Examining the Effect of Short-term Supplementation of Thiamine Pyrophosphate on the Aerobic and Anaerobic Capacity in young men basketball players in Behbahan City

Omid Zafarmand *
Master of Exercise Physiology, Iran
*Corresponding Author email: Omidzafarmand2202@gmail.com

Zahra Jafari Azar
Master of Sport Management, Iran

Mohammad Umrayee
Master of Exercise Physiology, Iran

Abstract

The purpose of this study was to check the effect of short-term supplementation of thiamine pyrophosphate on the aerobic and anaerobic capacity in young men basketball players in Behbahan city. This is a quasi-experimental research performed on the 20 young men basketball players in Behbahan city. After being put into the supplement and placebo groups, the participants took thiamine and placebo for a week respectively. They received 100 mg. of supplementary thiamin and placebo twice a day (at 7 a.m. and 5 p.m.). The data were analyzed using one-way variance analysis test with repeated measurement. The findings showed that a significant increase was observed in the maximum rate of oxygen consumption and the travelled distance and time up to the end of the activity in supplementation group compared to the placebo group. As a result, taking thiamine supplementation in young men basketball players in Behbahan city can improve anaerobic capacity, reduce fatigue and increase oxygen consumption.

Keywords: Thiamine Pyrophosphate, Aerobic and Anaerobic capacity, Maximum Oxygen Consumption, Fatigue Index, Young Men Basketball Players, Behbahan City.
Introduction

In the world of today’s industry and Machine, no opportunity has been left to do physical exercises and physical activities. The final outcome is nothing more than the physical and mental disorders. In contrast to the reduction of physical activities and physical tasks, there is championship and professional sport in the new age which made the athlete to continue to the point of burnout that has nothing but muscle fatigue and different injuries. Years in which coaches, especially in the competition season, imposed extra training load on their athletes so that they can achieve the desired optimum performance on the match day (2). The load of prolonged exercise can have negative effects on mental health, including loss of enthusiasm for practice and competition, depression tends to abandon the practice, inability to focus, and physical health such as diarrhea, constipation, the fatigue of muscle aches, swelling in the lymph nodes, muscle lactic, and endangering people's safety systems (5). In order to improve the performance levels of athletes, the coaches use supplementations such as thiamine. Regarding the previous studies, it has been proved that the role of thiamine is necessary in the correct function of organs, activation of the required enzymes to burn sugar, the function continuation of Krebs cycle as well as transmission and nerve conduction (3). Its deficiency may result in endangering the health of athletes who are high in protein and carbohydrates needs. Many studies confirmed the positive effect of supplementation on the athletes’ body. After the consumption of thiamin supplementation by different subjects, the studies demonstrated the reduction of blood level of lactate, heartbeat, and high levels of oxygen consumption. It has been proved in many researches that the oral supplementation of thiamin in patients with type 2 diabetes who do exercise will lower the leptin concentrations and blood glucose (7). As the consumption of non-standard and illegal supplements is on the rise among athletes, it is necessary to do an exact planning to increase the efficiency and take the supplements carefully, and more studies should be carried out so that the athletes without any concern and in a good health and based on the principles and rules of sports can use the supplements legally. The aim of this research was to examine the effect of short-term supplementation of thiamine pyrophosphate on the aerobic and anaerobic capacity in young men basketball players in Behbahan city.

Research Methodology

This paper aimed at examining the effect of short-term supplementation of thiamine pyrophosphate on the aerobic and anaerobic capacity in young men basketball players in Behbahan city (a city in Iran). The statistical population of this study included the total young men basketball players in Behbahan city. The statistical sample of this research also consisted of 20 young men basketball players selected randomly among young men basketball players in Behbahan city in 2016. The participants were activated and did exercise regularly. This is a quasi-experimental research. In this study, the whole participants were exposed under the influence of both independent variables. The study protocols were run using a double-blind crossover design and the data were gathered. First, the participants filled the public information and health questionnaire constructed by the researchers. Then, they signed the written consent based on this that they will participate in the study. Next, some explanations have been given to the participants about the different stages of research implementation and the way it is
conducted. Before starting the test, the participants were asked to avoid consuming coffee, dairy, and intense exercise, at least ten hours before the test, due to their effects on the use of macronutrients as fuel to produce energy during exercise and rest and because of their interaction with thiamin pyrophosphate during chemical reactions. They are also asked not to eat 7 hours before the test. Their record was announced at the first stage so that they don’t follow improving it in the second stage. The study was done within 6 days. On the first day after ten-minute break, the participants were assigned under the measurement of anthropometric and the data related to the height, weight and body mass index were measured. The weight of the participants was measured using the Seca 767 digital scale and their height was also measured using the Seca 206 digital scale both of which were made of Germany. In order to do the Bruce protocol, the treadmill of Technogym Company Med 700 DE model made in Italy was used. Then, the participants were randomly assigned to the supplement and placebo groups and took thiamin supplementation and placebo respectively within a week. The participants who consumed thiamin supplementation on the first day took placebo afterwards and the other group who received the placebo was now taking thiamin supplementation. Again the data was collected by the researcher. Before being assigned to the supplementation and placebo groups, the under study participants for initial evaluation of the variables filled the Bruce and Rest tests two days before starting supplementation period. That is, at first the Rest test was run and the Bruce test followed two hours later. Then, the required data was collected to be analyzed and compared with the post-test data. After being put into the supplementation and placebo groups, the participants received thiamin supplementation and placebo within six days. They received 2oo milligrams of thiamin supplementation and placebo twice a day. That is, they received 100 mg. at 7 a.m. and 100 mg. at 5 p.m. After the implementation of the first test and the six days period of supplementation, the washing period was applied in ten days. In order to examine the data distribution and the homogeneity of variances, Kolmogorov–Smirnov test and Levene test were used.

