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Annals of Biological Research, 2012, 3 (5):2275-2281
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Climbing effect into high altitude, as subsequent on supplement of Q10 coenzyme on Frap changes, GLU, HCT and WBC value in male mountaineers' serum

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ABSTRACT

The aim of this research was to study the climbing effect into high altitude contribution as subsequent to supplement of Q10 coenzyme on Farp changes, Glu, HCT and Wbc rates in male mountaineers' serum. Thus, 24 experienced and skilled male mountaineers (average 181 cm height, 25.5 years old, 75 kg, Body mass index 22, Percent of hypodermic fat 10 cm in Ave., VO2 MAX 80.5 lit/min, with experience of 5-15 years) were selected randomly and divided into 2 Experimental and Control groups. Before climbing, they consumed Q10 supplement and Placebo for 14 days. Their blood samples were analyzed in 4 different altitudes; 1500m, 2800m, 4300m and 5671m during climbing to Damavand summit. The results were considered by special kits of laboratory and auto-analyzer machine. Data were analyzed by F Test (as variance test with repeating in related factor). The relation among Q10 supplement on FARP changes, Glu, HCT and Wbc was not meaningful, but altitude effects and its changes on Glu, HCT and Wbc got a meaningful relation. So, we can conclude that there is no meaningful relation among Q10 supplement with FARM, Glu, HCT and Wbc Factors.

Key words: high altitude, glucose, hematocrit, leukocytosis, coenzyme of Q10, mountaineering.

INTRODUCTION

Mountaineering is a sport with sufficient and useful effects like promotion and improvement in Hemoglobin rate and cardiac-respiratory perseverance or without of having useful effects as acute mountain sickness (AMS) like: HACE Diarrhea, Vomiting, Headache and Oxygen Deficit in environment. In 1968, during the summer Olympic Games in Mexico City, altitude effect on athletes' performance was considered by the media, seriously [13]. Based on related reports, Hypoxia is arising from climbing into high altitudes [1, 13]. Getting an exercise extremely increases oxygen rate of body and its consuming. More consumed oxygen will make more free radicals in the body which it will result in destroying of the body cells and body wearing [9, 17, 18]. At this condition, the body uses from anti-oxidants in its around to collate with oxidants and free radicals [18, 19]. if we remove our body needs for these substances well, it will be without of problems and the cells will be safe against the oxide getting as a result of anti-oxidant deficit in internal part [2, 8, 16]. Using anti-oxidant substances is the best solution to save the cells and to measure the ability of them in Plasma-Fe complexes or anti-oxidant capability and anti-oxidative power measuring [4, 7]. Thus, practicing and activity in high altitude get more contribution on free radicals making in the body [24]. However, loosing appetite (Anorexia) and extreme exercising are two main scopes in living at high altitudes but sufficient caloric value and suitable nutrients are also necessary factors because it's so important issue for mountaineer's healthy system in high altitudes (who will face with loosing appetite or body weight) [2]. More attempt and energy

