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Effects of the Changes in the Student's Blood Sugar after Certain Aerobic Sport Activities

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Abstract: The present research aims at investigating the changes in the blood sugar of athletic students after taking part in certain aerobic sport activities. The idea behind this research is originated from the fact that many specialists in physiology believe that reduction of sugar in blood (hypoglicemy) or its increase (hyperglicemy) can cause irreparable or irretrievable damages in the body. Also, a lot of researches have shown the reduction of sugar in blood after physical activities. In this research fifteen students have taken part and have gone through tests twice and 10cc of their blood has been taken for analysis.
Since the observed t (3.72) related to changes in blood sugar before and after aerobic physical activities is higher than the critical at $p<=0.05$ level at the degree freedom of (N-1), the null hypothesis is rejected and the sport activity causes a statistically meaningful change in blood sugar. However, this change is not due reduction but a 9.92% increase.
For the acceptance or rejection of the second hypothesis, the blood sugar level of the subjects as one factor and their weights (by using certain criteria for height and weight) as the second factor were studied. The Pearson's correlation coefficient was applied for statistical analysis. Since the correlation of 0.406 was obtained statistically, speaking a relative correlation between blood sugar of the subjects and their weights was observed.

Key words: Aerobic sports, Elastic Activity, Hypoglicemy, Hyperglicemy

Introduction

In general, lack of activity and movement results in weakness and feebleness of body's muscles. This is so, because in case at being motionless, blood circulation will get slow and its tissues will get faint as a result of not absorbing blood. And as result the weight of muscles will be reduced in proportion to the body's natural weight, and therefore the body will lose its ability and power to carry out some activties.
Carbohydrate is one of the energizing factor's the effect of which on athletic activities has seriously been studied. There is lots of evidence indicating that: lack of body's carbohydrate is related to fatigue. Most of the studies pertaining to the "value at carbohydrate for athletes" are conducted on the individuals participating in long term aerobic races. Because in such races and sports, it is more probable that the amount of muscular glycogen decreases and gets evacuated. Decrease in the amount of body's carbohydrate and bloods glucose is followed by fatigue and lack of executive capabilities. Further more, it is possible that such a relation exists in aerobic endurance with high intensity too. Prevention of decrease in the amount of carbohydrate is possible when a diet full of carbohydrate is used.
Glycogen stored in the liver to provide the blood glucose at a natural and normal level. Brain and nervous system of human being uses up 120gr of blood's glucose every day. Out standing decrease in the amount of blood's glucose and its serious deficit is called hypoglycaemia and is followed by some specific signs such as headache and vertigo. When foods full of carbohydrate are eaten and digested, liver's additional glucose, which is stored, is not due to any hormonal mechanism. But when glucose wants to enter to brain cells and muscles, it is under the control of insulin hormone (which is exuded by pancreas) (Buden, Ekblum).
When food stuffs changed into sucrose, those sucrose changed into simple glucose, and afterwards simple glucose changed into glucose, then some of the produced glucose will be used by nervous cells and some of that will be stored in blood, liver and muscles so that the surplus changes into fat through the liver (Gannadha, Mostafa). Researchers have observed that fatigue subsequent to temperate and long-term sports will result in the decrease in blood's amount of glucose. They also saw that: if people eat an additional amount of carbohydrate when they are tired the blood's amount of glucose will return to its normal level. And in this way, the athlete can continue exercising to a considerable extent. Therefore, they guessed that the main limiting factor in performing temperate and long-term exercise would be hypoglycaemia. During performing the exercises, the amount of blood's glucose is maintained by the glucose released from the liver. Since the amount of livers glycogen is limited, long-term exercises are seriously dependant on gluconegenesis (Seifert *et al.*, 1986).
In human being's body within doing light activities, the amount of blood's gluconegenes is used as well as blood's glucose. It is proved by reduction of glucose caused by 60-minute activity done (Seifert *et al.*, 1986).
The collected documents indicate that: during long term exercise, decrease in the amount of body's carbohydrate plays a great role in increasing physical tiredness (Lavoie et al., 1982). Long or reappearing hypoglycaemia may cause brain damage in laboratorial animals or in human being. When brain is damaged, it is not unexpected to observe some nervous signs such as epilepsy (Tafzili).
In a research of walking for 4 hours and with 50% of the maximum amount of the used oxygen, 40% of the brought energy was due to metabolism of carbohydrate. The result of aforesaid research was that: although during walking, the capacity of perseverance increase through the complements of carbohydrate, tiredness is not due to hypoglycaemia or lack of operations of central nervous system.
The researchers have found that: during the bodily light

