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Research Article

A STUDY ON THE EFFECTS OF CLIMBING TO ELEVATIONS ON SOME HEMATOLOGICAL AND PHYSIOLOGICAL INDEXES

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ABSTRACT

Introduction and objective since particular hypoxia conditions on high altitudes, cause different responses and consistencies in human body, the objective of this research was to study the effects of climbing to altitudes (elevations) on some selected hematological (Platelet) and physiological (Pulse) factors, and stability of changes after returning from elevations.

Materials and Methods: 17 non athlete male cases with the average age of 38.7 years were determinedly selected and their blood samples were collected in three stages: Before starting-48 hours after presence on an altitude of 4400 miter, and 72 hours after coming down, and the physiological indexes were studied. Friedman test at the level of ($\alpha \leq 0.05$) and spss software version 15 were used to compare the average changes of the three stages.

Findings: The results showed that there is a significant difference between the average changes in the three stages so that the average ranks of puke and plate let in the three stages were (2.06-2.94-1) and (1.88-3-1.12) respectively.

Discussion and conclusion- Deployment at an altitude of 4400 miter for a period of 48 hours causes an increase of platelet and also increase of heart rate to compensate of the shortage of cardiac output because of hypoxia, low temperature and moisture on the elevations. Through reduction of plasma volume, reduced secretion of antidiurtic hormone, and also activation of erythropoitine hormone, and the changes remain relatively stable up to 72 hours after returning down the elevations altitudes.

Keywords: Elevation (Altitude), Platelet, Pulse

INTRODUCTION

Human beings have evenly, either affected nature, or have been affected by natural factors and incidents of the environments[13].

Mean while mountains and altitudes have a special place (position) as one of the main components of living environment of human beings[1] progress in technology, and use of machineries and vehicles have inhibited human beings from their active and dynamic nature, and most probably have caused many risk factors[8]. During the two past countries, mountaineering has been introduced as a refreshing and attractive physical activity which has got a special position in different countries. Physical activity on altitudes is followed by various benefits for individuals, which are used by sports coaches and athletes[2]. Of course besides these benefits some problems may arise for individuals on the altitudes. The most basic characteristic upon climbing to altitudes is the atmospheric changes of environment so that by increase of elevation, the ambient oxygen density is decreased[13].

This sagital pressure of oxygen creates elevation specific hypoxic conditions in the body which cause the appearance of hypoxic physiological responses in the body. these developments along with changes of respiratory model . Heart beat and blood pressure are able to reduce the performance of individuals climbing to altitudes[11].

By climbing to altitudes under conditions of barometer pressure with low density of oxygen heart beat of rest and sports increase[4]. By consist age of body on the altitudes, gradually, the succession of resting heart beat is reduced[7].

Different research cases are seeking to answer questions such as period of staying on altitudes extent of altitude, type of exercise, and the rate of effects on the performance (functioning) of different organs of human body.

In a research by ruskoh et al[16] it was shown that the level of hemoglobin had increased in athletes who had exercised on an altitude of 1800 miters for 18-28 days. Pugh[15] explains in his research on heart beat that by climbing to higher altitudes (5800 miter) , under conditions of low working rate , the number of heart beat has been higher than the sea level , but by intensifying working , the number of heart beat is equal or lower than the sea-level zones.(regions).

In a research by Pugh[15] study on altitude longer than 36 days increase of hemoglobin concentration level, and mass of red

blood cells. The results of a research by Fauro et al[6]., showed that staying on altitudes for a short period (one hour on 4300 miters) has no effects on the level of blood hemoglobin.
Research by piehl[14], physiological and hematocrite changes caused by exposure of individuals to hypoxia were studied the sagital pressure of blood oxygen and saturation of oxygen reduced significantly during 10(ten) days of staying in hypoxia, hemoglobin and hematocrite reduced after two (2) days in hypoxia, and then returned to the primary level.
In a study by knauppetal[9] the correlation between continuation of exposure to hypoxia (hypoxic) environment at the level of plasma erythropoitine in healthy (individuals) were studied, and no increment in erythropoitine was observed after 5-60 minutes. With respect to the aforesaid items and the results obtained in most research cases, since a stay of longer than one weel, has been considered to study the effects of altitude , on blood and physiological factors and also with respect to the fact that in most research cases , athlete individuals have been used as test samples , the present research has studied the effects of an altitude of 4400 miters on hemoglobin and hematocrite level of a group of non athlete males, before climbing to altitudes , 48 hours after climbing , and the stability rate of changes 72 hours after returning , the results of which could be used to upgrade the awareness of individuals interested in climbing the altitudes(elevations), and enable those who climb the elevations to have a higher efficiency in a shorter time. Moreover, the results of this research could provide mountaineers will valuable information so that they will be aware of normal and sometimes abnormal changes in their body upon climbing elevations and they will be able to have successful climbing with the least unpleasant and dangerous complications.