consuming during the practice or the competitions cause to make unsuitable needs in athletes' diet and making some troubles at the balance of received energy and caloric needs of the exercise particularly in preservative athletes [12]. More studies show that Hypoxia make to get cellular balance out of order and to decrease and change the Glucose rate soon. Glucose gets in change with increasing the height and its consuming gets more in the heart [6]. In fact, changing the height make changing the sugar in the blood. Studies have shown that preservative activity make to decrease Glucose in the blood too [1]. Due to mountaineering sports as a preservative fields, changing of Glucose rate sounds a popular event although other events and its problems as a result of altitude (such as oxygen deficit, liquid deficit in the body, changing of hormones, excretion in some of hormones, free radicals producing, unsuitable nutrition and etc.) may effect on blood's sugar rate (Increasing/decreasing) well [2]. Also, one of other restrictions by human's body is related to increase of red globules against outer part of Hypoxia. This reaction releases Erythropoietin hormone from the kidneys [2, 16]. Hematocryte as a percent of total volume of the blood in erythrocytes (number of red globules) cause to increase the blood volume value from %10 to %15 subsequent to permanent effect for 6 months in a height more than 4000 m [2, 15]. Due to available problems at the height and cellular balance impairing in hypoxia environment, it might change hematocryte rate at this case. Cellular balance impairing and increasing red globules rate get a change in white globules rate or leucocytes rate of the blood during the height and hypoxia conditions. Studies showed that activity could change white globule numbers soon [19]. Blood leucocytes get increase as a result of more activities and get change in the body [20]. There are a lot of studies that have been shown long and preservative sports activities could change blood volume rate mainly. Mountaineering field as a preservative sports has this scope in the blood which we can observe it in the mountaineers' serum, well. So, under effective and related factors on the height and hypoxia conditions, we will discuss on Q10 anti-oxidant effects with climbing into the high altitudes and its useful procedure on white globules rate. According to the studies in 2005 about of the height, it was shown that anti-oxidants have a defensive role and resistant force against free radicals, hypoxia, and oxidative stress. Thus, they can restore the cells and prevent from any changes [1]. Also, they play a role as a balancing state for the cells and a mediator/modifier substance inside the cells [6]. Free radicals may get damage into the brain and blood cells and make different height diseases like AMS sickness [17]. In the athletes, Q10 deficit make metabolic stress as free radicals increasing as a result of severe exercises [7]. During a research in 2004, the effect of vitamin E was considered on the serum of Himalaya mountaineers (Pomori, 7161m) after climbing to the summit for 3 weeks. I was observed that vitamin E as an anti-oxidant could prevent from mitocanderya damage stem from hypoxia [17]. Cooke, et al. (2009) concluded that low rate consuming of Q10 as a complementary coenzyme can increase its concentration in intra muscular tissues and reduce oxidative stress, serum and make to increase MDA level during and after of activity of the body.(under studying Q10 effect on athletes' performance and other persons who are not athletes). And only other researcher, Magalhase et al. (2004) reported that hypoxia and oxygen decreasing would increase oxidative stress and free radicals in cellular mitocanderya and decrease the phosphorylation of oxidative agent.

Whereas Subdehi et al. (2004) reported that anti- oxidant couldn't get any effect on related indices of oxidative stress and free radicals in high altitudes. Furthermore, Zoha and et.al. (1996) pointed to positive effects of nutrient supplements of Q10 coenzyme in euorotic sports (30). Due to great role of Q10 as an oxidant in balancing of intercellular system, ATP formation, oxidative chain, electron diffusing inside mitocanderia and other anti- oxidants reproducing(as a mediator substance inside the cell), made the researcher to seek for this study under the contradictory results about antioxidants in different sports and athletes' performance. Also, the researcher has studied the Q10 supplement consuming effects with climbing into Damavand, anti-oxidative power variations value and Glu values, HCT and the lecocytose in male's serum.

MATERIALS AND METHODS

Recent research is a semi-experimental study and 24 experienced male mountaineers with climbing record of 5-15 years, with no disorder at the height were chosen randomly. Some of them were chosen with following specifications:

Anthropometric and physiological indices such as VO2max, BMI, Hypodermic, Fat, Age, size, weight, type and procedure in mountaineering sport, experience, knowledge and educational level about of the height and mountaineering, strength of body, cardio-vascular power, body fitness for mountaineering and activity on the height. They were divided into two groups based on anthropometric and physiological factors: experimental group (n=12) and controlling group (n=12)

According to the team specialist and physician advice, experimental group consumed pure Q10 coenzyme made in Webber naturals Factory of Canada, with 100mg daily (consumed concentration was considered by the age) for two weeks before climbing into the height. Placebo group consumed placebo Dextrose with 100mg in a day for two weeks before climbing into the height [9, 18].

Blood sampling was considered with 5cc rate in each stage under the completely controlling of nutrition in the test before climbing to the summit and during of the climbing and also with consuming of Q10 and placebo as follows: (from anticobital of the tests in 4 steps).

For two weeks before climbing into the height in fasting status with 1500m.
In the base camp of Damavand at the height of 2800 m in fasting status.
Before climbing into Damavand at the height of 4300 m and in fasting status.
After climbing into the summit in the height of 5671m and backing.

Measuring tool
This study involves following tools:
1. Maximum consumed oxygen predictor
2. Fat percent of the body
3. Measuring of fat in stomach skin.
4. Hypodermic fat measuring in the upper pelvis.
5. Size measuring
6. Calender age
7. Mass measuring
8. Digital scale
9. Cornimeter (timer)
10. Centrifuge
11. Power supply
12. Special kits of laboratory
13. Measurable parameters such as auto analyzer laboratory scale and blood- letting tools.

