Research Paper

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Effect of Moderate Hypoxia on Selected Biochemical and Physiological Variables of Middle and Long Distance Runners

Physical Education

KEYWORDS : Moderate Hypoxia, Training, Blood Lactate, Vital Capacity

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ABSTRACT

The purpose of this study was to determine the Effect of Moderate Hypoxia on Selected Biochemical and Physiological Variables such as, H.D.L, L.D.L, Creatine, Blood Lactate, Haemoglobin, R.B.C, W.B.C, Resting Pulse Rate, Blood Pressure and Vital Capacity of Middle and Long Distance Runners. 40 college level middle and long distance runners were selected and divided in to two groups. The selected subjects were trained athletes. This is to avoid the acclimatization problem. The experimental group exposed to the experimental training at high altitude and control group undergone their training at sea level. The training was given for a period of six months. All the subjects were tested in the selected Biochemical and Physiological Variables before and after the training program. Biochemical variables will be tested with the help of lab experts. Resting pulse rate was taken at the radial artery and the pulse counted for one minute was recorded in number of beats per minute. Blood pressure was taken by using a standard Sphygmomanometer, a stethoscope. Both systolic and diastolic blood pressures recorded. Vital Capacity was taken by using a hand Spirometer. Dependent 't' test was used to find out the mean differences since the groups will be equal and will be independent on the same treatment variable.

INTRODUCTION

In the last few decades' sports have gained tremendous popularity all over the globe. The popularity of sports is still increasing at a fast pace and this happy trend is likely to continue in the future also. Sports have become an important social and cultural activity in the modern world, which is being given the rightful place it deserves by the nations and societies of the world. The area of performance sports is not merely a glamorous area of sports. It also fulfils its certain valuable social functions due to which it has been accorded high importance all over the world. It contributes towards the all round development of the personality and enhances the horizons of awareness among the competing sports men with regard to the fact that they are representing particular states or countries of their origin. Different training methods have been commonly used to improve physical fitness and its related standards of performance of athletes. The training methods include weight training, circuit training, plyometric training, fartlek training, altitude training, resistance training and interval training.

Altitude training traditionally referred to as altitude camp, is the practice by some endurance athletes of training for several weeks at high altitude, preferably over 2,500 m (8,000 ft) above sea level, though more commonly at a lower altitude due to the lack of availability of a suitable location. At this altitude the air still contains approximately 20.9% oxygen, but the barometric pressure and thus the partial pressure of oxygen is reduced. More common nowadays is the use of an altitude simulation tent, altitude simulation room, or mask-based hypoxicator system where the barometric pressure is kept the same, but the oxygen content is reduced which also reduces the partial pressure of oxygen. Such devices have enabled different altitude training techniques including Live High, Train Low, or the practice of merely performing occasional exercise sessions at altitude.

METHODOLOGY

Forty college level athletes selected and divided in to two groups. The selected subjects were trained athletes. This is to avoid the acclimatization problem. The experimental group exposed to the experimental treatment at high altitude and control group undergone their training at sea level. The training was given for a period of six months. The intensity and repetitions were increased after every two weeks. The subjects tested in Blood lactate, HDL, LDL, Creatine, Hemoglobin, W.B.C, R.B.C (These Biochemical variables will be tested with the help of lab experts) Blood pressure, Resting heart rate and Vital capacity. Dependent 't' test was used to find out the mean differences since the groups will be equal and will be independent on the same treatment variable.

RESULTS AND DISCUSSION

To find out the significant mean difference between initial and final scores for experimental and control groups Dependent 't' test was used. The mean difference of the criterion measures for the control and experimental groups are presented in tables.

TABLE I
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON HDL

Groups	No	Initial mean	Final mean	't'
EXP.	20	49.40	51.55	5.138
CONT.	20	51.05	51.00	0.127

** Significant at 0.05 level of confidence.

't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table I reveals that in the case of the experimental group significant changes were noticed in HDL following eight weeks of high altitude training. Since the 't' value obtained for HDL was 5.138, which is higher than the required table value. In the case of control group there were no significant changes.

TABLE II
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON LDL

Groups	No.	Initial mean	Final mean	't'
EXP.	20	92.90	89.50	4.985
CONT.	20	95.55	95.60	0.081

** Significant at 0.05 level of confidence.

't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093 Table II reveals that in the case of the experimental group significant changes were noticed in LDL following eight weeks of high altitude training. Since the 't' value obtained for LDL was 4.985, which is higher than the required table value. In the case of control group there were no significant changes.

TABLE III

Group	N	Initialmean	Final mean	't'
I	20	.7250	.6900	1.677
II	20	.7300	.7300	0.000

DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON CREATINE

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093.