and long term exercises, the density of blood's glucose and the amount of out put of activities are inversely related. A research conducted on 8 cyclists showed that: maintaining the blood's glucose at a relatively high level might increase athletic efficiency, and also the fact that retaining the blood's glucose at a high level is an important factor in better performing athletic operations.

Materials and Methods

15 male scholars make the sample participating in this research and form the statistical community of the research. And most of them are major in physical education. Test takers had played various sports for more than 3years. Their mean, standard deviation, size, age and weight are respected (17.2±4.62), (23.73±2.54), (64.87±4.66). Since the research was conducted in a controlled and non-empirical condition, a quasi-experimental method was used. Before test taking and immediately after carrying out the exercise (Naderi *et al.*). The blood was sampled from the vein of elbow and in a sitting posture.

Total amount of blood, which was taken, was 10cc, and it was taken within 2 times. When all of test takers, wearing appropriate clothes and shoes, were ready and present in the athletic complex of the university to take the test, the scholars ran 400 meters slowly and monotonously in the track and field pist. Then they stood up in very disciplined from and exercised different elastic activities under the guidance of the researcher. Eventually they all together exercised exercising activities that are usually done in general physical training (I) courses for 15minutes. Obviously, such activities and movements were exercised in all directions and by different parts of body. 5 minutes after performing exercising elastic activities the scholars took a rest and the objectives of the research were described in detail. Then the scholars participating in the research exercised some activities together, for example long jump bar-jump, sit-up and some activities strengthening muscles of hands and shoulders. The Scholars climbed up some stairs on long jump, the height of which was 25 and 50 cm (the spectators place). There were 20 stairs with the height of 25cm, and 10 stairs with the height of 50cm.

And the scholars jumped up each set of stairs for 4 times and on long jump in general physical training courser, such tests are given to strengthen the back muscles of for leg. After a short rest, the scholars were stationed in 2 group of 8 behind the check point from which 100m running in the track and field pist began, and then they ran a 60 meters distance with their maximum acceleration and speed .The testes took a short rest and then exercised some simple activities on the wresting mat of the athletic saloon. In the bodybuilding saloon of the athletic complex any scholar-in accordance with his ability-began weight lifting for 15 minutes.

Results and Discussion

The reasons of testes increase in the level of glucose would be recapitulated in this way: The testes participating in this research were scholars major in physical education all of whom had at least 3 years of athletic records in different courses. The amount of their blood's glucose was fixed at a normal level and did not decrease .On the other hand, aerobic athletic activities that totally lasted 75 minutes included short term runs, jumpings and explosive activities, each of which having a short interval in between. For this reason, glucagon found an opportunity to be exuded from cells of islets of langerhans (pancreas) and to enter the blood circulation to keep the blood's glucose at a normal level.

It is probable that: during performing hard athletic activities plasma dwindles in size, and its water would be transferred into lymph as a result of high blood pressure (systolic). In any session, if hard and continues physical activities are carried out, body's temperature might increase and as a result perspiration might happen, and body's volume of water and volume of plasma might also decrease All of these factors may increase the amount of blood's hematocrit. In such conditions, blood's amount of glucose is probably more than that of resting time. Especially, when some activities are carried out, exuding of some hormones such as catecholamin, growth, cortisol and glucagon will make the liver release more glucose and exuding of insulin may also decrease.