Blood samples of persons were taken to the laboratory after safe packing and freezing. They were put into the special kits such as blood sugar kit, Frap kit from Germany brand with 0.0001 as an accuracy and sensitivity. Expected results obtained through auto-analyzer machine (cell counter) from U.S.A manufacturer after the related experiments doing.

Statistical methods
Firstly, we used Kolmogorov- Smirnov test for data homogeneity and then it was used from F test (variance with test operation) at the following stage. Following test (Bonferroni Test) was also considered for meaningful data values. All the statistical estimations were analyzed by Spss16 with $a<0.05$, as a meaningful level. We used descriptive report to detect the statistics, data and individual species for the athletes.

RESULTS

In this section, we express descriptive report and related information about of hypothesis in evaluation. Anthropometric and physiological indices as great factors of participants were as follows:

All of them: with Average age of 25.5 years and S.D=15
Size: Ave=181cm, S.D=25
Weight=75kg, S.D=90
Body Mass index: ave.=22, S.D=4.50
Hypodermic fat ave.=10cm, S.D=1.50
Vo2max: ave.=80.5 lit/min, S.D=12.74
Groups: 2 groups, Experimental and controlling groups. (n=12)
F test in four stages showed that Q10 effect on serum anti-oxidative power and blood sugar values couldn't be meaningful difference for the male mountaineers who climbing into the high altitudes ($P>0.05$). Also, Q10

coenzyme effect wasn't meaningful about of some variations in HCT and anti- oxidative power (P>0.05). Lastly, there isn't any meaningful difference about Q10 coenzyme effect on anti- oxidative power and Wbc value (P>0.05).

Table 1. Changes of GLU and FRAP in both groups

Controlling group					
Hight		1500m		5671	
Anti -oxidative power & blood's sugar		72+		63+	
		2.9		7.9	
Experimental group					
Anti- oxidative power & blood's sugar		81+		61+	
		7.8		4	
P>0.05		St. df		Ave.	
Within the Group	Within the Height	Control	Experimental	Control	Experimental
0.480	0.003	0.22	0.21	76	74

As it is shown in table 1, there isn't any meaningful difference among of the groups.

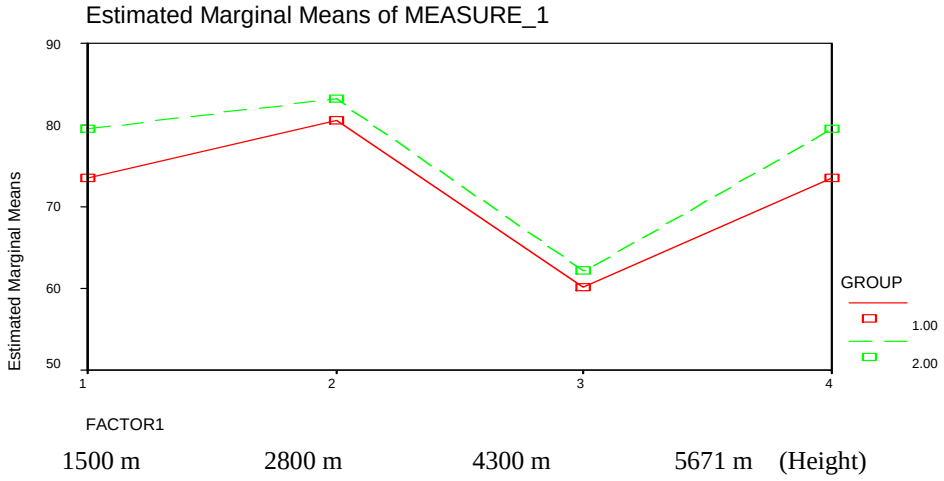

Figure 1. Changes of GLU and FRAP (mg/dl) in both groups

As you can observe in this figure and related tables, there is not any considerable relationship between blood sugar and anti- oxidative power. But we can see a meaningful relation among different heights. It wasn't observed any meaningful relation between antioxidant power and HCT values in the serum of male mountaineers subsequent to Q10.

There was a meaningful relation among of height variations in both of the groups.

