficial effects of what that does to the body. A common misconception is that there's less oxygen at higher altitudes; yet the percentage of oxygen molecules in the air (20.9%) remains the same, whether you're on the beach or on top of a mountain. The difference is there's lower air pressure and pressure is key to getting oxygen into your muscles.
It's worth noting that central (heart and lungs) and peripheral (blood and muscular) adaptations occur at different rates and there can be large individual variation in the response to altitude between athletes. This means some athletes respond better to altitude training than others. The duration and height of the training camp play an important role alongside the specific training (continuous, interval, resistance etc.) that is completed whilst you are at altitude.

Methodology
The purpose of the study was to find out the effect of altitude training on selected physical fitness components such as strength endurance and cardio respiratory endurance. To achieve this purpose of the study, thirty men students studying in Kingston Engineering College, Katpadi, Vellore District, Tamil Nadu, India were selected as subjects at random. The age of the subjects were ranged from 18 to 20 years. The selected subjects were divided into two equal groups of fifteen subjects each, such as altitude training group (Group I) and control group (Group II). The altitude training group (Group I) underwent their respective training programme for three days per week for twelve weeks.
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Analysis of the Data

The influence of altitude training on each physical variable were analyzed separately and presented below.

Strength Endurance

The analysis of covariance on strength endurance of the pre and post test scores of altitude training group and control group have been analyzed and presented in Table I.

Table I: Analysis of Covariance of the Data on Strength Endurance of Pre and Post Tests Scores of Altitude Training Group and Control Group

test	Altitude Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	41.20	41.07	Between	0.13	1	0.13	0.01
SD	4.21	4.13	Within	495.33	28	17.69	
Post Test							
Mean	47.33	41.60	Between	246.53	1	246.53	9.90*
SD.	3.91	3.61	Within	697.47	28	24.91	
Adjusted Post Test							
Mean	47.27	41.66	Between	235.97	1	235.97	238.51*
			Within	26.71	27	0.99	

* Significant at. 05 level of confidence.

(The table value required for significance at. 05 level of confidence with df 1 and 28, 1 and 27 were 4.20 and 4.21 respectively)

The table I shows that pre-test means on strength endurance of altitude training group and control group are 41.20 and 41.07 respectively. the obtained "F" ratio of 0.01 for pre -test means is less than the table value of 4.20 for df 1 and 28 required for significance at. 05 level of confidence on strength endurance. The post-test means on strength endurance of altitude training group and control group are 47.33 and 41.60 respectively. the obtained "F" ratio of 9.90 for post-test means is more than the table value of 4.20 for df 1 and 28 required for significance at. 05 level of confidence on strength endurance.

The table I further shows that the adjusted post-test mean values of altitude training group and control group are 47.27 and 41.66 respectively. The obtained "F" ratio of 268.51 for adjusted post-test means is greater than the required table value of 4.20 for df 1 and 28 required for significance at. 05 level of confidence on strength endurance. The results of the study indicated that there was a significant difference between the adjusted post-test means of altitude training group and control group on strength endurance.

Cardio Respiratory Endurance

The analysis of covariance on cardio respiratory endurance of the pre and post test scores of altitude training group and control group have been analyzed and presented in Table II.

Table 2: Analysis of Covariance of the Data on Cardio Respiratory Endurance of Pre and Post Tests Scores of Altitude Training Group and Control Group

test	Altitude Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	1344.67	1336.67	Between	480.00	1	480.00	1.13
S.D.	20.45	20.30	Within	11906.67	28	425.24	
Post Test							
Mean	1446.67	1353.67	Between	64867.50	1	64867.50	22.87*
S.D.	19.38	23.63	Within	79424.17	28	2836.58	
Adjusted Post Test							
Mean	1443.71	1356.62	Between	54684.34	1	54684.34	183.07*
			Within	8065.06	27	298.71	

* Significant at. 05 level of confidence.

(The table value required for significance at. 05 level of confidence with df 1 and 28, 1 and 27 were 4.20 and 4.21 respectively)

The table II shows that pre-test means on cardio respiratory endurance of altitude training group and control group are 1344.67 and 1336.67 respectively. the obtained "F" ratio of 1.13 for pre -test means is less than the table value of 4.20 for df 1 and 28 required for significance at. 05 level of confidence on cardio respiratory endurance. The post-test means on cardio respiratory endurance of altitude training group and control group are 1446.67 and 1353.67 respectively. the obtained "F" ratio of 22.87 for post-test means is more than the table value of 4.20 for df 1 and 28 required for significance at. 05 level of confidence on cardio respiratory endurance.

The table II further shows that the adjusted post-test mean values of altitude training group and control group are 1443.71 and 1356.62 respectively. The obtained "F" ratio of 183.07 for adjusted post-test means is greater than the required table value of 4.21 for df 1 and 27 required for significance at. 05 level of confidence on cardio respiratory endurance. The results of the study indicated that there was significant difference between the adjusted post-test means of altitude training group and control group on cardio respiratory endurance.

Conclusion

1. There was a significant difference between altitude training group and control group on strength endurance.
2. There was a significant difference between altitude training group and control group on cardio respiratory endurance.
3. And also it was found that there was a significant improvement on selected criterion variables such as strength endurance and cardio respiratory endurance due to altitude training.

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