Taurine and its effect on endurance and visual reaction velocity.

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RESUMEN
Este estudio investiga el efecto de la taurina complementos alimenticios en la carga física. Hemos examinado si este producto afecta positivamente al cuerpo humano, principalmente en términos de velocidad de reacción y la resistencia del organismo después de la ingestión, como el fabricante de la preparación. Después de la aplicación de sustancias de ensayo a las personas, lo primero que midió la velocidad de reacción visual, y luego de identificar el impacto sobre la capacidad de resistencia. Para la prueba, optamos por una modificación de la prueba Conconi. A lo largo de la prueba, que participantes mide la frecuencia cardíaca (FC), frecuencia cardíaca máxima (FC máx), la ventilación pulmonar máxima (VE), VO2max, la frecuencia respiratoria (BF) y la velocidad máxima. De los valores medidos son estadísticamente identificar el impacto de la taurina en el cuerpo. Para nuestra sorpresa, no se observaron valores de la mayoría de los cambios rápidos. El estudio muestra así que la taurina complemento alimenticio no tiene ningún efecto sobre el rendimiento físico o el tiempo de reacción, como el fabricante de este producto.

Palabras clave: taurina, prueba de reacción, capacidad de resistencia, test de Conconi, prueba doble lego

ABSTRACT
This study examines the effects of a dietary supplement – Taurine during physical exercise. We have been trying to detect if this product's positive effects on human body mainly in the light of reaction velocity and stamina are as stated by the preparation producers. Upon the application, we measured participants' visual reaction velocity and thereafter the effects on their endurance abilities. We chose the modification of Conconi test for the evaluation. During the whole test we recorded participants' heart rate (HR), maximum heart rate (HRmax), maximal lung ventilation (VE), VO2 max, breathing frequency (BF) and maximal speed of a running machine. We statistically analysed the effects of taurine on human body from the outcomes. Most observed values do not show distinctive variations. The study reflects the fact that the dietary supplement Taurine does not influence either physical performance or reaction velocity as it is granted by producers.

Key words: taurine, reaction test, endurance abilities, Conconi test, double blind test
INTRODUCTION

Taurine is named after the Latin Fel tauri, which means ox bile. Thanks to its name, Taurine is associated with many stories about its origin and effects, e.g. The substance is made from ox bile, ox testicles, or even from ox semen. On this account there are many associations “power”, “energy”, “endurance” that are shifted on the product. The ground for Taurine supplemented products in the market is not only its dietetic effect, but also these mentioned reasons that are used in advertising to increase sell-rates (Jacobsen and Smith, 1968).

The study deals with endurance and visual reaction velocity of an individual after they use a dietary supplement containing Taurine. This work should enrich existing studies concerning this dietary supplement and prove that Taurine functions as a stimulant, it helps the organism to withstand burden longer and that it also functions as an “accelerator” of impulses transmission that helps to faster reaction velocity of an individual.

The biggest producer of 100% Taurine in the world Chinataurine company claims that the substance belongs to the stimulant substances that promote the activity of the nervous system, improving physical and mental performance, positive effect on the body recover faster after physical exertion, increase stamina and endurance, improves speed reaction (chinataurine, 2010).

Other advantages of Taurine are stated by all world producers and dealers Nutrend, Sportnutrition, aminostar etc. says that Taurine, as a sport substance, is attractive as it functions as “insulin mimicker” (simulates the function of strong anabolic hormone Insulin that gets energy and amino acids circulating in blood into muscle cells). Furthermore it helps psychical and physical performance, even longlasting and tedious and puts behind tiredness. As it is stated by Nutrend: “Taurine belongs to stimulative substances, so that it facilitates nervous system functions”. It is a stimulant of nervous activity and “accelerator” of impulses transmission. (Nutrend, Chinataurine, Sportnutrition, 2010)

There are also several studies on mammals whose findings proved the effectiveness of Taurine on brain, cardiovascular system, lungs, neurons, liver and kidneys. Particular researches show that the presence of Taurine in a body improves functions of these organs. (Huxtable, 1992, Schaffer, 1994, Schuller et al., 1990). One of them talk about Taurine like supplementation which increases skeletal muscle force production and protects muscle function during and after high-frequency in vitro stimulation (Goodman et al., 2009).