Table 2. Changes of HCT and FRAP in both groups

Controlling group					
Hight		1500m		5671	
Anti -oxidative power & HCT		45+		43+	
		0.76		94	
Experimental group					
Anti- oxidative power & HCT		44.7+		43+	
		0.52		78	
P>0.05		St. df		Ave.	
Within the Group	Within the Height	Control	Experimental	Control	Experimental
0.97	0.005	0.44	0.34	43	43

As it is shown in table 2, there is no meaningful difference among of the groups. It means that HCT levels have been observed in the groups with changing the altitude. The recent study by Tannheimom et al. (2009) has adaptation

with our studies in the past. Studies show that red globules percent is increased at the first week of setting on the height especially during of two first days [2]. It might be related to erythropoietin hormonal excretion from the kidney and low level of plasma volume, i.e., settling on the height cause to increase the red globules [2, 10]. At this study, Q10 coenzyme hasn't been inferred to HCT producing or promotion. Nutrient supplement of Q10 (as an anti-oxidant) could play an important role in damages and cellular injuries against free radicals, in practice. Also, it's necessary in energy producing and ATP on the cells. So, as before mentioned, the most important agent of HCT excretion is related to erythropoietin hormone excretion from the kidney [2]. It is adapted and approved with HCT rate of Himalia region studying results by M Tannheimer successfully [22].

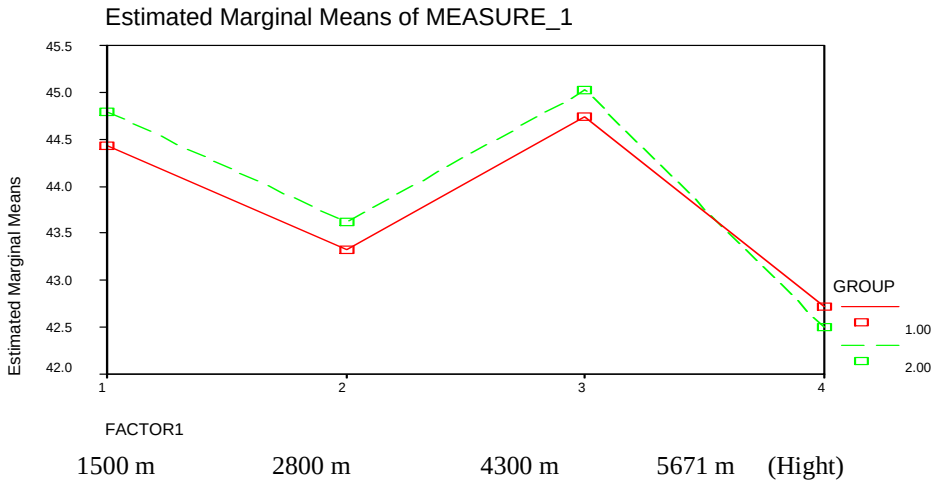

Figure 2. Changes of HCT and FRAP (fl) in both groups

In this figure, there is a meaningful relation between anti- oxidant power and HCT for both groups, but that's meaningful relation in different heights. The relation between serum anti -oxidant power relations and males' Wbc isn't meaningful subsequent to making of Q10 supplement and climbing on height altitude.

Table 3. Changes of WBC and FRAP in both groups

Controlling group					
Hight		1500m		5671	
Anti -oxidative power & WBC		5.5+		8+	
		44		0.76	
Experimental group					
Anti- oxidative power & WBC		6. 1+		8+	
		66		1	
P>0.05		St. df		Ave.	
Within the Group	Within the Height	Control	Experimental	Control	Experimental
0. 830	0. 000	42	47	7. 35	7. 28

As it is shown in table 3, there is no meaningful difference. Nazirolu et al findings (2004) is parallel with our studies about of Wbc variations in sports, also, it is parallel with Beidleman studies in 2006 completely [3]. All individuals get heavy exercises may face with some exchanges in white globules number many studies have approved this [3]. According to Tartibian et al. (2009), it was shown that Wbc rates have been differed in the athletes in comparison with the others perfectly. Extremely exercises make to decrease anti- oxidant rate soon and to increase white globules by cellular damage soon [3]. Bidleman and et.al (2006) got an experiment about Wbc in the blood. He showed that there are some variations in the rates and white globules number by settling on the height. Also, due to the study on Himalaya in 2004, it is shown that climbing into the height gradually (with a constant or increased rates) make to increase the white globules number in the blood [17]. It isn't observed Q10 effect on Wbc variations, but height agent contributed on Wbc/lecositose changes. So, Wbc had a meaningful difference in both of the groups.

