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The Effect of B Vitamins on Blood Lactate Levels in Training Soccer Players and Sedentary Men at Exercise Recovery

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Abstract

Background: *The aim of this study was to determine whether a relationship exists between B vitamins and blood lactate levels in training soccer players and sedentary men at exercise recovery*

Method: *There were 10 sportsmen and 11 sedentary men included in the study, ranging from ages 20-29. Vitamin B complex was administered orally for 15 days for each group and then blood lactate values before and after exercise in each group were included. In addition, the physical charecteristics (age, height, body weight) were recorded.*

Results: *The results demonstrated that a positive correlation between B vitamins and blood lactate levels. It was found that the severity of periodontal disease increases with age. There was no relationship between the level of heart rate of individuals before and after the exercise.*

Conclusion: *The treatment with B vitamins decreases blood lactate levels in individuals participating in this study.*

Keywords*: B Vitamins, lactate, soccer players, sedentary men*

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Introduction

The basic principle about sportsman's diet is compensation of nutrients in stability that are increased because of the training activity. The effect of nutrient additives on increasing performance is well known (1). Adequate vitamin intake is needed for living organisms to maintain the biochemical events daily. B-vitamins are necessary in energy-producing pathways of the body and the requirement for these vitamins may be increased in athletes. Active individuals with poor or marginal nutritional status for a B-vitamin may have decreased the ability to perform exercise at high intensities (2). Thiamine (B1), riboflavin (B2), and pyridoxine (B6) are water-soluble B-complex vitamins found in a variety of animal and vegetable products. Thiamine is essential in the metabolism of carbohydrates, its possible positive capability on exercise performance is investigated by a previous study (3). It has been shown that lactic acidosis is favored in situations with thiamine deficiency (4). Riboflavin is necessary for the synthesis of coenzyme flavin adenine dinucleotide (FAD) that is especially important in the metabolism of glucose, fatty acids, and amino acids for energy (5). Pyridoxine is directly related to energy production during exercise by the breakdown of muscle glycogen (6). However, the results obtained from the studies with supplementation of B-vitamins to diet for increasing exercise performance are conflicting (2,3,7). Therefore, new detailed metabolic studies are needed.

Lactic acid is constantly produced by broken down of glucose during metabolism and exercise. During exercise, the lactate concentration increases, causing fatigue and loss of strength so chasing of lactate is an important process (8).

With regard to B-vitamins, a lowering effect on BP has been investigated extensively in the literature (9,10).

This article focuses on B-vitamins and their role in energy metabolism, so the purpose of this study was to investigate the effects of B complex vitamins including diet on blood lactic acid levels, heart rate, systolic and diastolic blood pressures in sedentary individuals and soccer players related with the exercise.

Materials and Methods

A total of ten sportsmen from a soccer team and eleven healthy male Dicle University students who do not participate to sportive activities (aged 20-29) were recruited to the study. The sportsmen and sedentary individuals who do not have drug addiction were participated to the study. Groups were gathered as not to have significant differences about the physical characterstics (age, height and

body mass). Soccer players and the sedentary subjects received a combination 1 pill/ day of B complex vitamins (Bemiks, Eczacıbaşı Drug Company) for two weeks. Each Bemiks pill includes: B1 vitamin: 10 mg, B2 vitamin: 2 mg, B6 vitamin: 2 mg, B12 vitamin: 3 mcg. Before performing the exercise tests, the subjects that had taking pills for any reason were not included to the study. Tests were applied during morning (09:30-10:30) at Exercise Laboratory of Physiology Department. After taking starved venous blood specimens, subjects underwent physical exercise using the modified Pugh protocol (11) (treadmill with an inclination of %1 at a speed of 10 km/h for 10 minutes in duration) by VOİT 6600 treadmill. Immediately after the exercise, bloood lactate levels, arterial blood pressures and heart rates of the subjects were measured. Bloood lactate concentrations were measured before and after the administration B complex vitamins by ABL 700 Radiometer Copenhagen blood gases instrument. Results are expressed as mean ± SEM. To compare multiple groups, Tukey's test were applied. Differences were considered significant when $P < 0.05$. Statistical analyses were carried out using the statistical packages for SPSS 15.0 for Windows (SPSS Inc., Chicago, IL, USA).