METHODS

The present research was in the type of semi- experimented. The participants in this research were selected determinedly among non athletic make in the age range of 30 to so years, and the effects of independent variables (elevation) on dependent variables (Platelet and Pulse) were studied.
The statistical samples in the age- range of 30 to 50 years, who were selected determinedly data analysis have been provided in two descriptive and analytical parts.
In the descriptive part statistical characteristics such as average (mean) standard deviation high and low limits (extents) were used , and in the analytic part (inferential) also statistical correlations between independent and dependent variables of the research were studied data analysis of the research was done using parametric test of repeated measures , and spss software version 15.

RESULTS

Indices of central Propensity, average values and indices of dispersion, and standard deviation were used to describe the studied variables, Also Colmogrof –Spirnof statistical test was used to assess the distribution of numerical variables, in view of the rate of conformity with normal theoretical distribution, Because in neither of the studied variables, the pulse were less than the significant level of 92.05 there free distribution of the variables were in conformity with normal theoretical distribution, and thus Parametric test was used to compare the variables.
Variance analysis test for repeated measures was used to study the changes of dependant variables, and multiple comparisons test was used for one by one Comparison of the average of the variables with each other.
As it is observed in the test table the averages of all variables in three consequtice periods have been different, and as it has also been specified in the table with asterisk, there are significant changes between different measurement times in all variable, in other words, in all of them the contrary assumption is rejected, and the assumption of the research is accepted.

Table 1: The results of variance analysis test for repeated measures of dependant variables

Row	Index	Total Squares	Degrees of Freedom	Average of squares	F ratio	Significance level
1	Pulse	131.01.98	2	131.61.98	1.56	0.001
2	platelet	895623.09	2	895623.09	$88D_1 65$	0.001

Table 2: Results of dual (double) Comparison of dependent variable through LSD Test

Row	variable	index of Row	index of column	Average difference	Standard deviation	Signification level
1	pulse	1	2	-22.17	2.41	0.001
			3	-9	1.27	0.001
		2	3	13.17	2.23	0.001
2	platelet	1	2	-44.29	4.06	0.001
			3	-22.99	2.87	0.001
		2	3	21.35	3.30	0.001

As it is observed in the table of double comparison of the variables, the difference between all stages has been significant in comparison to the previous stage, therefore in all variables the contrary assumption is rejected and the research assumption is confirmed.

DISCUSSION

the rate of blood platelet increased 48 hours after climbing in comparison to before climbing, and 72 hours after returning from elevation, although the rate reduced but did not real, the level before climbing, and using multiple comparison test, it

was specified that the significant changes observed in the variance analysis test did exist between all stages, and the results this research are in consistency with the research cases carried out by Ruskoh et al[16], Piehl[14], Knaup et al[9], Faura et al[6]., and Pugh[15].

One of the probable reasons for the increase of platelets which Could be mentioned here is low temperature on the altitudes. Because of cold weather on the devotions absolute moisture is very low. Cold weather retains a very a very small quantity of water[3]. Therefore very low moisture on the high altitudes, probably accelerates dehydration in fact, because of dry weather, a large quantity of water is lost through respiratory evaporation.

Moreover because of reduction of sagital pressure of oxygen. On the elevations, and struggle of respiratory system to compensate the shortage of oxygen is probably resulted in the loss of water, and reduction of plasma which in turn is followed by the increase of platelets.

Another reason of these changes is probably. The reduction of ant diuretic hormone, in a form that by deployment on elevations , and hypoxic condition, secretion rate of the hormone is reduced and subsequently the rate of output of fluids through urine is increased, which in turn causes reduction of intra tissue and intracellular fluids and ultimately to compensate the defect, a part of plasma liquid enters the intra tissue and intracellular sections, and in this form, the plasma volume is reduced, and subsequently the number of platelets is increased in the volume unit.

Reduction of plasma volume is directly correlated to reduction of secretion of ant diuretic hormone in chronic hypoxia and dehyderation[17].

According to the findings of the research, the pulse rate increased 48 hours after climbing in comparison to before climbing, and 72 hours after returning from altitude though the rate reduced, but did not reach the level of before chiming. Using multiple comparisons test it was specified that the significant changes observed in the variance analysis test did exist between all stages as it was also mentioned in a comment to the third hypothesis, very low moisture increases respiration rate on the elevations.

Also water evaporation is increased through Perspiration while doing activities and the same thing causes reduction of plasma volume.

The reduction of plasma volume, and subsequently reduction of total blood volume should be somehow compensated. The compensation is achieved by the increase of cardiac output.

More over the quantity of oxygen which reach the muscles with a certain volume of blood is limited on the elevations.

By climbing to elevations, under barometer pressure condition and low density of oxygen the heart beat rate of rest and exercise is increased[4]. It seems that the logical method to compensate to this limitation is to increase the volume of blood which is transferred to active muscles, and perhaps it could be said that the simplest way for this process is the increase of heart beat rate.

CONCLUSION

Generally speaking, and as an interpretation to all hypotheses, it could be said that since the period of consistency to hypoxic condition and the period of returning from altitudes are close to each other, meaning that the longer stay on the altitudes, appropriate to stay, physiological changes are more stable and will disappear more slowly after returning from the altitudes.

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