It has been found out that the most significant improvement in organs functioning are in cardiovascular and brain systems. As far as cardial system is concerned, Taurine acts as a regulator of calcium homeostasis and osmotic balance. Such functions show that Taurine is able to act as an agent against hypoxia and aggravated cell oxygenation (Lombardini et al., 1992, Nakamori et al., 1990, Schaffer, 1994). In similar manner reads the study by Trachtmana (Trachtman, Sturman, 1996), which mentions Taurine as a substance useful for kidney treatment. Another study (Ohta et al., 1986) points out that Taurine is good for asthmatic attacks prevention. Furthermore, the reduction of Taurine in an organism may lead to depressive functions of immune system (Schuller et al., 1990). In cerebral system, there is disunity whether Taurine is neurotransmitter or just neuromodulator. The criteria necessary for Taurine to be classified as a neurotransmitter are following: Taurine is present in CNS in high concentration(40-50 mmol), is predominant on synaptic links and there is an intake mechanism on synapses with high capacity (Huxtable, et al., 1998). Apparently, this can increase reaction velocity of an individual.

Taurine posses the ability to transfer glucose into a cell (analogous to Insulin), which has potentials for recovery acceleration. For an example during
training – Taurine supplements prior to the training increases the level of Taurine in blood and between individual series of exercise enables faster carbohydrates transfer into muscle cells – that means higher energy output and higher volume of exercise series (Martin, 1995).

METHODS

Subjects
The testing was performed in February 2006 in laboratory of University J.E. Purkyne in Ústí n.L., Czech Republic on 18 male, during two sets of tests, age of 17 – 19. Subjects filled out a health history questionnaire and signed a consent form (under age of 18 filled out their parents). The subjects were all healthy and instructed on the use on treadmill with different running speed and grades before participating in any testing, all of them were healthy without subjective difficulties. The study procedures complied with the Declaration of Helsinki for human experimentation and were approved by the local ethics committee.

Table 1. Subjects characteristics

<table>
<thead>
<tr>
<th>Persons</th>
<th>18 (male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18,67 (1,08)</td>
</tr>
<tr>
<td>Height</td>
<td>180,22 (10,66)</td>
</tr>
<tr>
<td>Weight</td>
<td>73,89 (14,49)</td>
</tr>
</tbody>
</table>

Experimental protocol
For test we used double blind test. First, we tested the whole group without the use of a tested substance. For the second time, we randomly devided participants into two groups. Group A was given 500 mg of Taurine and the group B was given the same amount of placebo (2 capsules a 250 mg). Capsules were taken with a glass of water, and the subjects then rested for 1 hour. Individual participants did not know whether they had been given tested substance or placebo in order to minimize the psychical test affecting. The outcomes of both test were compared and we checked them for statistically significant differences. The research was done twice with a week interval between particular testing. Participants had abstained from Taurine and Caffeine 48 hours prior to the testing, because Taurine capsules producers declare Caffeine may multiply the effects of Taurine and therefore affects our testing. (Jensen, M.B. et al., 2005)

Materials
First we measured participants' visual reaction velocity with a switch connected to a computer equipped with visual reaction testing software (Fitsport Bratislava Ltd.). Participants were exposed to a flashing red point, 10 cms in diameter, on the screen and they reacted by pressing the switch five times over. Their reactions were recorded and from the measured values we deduced the average reaction velocity of a participant.

Second test we measured on the treadmill. Individual gradually passed on the treadmill HP Cosmos Venus (HP Cosmos Sports and Medical, Germany) modified Conconiho test (Conconi, 1982) while sensors recorded spiroergometric parameters and monitored heart rate. Before the actual test was a 2x3 min warm-up. First, starting with the treadmill speed 8 km/h-1 and the second on 10 km/h. After the individual sections were recorded submaximal heart rate. The initial treadmill speed of test was set to 9,5 km/h respectively. 10 km/h. The first 200 m can not be counted because the velocity is not constant in this section and starting from scratch. Test started on the speed of 10 km/h, but the values and record lap times to a rate of 12 km/h. The inclination of treadmill was set at 1% due to lower compensation for environmental resistance due to terrain conditions. Every 200 m speed was increased by 0,5 km/h. Probands performed the test and treadmill was then immediately stopped. Persons were during the test verbally motivated, informed about the current running speed and distance of the remaining sections. As compensation for the impossibility of cooling air used an
electric fan. The cardiotachometer (Polar S610) was used to measure heart rate values during the test which allows the subsequent processing and evaluation of results using Polar Precision Performance software (Polar Electro Kempele, Finland).