All the participants signed letters of informed consent under the approval of the University of Dicle Committee for Ethics, in compliance with the international standards formulated in the Declaration of Helsinki.

Result

There were no significant statistical differences between the groups participating in the study when compared with age means, height, body weight and body mass index (Table 1).

Table 1. Physical characteristics of individuals

	Age (Year)	Height (cm)	Body Weight (kg)	Body Mass Index (kg/m^2)
Amateur Soccer Player	23.6 ± 3.68	178.2 ± 6.28	71.5 ±10.23	22 ± 3.0
Sedentary Men	24.27 ± 2.28	179.0 ± 6.76	77.45 ± 7.0	24.0 ± 2.0

Systolic and diastolic blood pressures and heart rate of the subjects were at physiological baseline as seen at Table 2.

Table 2. Effect of B Vitamins on heart rate and blood pressure at sedentary men after exercise

	Heart Rate	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Before receiving B vitamins	130.18 ± 14.23	141.36 ± 17.04	71.09 ± 9.70
After receiving B vitamins	130.72 ± 14.92	134.54 ± 14.39	80. 90 ± 8.00

B complex vitamin supplementation to sedentary and sportmen subjects showed no significant differences of arterial blood pressures and heart rate at resting and post-exercise conditions (Table 2,3).

Table 3. Effect of B Vitamins on heart rate and blood pressure at amateur soccer players after exercise

	Heart Rate	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Before receiving B vitamins	113.20 ± 14.08	139.00 ± 16.79	79.00 ± 9.94
After receiving B vitamins	117.80 ± 11.79	133.50 ± 11.55	83. 50 ± 9.14

Post-exercise blood lactate levels of sedentary subjects were significantly higher than amateur soccer players. Application of B complex vitamins for 15 days unchanged blood lactate levels of subjects before exercise while significantly decreased post- exercise levels were obtained at both soccer player and sedentary groups (Table 4,5).

Table 4. Effect of B Vitamins on lactate levels in sedentary men

	Lactic Acid levels before exercise(mg/dl)	Lactic Asid levels after exercise(mg/dl)
Before receiving B vitamins	9.27 ± 2.45	45.81 ± 19.86
After receiving B vitamins	11.09 ± 4.08	24. 45 ± 8..37*

* Statistically significant, compares before receiving group ($p<0.05$).

Table 5. Effect of B Vitamins on lactate levels in amateur soccer players

	Lactic Acid levels before exercise(mg/dl)	Lactic Asid levels after exercise (mg/dl)
Before receiving B vitamins	10.30 ± 2.49	16.60 ± 6.63
After receiving B vitamins	8.00 ± 4.05	11.30 ± 3..65*

* Statistically significant, compares before receiving group ($p<0.05$).

Discussion

Vitamins are needed for the normal metabolic functions and during their deficiency the physical performance degenerates, therefore administering of vitamins to the individuals with vitamin deficiency corrects the impaired physical performance (1). The potential ergogenic effect of thiamine have been showed by the studies about the effect of thiamine supplementation to exercise performance (2,3). B vitamins are gathered to several reactions like energy constitution from carbohydrates, erythrocite production, management of hemoglobine synthesis during exercise. Webster et al. (7) investigated the effect of thiamine on lactate accumulation and exercise performance in 14 healthy individuals by bicycle ergometry and showed no effect of thiamine on exercise performance, including blood lactate concentrations. On the other hand, in a study about the efficacy of B vitamins on exercise performance with 23 healthy male, significant decreased blood lactate levels were found after applying B vitamins (12). After thiamine or placebo treatment to healthy individuals, blood lactate concentrations of thiamine group was found to be decreased (13). Taking these into account, it is so difficult to compose valid literature data because of the conflicting studies about B vitamins' efficacy on post exercise blood lactic acid levels. The findings obtained from our study showed that application of B complex vitamins to healthy male sedentary and amateur soccer players formed no significant differences at circulatory parametres, diastolic and systolic blood pressures, heart rate and pre -exercise blood lactic acid levels while exerted significant decreases on post-exercise blood lactic acid levels exercise. The results of this study suggest that B complex vitamins may influence postexercise recovery period of soccer players and also sedentary men positively. Nonetheless, further and extended studies are needed to affirm our hypothesis.

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