Results

**Table 1. Comparing the Mean and Standard Deviation of Anthropometric Characteristics of the Subjects**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>7.20</td>
<td>4.66</td>
</tr>
<tr>
<td>Height</td>
<td>168.00</td>
<td>2.34</td>
</tr>
<tr>
<td>Age</td>
<td>16.3</td>
<td>2.2</td>
</tr>
</tbody>
</table>

The results of Table 1 showed the comparison of the Mean and Standard Deviation of Anthropometric Characteristics of the Subjects. The mean and standard deviation of weight variable were 7.2 and 4.66 respectively. In the case of height, they were 168 and 2.34 respectively. The mean score of age variable was 16.3 and its standard deviation was 2.2.
Table 2. Comparing the Mean and Standard Deviation of the Descriptive Statistics Results of the Research Dependent Variables of the in Supplementation and Placebo Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Supplementation</th>
<th>Placebo</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>St.D</td>
<td>Mean</td>
</tr>
<tr>
<td>Anaerobic power peak</td>
<td>490.50</td>
<td>75.02</td>
<td>485.92</td>
</tr>
<tr>
<td>Anaerobic power mean</td>
<td>358.48</td>
<td>86.41</td>
<td>380.75</td>
</tr>
<tr>
<td>Fatigue Index</td>
<td>29.64</td>
<td>12.05</td>
<td>27.44</td>
</tr>
<tr>
<td>Maximum of consumed oxygen</td>
<td>47.65</td>
<td>2.70</td>
<td>41.40</td>
</tr>
<tr>
<td>The elapsed time</td>
<td>16.21</td>
<td>0.68</td>
<td>14.17</td>
</tr>
<tr>
<td>The travelled distance</td>
<td>2500.40</td>
<td>123.98</td>
<td>215.40</td>
</tr>
</tbody>
</table>

The results of Table 2 indicated that a significant difference was observed between the maximum of consumed oxygen, the elapsed time, and the travelled distance in both groups of supplementation and placebo. As seen in the table, no significant difference was observed between the peak of anaerobic power and the mean of anaerobic power in both groups of supplementation and placebo. Table 2 also showed that there was an improvement among the anaerobic power and fatigue index in thiamin supplementation group compared to the placebo group. However, this improvement has not shown a significant difference in both groups of supplementation and placebo.

**Conclusion**

The study results demonstrated that there was a significant difference between the index of travelled distance, the maximum of consumed oxygen, and the elapsed time in thiamin supplementation group compared to the placebo group. The anaerobic power and fatigue indices have also improved in thiamin supplementation group. However, this improvement has not made a significant difference. The results of this study correspond with the results of Masuda et al. (2010) and Eini (2015). Manuel et al. (2005) and Henderson et al. (1985) in their studies stated that they confirmed the effect of thiamin pyrophosphate supplementation on the exercise and they believed that by doing exercise and taking supplementations, the blood lactate level goes down slightly and aerobic capacity will go up (4). Hernandez et al. (2008) examined the effect of the intravenous therapy of the thiamin pyrophosphate supplementation on the athletes and came to the conclusion that after the activity, the blood lactate levels will go down; after receiving the intravenous of thiamin pyrophosphate, the heartbeat has gone down followed by going up the consumed oxygen (8). The researchers believe that some athletes are exposed to the thiamin deficiency but this deficiency may not affect the sport performance in competitions which depends intensely on the Glycolytic energy production. It may be important for athletes who rely more on the sports related to the aerobic and nerve activity such as coordination of hand and eye (9). It has been proved that the ability of a muscle to extract oxygen from an arterial blood is a main factor in the overall capacities of an organism to oxygen consumption. This process consists of increasing the density of capillaries, the dominance of muscle fibers, mitochondrial
mass, and a multi-enzyme complex (1). In general, the results of this study showed that a considerable progress has been observed in the parameters of the maximum of consumed oxygen, the elapsed time, and the travelled distance. A little improvement has been seen in the indices of the anaerobic power peak, anaerobic power mean, and the fatigue index. But the use of dietary supplements by athletes to supply energy and do demanding exercises is justifiable. Researchers are required to do a more comprehensive and thorough research on the effects of dietary supplements of athletes to be able to increase the athletes’ ability without using any illegal substances. Considering the nutrition, stress and excitement of athletes, other researchers are recommended to perform this study on the other athletes.
References