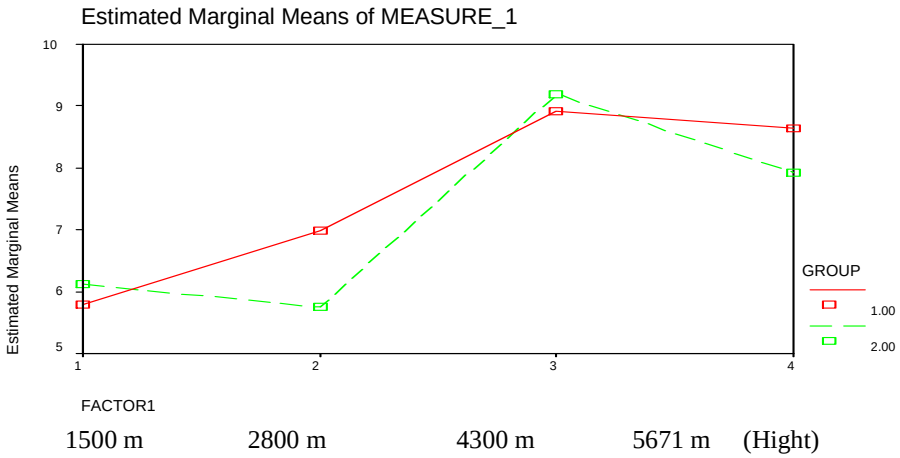

Figure 3. Changes of WBC and FRAP (qL) in both groups

As it is shown in figure 3, there isn't any meaningful difference between anti -oxidant power and wbc values. We can see this difference in height variations.

DISCUSSION

Due to the results of Q10 coenzyme effect with high altitude climbing on anti- oxidant power and blood's sugar, HCT and Wbc in males' serum rates, there isn't any meaningful difference. Studies have been shown that oxygen deficit on the height get damage the balance between anti- oxidant and body's oxidant and lastly result in oxidative stress signs at the body and free radicals [8, 17]. This stress at the height is a type of oxygen reaction in the cell which it can get damage in cellular contents like lipid membrane, mithocanderya, structural and practical proteins and even cell's nucleus and DNA [4, 16, 17]. It was shown that hypoxia can get derangement of the cellular balance and decrease the Glu value in the blood [6]. Increasing height is made changes in Glu and promoted its consuming in the heart [5]. In fact, height variation has been made to get some changes in blood sugar that it is decreasing with preservative action [6, 11]. Due to the results from deduced and description statistics way and the related figures, firstly blood sugar of the mountaineers was in natural status before the climbing and then it was decreasing slowly and reaching in its lowest rate in Damavand summit. From the model and diagram, anti- oxidants don't have any contribution on blood's sugar rate and there isn't any meaningful difference among of anti- oxidative power and value of blood sugar subsequent to Q10 coenzyme. But the height variation effects on blood's sugar decreases during of the height changes and movement promotion in climbing and vice versa. So, Q10 supplement effect on anti- oxidative power and blood's sugar in male's serum after climbing into the summit without of any valuable difference (getting difference just in the height). This study is parallel with Chen et al. (2007, 2009) results in American sports magazine, published in 2008 as named of Braun B [5, 6]. As you know one of sugar performances is related to increase the decomposition of the fat in the body. More fat agents get oxide in following of oxide getting in blood's sugar at the height [5, 6]. In fact, mountainers' blood sugar depends on nutrition and diet mainly. The status of the nutrition has a direct relationship with the worst diseases of mountain [2]. Thus, these patients will be in low appetence and it may be decreased their blood's sugar. Also, some many factors are useful for this disease as follows: Age, sex, genetics, pollution, cold air and so on [2].

CONCLUSION

The aim of this study is related to climbing into the height effect on anti- oxidative power and values of blood's sugar, HCT, Wbc subsequent to Q10 supplement. Detecting of effected agents like height is considered in some indices of males' serum well. We hope to get injuries in low on the body to recognize the effected agents at the height. Finally, all the mountaineers will be able to promote their performance and sport activities against hypoxia, disease and stresses from the climbing into the high altitudes.

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