Table III reveals that in the case of the experimental group no significant changes were noticed in Creatine following eight weeks of high altitude training. Since the 't' value obtained for Creatine was 1.677, which is lesser than the required table value. In the case of control group also there were no significant changes.

TABLE IV
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON BLOOD LACTATE

Groups	No.	Initial mean	Final mean	't' ratio
EXP.	20	24.200	20.985	3.927
CONT.	20	24.355	24.465	0.836

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table IV reveals that in the case of the experimental group significant changes were noticed in Blood Lactate following eight weeks of high altitude training. Since the 't' value obtained for Blood Lactate was 3.927, which is lesser than the required table value. In the case of control group there were no significant changes.

TABLE V
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON HAEMOGLOBIN

Groups	No.	Initial mean	Final mean	't' ratio
EXP.	20	13.48	14.02	8.301
CONT.	20	13.55	13.56	0.302

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093.

Table V reveals that in the case of the experimental group significant changes were noticed in Hb following eight weeks of high altitude training. Since the 't' value obtained for Hb was 8.301, which is higher than the required table value. In the case of control group there were no significant changes.

TABLE VI
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON RBC

Groups	No.	Initial mean	Final mean	't' ratio
EXP.	20	4.4650	4.3550	4.819
CONT.	20	4.4800	4.4750	1.000

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table VI reveals that in the case of the experimental group significant changes were noticed in RBC following eight weeks of high altitude training. Since the 't' value obtained for RBC was 4.819, which is higher than the required table value. In the case of control group there were no significant changes.

TABLE VII
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON WBC

Groups	No.	Initial mean	Final mean	't'
EXP.	20	7165.00	7045.00	0.763
CONT.	20	6855.00	6850.00	0.114

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table VII reveals that in the case of the experimental group no significant changes were noticed in WBC following eight weeks of high altitude training. Since the 't' value obtained for WBC was 0.763, which is lesser than the required table value. In the case of control group also there were no significant changes.

TABLE VIII
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON RPR

Groups	No.	Initial mean	Final mean	't'
EXP.	20	59.8500	58.4500	7.628
CONT.	20	61.6000	61.2500	2.101

*** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table VIII reveals that in the case of the experimental group significant changes were noticed in Resting Pulse Rate following eight weeks of high altitude training. Since the 't' value obtained for Resting Pulse Rate was 7.628, which is higher than the required table value. In the case of control group there were no significant changes.

TABLE IX
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON BLOOD PRESSURE(SYSTOLIC)

Groups	No.	Initial mean	Final mean	't'
EXP.	20	117.0000	117.5000	1.000
CONT.	20	116.0000	116.0000	1.000

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table IX reveals that in the case of the experimental group no significant changes were noticed in Systolic Blood Pressure following eight weeks of high altitude training. Since the 't' value obtained for Systolic Blood Pressure was 1.000, which is lesser than the required table value. In the case of control group also there were no significant changes.

TABLE X
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON BLOOD PRESSURE(DIASTOLIC)

Groups	No.	Initial mean	Final mean	't'
EXP.	20	77.0000	77.0000	.000
CONT.	20	77.0000	77.0000	.000

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table X reveals that in the case of the experimental group no significant changes were noticed in Diastolic Blood Pressure following eight weeks of high altitude training. Since the 't' value obtained for Diastolic Blood Pressure was 0.000, which is lesser than the required table value. In the case of control group also there were no significant changes.

TABLE XI
DIFFERENCE IN MEAN OF EXPERIMENTAL AND CONTROL GROUPS ON VITAL CAPACITY

Groups	No.	Initial mean	Final mean	't'
EXP.	20	2865.000	2985.00	6.439
CONT.	20	2607.500	2625.00	1.584

**** Significant at 0.05 level of confidence.**
't' value needed for significance at 0.05 level with 19 degrees of freedom was 2.093

Table XI reveals that in the case of the experimental group significant changes were noticed in Vital Capacity following eight

weeks of high altitude training. Since the 't' value obtained for Vital Capacity was 6.439, which is higher than the required table value. In the case of control group there were no significant changes.

CONCLUSIONS

The results of the study seems to be permitted for the following conclusions:

1. Participation in high altitude training and programme resulted in improvement on H.D.L, H.B, R.B.C, and Vital Capacity.
2. Participation in high altitude training and programme resulted in decrease of L.D.L, Blood Lactate and Resting Pulse Rate.

RECOMMENDATIONS

In the light of conclusions drawn, the following recommendations are made:

1. Similar studies may be under taken for different age groups and sex other than this study.
2. Similar longitudinal studies may be undertaken by increasing the duration and intensity of training programme.

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