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# Effect of short-term match period on the glucose and insulin levels of football players

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# ABSTRACT

Insulin level and blood insulin level differs according to the period and intensity of exercises. Body utilizes the glucose in the blood as energy at first. Insulin enables the glucose in the blood to enter into muscle cells. Certain adjustment mechanisms develop in the muscles as a result of exercises performed regularly, thus it is possible for the muscle to take glucose into more muscle cells and to use this glucose more efficiently as energy. This adjustment can be developed more efficiently by means of regular exercise. The purpose of this study was to determine the effect of moderate match program of 10 days on the glucose and insulin levels. Research is performed on 18 healthy male footballer subjects. All subjects participated in match program for total of 7 days, 90 minutes on one day within the framework of a 10 days match program. Blood samples were taken from all subjects in resting position before starting to the match program and 2 hours after the end of the last match. Glucose and insulin levels were specified in the blood samples received. At the end of the application, posttest glucose values of the experimental group which are the  $2^{nd}$  measurements, were higher than the pretest values that are the  $1^{st}$  measurements (p<0.05). At the end of the match program, a meaningful increase is determined in the insulin values of the footballers in comparison to their pretest values (p<0.05). Difference was statistically significant (p<0.05). Results of the study reveal that match program of 10 days influences glucose and insulin levels of football players in a significant way.

Keywords: Glucose, Insulin , Football, Blood, Training

## INTRODUCTION

Human body is in need of continuous movement because of its inborn characteristics. Sports and exercises gain importance as a treatment method besides their protecting effects [1]. In general, physical activity has a beneficial effect on the organism [2]. Energy source changes according to the type and duration of the exercise performed [3]. Intensity of the exercise influences the glucose consumption of the muscles and glucose production. During exercising, glucose production increases in order to meet the requirement of glycogen [4]. It is determined that as the intensity of exercise increases from 25% of VO<sub>2</sub> towards to 65% and 85%, the appearance rate of glucose increases. Disappearance of glucose is equal to the appearance of glucose during low intensity exercising, and glucose concentration remains constant. Appearance rate of glucose during medium and high intensity exercising is higher than the rate of glucose consumed by the muscles, and this situation causes the blood glucose concentration to increase [5]. Body works aerobically during the low intensity exercising, and more than half of the energy production is compensated by fats. As the intensity of exercising increases, carbohydrates began to be the basic

energy source and muscles incline towards to glycogen as a more efficient energy source [6, 7]. As the intensity of exercising increases, energy may be produced an aerobically by consuming only carbohydrates [6]. Blood glucose concentration is an indication of glucose consumption of muscles, and glucose production in liver [8]. All carbohydrates in our body are converted into glucose which is a simple monosaccharide that can be consumed immediately or they are stored in muscles and liver to be utilized later on. Blood glucose level is maintained between 0.8-1.0 grams in a liter in resting conditions [9].

When blood glucose level falls under its normal value hypoglycemia is observed, when it is above the normal value hyperglycemia is encountered [10]. Glucose in resting condition consists of breakdown of glycogen from the liver with the aid of glucagon and amino acids. During exercises, glucose increases with the help of catecholamine of which its secretion has increased from the medulla together with the glycogenolysis and glucagon. Intensity and duration of exercising increase secretion of these hormones [11]. Glycogen store of muscles is rapidly consumed as the glucose oxidation increases speedily during high intensity exercising. Glucose intake from the circulation also increases. If glycogen stores of liver are not sufficient, balance is established between glucose production in liver and peripheral consumption and blood glucose is kept within normal limits as far as possible.

Purpose of this study was to determine the effect of medium intensity match program of 10 days on the glucose and insulin levels.

## MATERIALS AND METHODS

## Subjects

18 healthy male athletes whose ages are between 18 and 24 have participated in this study voluntarily. Medical evaluation of all subjects is made and it is determined whether or not there is any adverse state that shall prevent their participation. Research is performed by means of pretest and posttest model

All subjects have participated in match program for total of 7 days, 90 minutes on one day within the framework of a 10 days match program. Blood samples were taken from all subjects in resting position before starting to the match program and 2 hours after the end of the last match. Glucose and insulin levels are determined in the blood samples received.