The accumulation of glucose of plasma during carrying out activities depends upon the equilibrium of muscle's absorbing glucose and liver's exuding it. Within resting time glucagon helps glucose to be released from the liver. This process is done when glycogen breaks down and Amino Acid form glucose. Within carrying out activities, exuding of glucagon will increase physical activities would increase exuding of catecholamin (epinephrine and nor epinephrine) from the central part of adrenal glands. These hormones together with glucagon will increase breakdown of glycogen. There are some documents dictating that: performing some activities will increase cortisol accelerate break down of proteins, and Amino Acid get released to be changed into glucose in the liver. Therefore, these 4 hormones would increase glucose of plasma through some processes such as break down of glycogen and new construction of glucose from proteins. Furthermore, growth hormones accelerate the transfer of released fat acid from fat cells into active muscles. And the result of the afore-said process is that less glucose will be used; that is, more glucose remains in plasma (Rennie *et al.*, 1976).

The amount of glucose released from the liver depends on the duration and intensity of the activity. The more the intensity of the activity is, the more catecholamine release. This process makes the amount of glucose released by the liver be more than that used by muscles. In long-term activities, the amount of glucose released from the liver is in proportion to the amount of glucose absorbed by the muscle. In such conditions, the glucose of plasma remains at rest level or a little more. Most often, the level of glucose plasma will not decrease up to the end of activity. When glycogen stored in the liver reaches its minimum point, the glucose of plasma will fall down, and as a result the level of glucagon of plasma will considerably increase (Rennie *et al.*, 1976).

Although in long-term activities, hormones regulate, control and adjust glucose of plasma it is probable that the amount of glycogen stored in the liver decreases considerably, and as a result glucose released from the liver will not meet the need of active muscles. In such conditions, in spite of hormones strong stimulations, the level of glucose of plasma will decrease. At this time, using glucose play an important role in increasing the level of glucose of plasma and in providing muscles with energy.

One of the important points that must be stated is that:

even performing sub maximal activity and relatively hard activities will decrease the amount of insulin of plasma. But the amount of glucose of plasma may increase a little and the muscle will excessively absorb it. Within performing activities, the level of insulin of plasma will clearly decrease and simultaneously absorbing of glucose by the muscle will increase. Such changes indicate that hormones congestion in one part is not considered as the more factor determining the entrance of glucose into the muscles and tissues rather, increase in the sensitivity of receivers of muscle's cells toward hormones is of more importance. Regular physical activities may strengthen the process of joining insulin to receivers of muscular strings (Costill *et al.*, 1997).

Table 1: Testes characteristics

Statistical index variable	Subjects	Mean Deviation	Standard
Age	15	23/73	2/54
Size	15	171/2	4/62
Weight	15	64/78	4/66

Table 2: Characteristics of heart beating changes before and after carrying out physical activities on the day of experiment

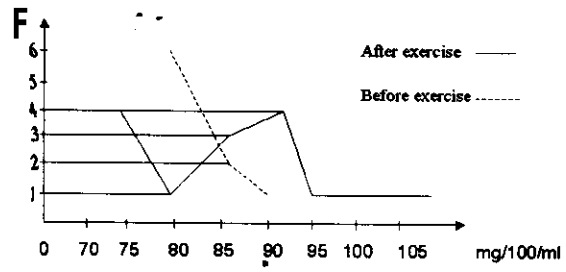
Statistical index Variable	Subject	Mean deviation	Standard
Systolic blood pressure(resting time)	I5	9/7	1/86
Diastolic blood	15	5/5	1/08
Systolic pressure (after rest)	15	11/33	1/74
Diastolic pressure (after rest)	15	5/93	1/39

Table 3: Blood's glucose before and after carrying out physical activities based on mg/100ml of blood

Statistical index Variable	Subjects	Mean	Standard Deviation	Observe t	Tablet t
Blood's glucose before the activity	15	74/33	4.42	3/73	2/97
Blood's glucose	15	81/33	9/03	3/73	2/97

Table 4: Comparing blood's amount at glucose while being hungry before carrying out the activity and relative weight using Pearson coefficient of correlation

Statistical index	Subjects	Mean	Standard Deviation	Pearson's coefficient of correlation
Blood's amount of glucose while being hungry	15	74/33	4/42	0/4064
Relative weight	15	22/04	0/96	-



A polygon curve of blood sugar changes in according to mg/100/ml blood in experiment day.

The personated table indicate testes descriptive features and characteristics of their heartbeats. Further more to understand the hypothesis of the research observation and "t" tablet and "SD" the amount of blood's glucose before and after physical activities.

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