Analysis

During the whole test were recorded breath by breath, values of ventilation respiratory parameters were collected by analyzer Oxycon Delta (Jaeger, sub. Of Viasys Healthcare, Germany). Have been recorded maximal speed of a treadmill and another values also. We measured the value of VO2max, maximum heart rate (HRmax), maximal lung ventilation (VE), breathing frequency (BF). While outcomes evaluation we searched for relevant changes depending on an used supplement.

For recording was used two-way valve with a rubber mouthpiece and nose clip, which prevents of nose breathing and the values were determined from eight breathing cycles. The device was calibrated by an internal calibration method. Using the software LAB Manager 4.65e. Viasys Healthcare, Hoechberg Germany, a dependence curve of the ventilation on an increasing load was drawn. An analysis of the inflection point of the ventilation curve set by the method of a two-component linear model determined the value of the running speed and also the corresponding heart rate after an analysis of the data with a Polar Precision Software. Anaerobic treshold was determined from the inflection point of the ventilation curve and the deflection point of the dependence curve of the heart rate on the running speed. The value of VO2 max ml.kg-1 and the maximal speed of the treadmill were recorded as well.

RESULTS

Both tests results were recorded and compared if there is a statistically significant difference between particular tests. As the most relevant parameter for the evaluation of endurance abilities improvements had been chosen the speed of a treadmill and the time of reaction. The data were analysed by statistic program Statistica 9.0 and reported P values which were based on two-sides alternative hypothesis (with P < 0,05 regarded as being statistically significant).

There were no indications of significant effect of Taurine on endurance (P = 0,27) and on visual reaction velocity ( P = 0,16). The main results are shown in Table 2 – 5.

At the end of the study, participants were asked to estimate the order in which they had recieved taurine and placebo, or to state if they had detected no diference between the two capsules: 47 % were unaware of any differences, 42% correctly guessed when they had recieved Taurine or placebo, and 11% guessed incorrectly.

### RESULTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean [km/hour]</th>
<th>Standard Deviation</th>
<th>Count</th>
<th>Difference</th>
<th>Standard Deviation of Difference</th>
<th>t</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taurine</td>
<td>15.39</td>
<td>1.17</td>
<td>5</td>
<td>0.22</td>
<td>0.57</td>
<td>1.18</td>
<td>0.27</td>
</tr>
<tr>
<td>Placebo</td>
<td>15.17</td>
<td>1.46</td>
<td>5</td>
<td>0.22</td>
<td>0.57</td>
<td>1.18</td>
<td>0.27</td>
</tr>
</tbody>
</table>

### DISCUSSION

The calculation has shown that in most case there are no statistically significant differences, thus no considerable effect of Taurine has been found. We may assume that Taurine, a substance referred to as stimulant able to increase reaction, does not produce mentioned effect. The statistically significant shift has been recorded in TF.
monitoring, however we cannot state that Taurine is responsible for higher values, because both groups show improvements. The comparison of our outcomes with similar studies has not been successful because such works are not available. We compared our outcomes only with the test done on caffeine (Jensen, M.B. et al., 2005). Caffeine is also referred to as a stimulant as far as reaction speed is concerned, and analogous to Taurine it does not show any significant speed differences. On this account, we may presume that producers use this labelling for marketing purposes to increase sell rates.

Furthermore we assume that the effects may be gained only by higher portions. Such increase in dosage could not be done, because the participants were tested for other abilities where according to the producer may be the risk of various health difficulties.

CONCLUSIONS

We tried to find out if there is a significant positive shift in endurance abilities and reaction speed of an individual. If it is possible to affect organism performance and reaction time to visual stimuli depending on a dietary supplement containing Taurine. We have found out that Taurine had not proved as a stimulant of endurance and reaction speed. Upon its application most participants did not show anticipated performance enhancement. If there are differences they are negligible and do not have statistic significance. Therefore we cannot recommend Taurine itself as an useful stimulant to gain better endurance and reaction speed which could be employed in many sport disciplines and branches.

REFERENCES

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