### **Determination of Glucose and Insulin Levels**

Blood samples taken from the subjects were evaluated by using Abbott architect I 2000 hormone analyzer and by means of chemiluminescence method [miclU/ml].

Measurements are realized twice:

1<sup>st</sup> Measurement: Resting condition before match program

2<sup>nd</sup> Measurement: Resting condition after match program

#### Statistics

Statistics were prepared by means of SPSS package program. Independent t-test was applied to analyze the data.P <0.05 value is considered as statistically significant.

#### RESULTS

#### Table 1: Parameters of Subjects that are examined

| Parameters         | 1 <sup>st</sup> Measurement | 2 <sup>nd</sup> Measurement | Р           |
|--------------------|-----------------------------|-----------------------------|-------------|
| Glucose [mg/dl]    | 96,12±17.b                  | 103,70±11.20a               | $0,000^{*}$ |
| Insulin [micIU/ml] | 11,60±3.65b                 | 13,90±3.02a                 | $0,000^{*}$ |

a, b; Differences in the Measurements Having Different Letters in the Same Column are Important [p<0.05].

At the end of the application, posttest glucose values of the experimental group which are the  $2^{nd}$  measurements, were higher than the pretest values that are the  $1^{st}$  measurements [p<0.05]. An important increase is determined in the insulin values of footballers at the end of match program in comparison to their pretest values [p<0.05]. The difference in between was statistically significant [p<0.05].

## DISCUSSION

At the end of the application, posttest glucose values of the experimental group which are the  $2^{nd}$  measurements, were higher than the pretest values that are the  $1^{st}$  measurements (p<0.05). Insulin level and blood glucose level differ according to the duration and intensity of the exercises [12, 13].

While glucose oxidation increases speedily during high intensity exercising, glycogen stores of muscles are consumed rapidly. Also glucose intake from the circulation increases. If the glycogen stores of liver are sufficient; balance is established between glucose production in liver and peripheral consumption and blood glucose is kept within normal limits as far as possible [14].

In another study performed on taekwondo athletes, it is determined that glucose levels of groups doing exercises regularly have increased in comparison to their pretest measurements [15]. These study findings support results of our study.

Insulin hormone prevents transfer of glucose from liver to the blood, and speeds up its storage in the liver [16].

Aldercreutz et al. (1976) had male athletes run 300 m for 3 times. Subjects rested five minutes between the first 300 m and the second 300 m, and three minutes between the second third 300 m. Their blood glucose levels increased during the long term exercises. It is considered that the decrease in the plasma insulin level takes its source from the increase observed in the blood glucose levels [17].

Cochran (1985) has determined an increase in the insulin concentration at first, then a decrease towards to the normal value. The relation between the blood glucose and insulin concentrations is well known. Therefore, the increase in the insulin secretion in the beginning of exercising result from the high blood glucose level in the beginning of the exercises [18].

In another study [19], blood glucose concentration showed a slight decrease in the first 10 minutes of exercising; however it exceeded the initial level at the end of the exercising that lasted more than 10 minutes. On the other hand, plasma insulin concentration decreased continuously. Presumably, the reason of this decrease is the inhibition of B cells in pancreas and high consumption or destruction of insulin.

Different results are obtained in studies in which glucose and insulin levels of groups doing exercises and practices are examined. Thus it is reported in a study performed on matmen, that while glucose levels are increasing in comparison to the pretest values, insulin values are decreasing significantly in comparison to the pretest values [20].

Attarzadeh Hosseini(2011), response of selected hormonal markers to the exercise during training cycles in semiendurance elite runners and the results show that the levels of the cortisol during preparatory period had a significant decrease; while, testosterone to cortisol ratio increased significantly during this period. Although, during competition period, cortisol increased and the levels of the testosterone decreased. While, Testosterone to cortisol concentration ratio during this period decreased significantly [21].

Results of our study reveal that match program of 7 days have an important influence by increasing the glucose and insulin levels.

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