Effects of different doses of β-alanine supplementation in the performance and body composition of elite rowers.

Dissertação apresentada com vista à obtenção 2º ciclo em Treino de Alto Rendimento Desportivo – de acordo com o Decreto-Lei nº 74/2006 de 24 de Março


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Key words: Rowing, Ergogenic supplementation, Beta-alanine, exercise performance, rowing-ergometer, Aerobic power, Anaerobic power, Anaerobic capacity.

Palavras-chave: Remo, Suplementação ergogénica, Beta-alanina, Performance desportiva; Remo-ergómetro, Potência Aeróbica, Potência anaeróbia, Capacidade Anaeróbia.
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To my parents.

To my sister.

To my unforgettable grandfather.
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Note: This dissertation is presented in article format, by choice and idea of my supervisor.
Effects of different doses of β-alanine supplementation in the performance and body composition of elite rowers

ABSTRACT

Introduction: The supplementation with beta-alanine increases the intramuscular carnosine content improving buffer mechanisms and exercise performance.

Objective: Verify the effects of two different doses of Beta-alanine supplementation, 1.6 g/day and 6.4 g/day, on the exercise performance and body composition of Portuguese elite rowers.

Methods: Twenty elite rowers, divided in three groups (Group A – 6.4 g/day; Group B – 1.6 g/day and Group C – Placebo) were evaluated in three moments (M1 – beginning, M2 – before 5 weeks of supplementation and M3 – 5 weeks after the supplementation) for some performance indicators and anthropometry. We evaluated the performance through the time and power developed at 100, 500 and 2000-m in the rowing-ergometer, as well as the weight, Body Max Index and Fat percentage.

Results: We stated the following results in M1 and M2 for groups A, B and C respectively: 100m - ; 500m; 2000m. The analysis of the intragroup variations showed that only for 100m performance GA showed significant alterations (p=) worsening their performance. (i) Group A, 16.7±0.7 – 16.9±0.9 (p=0.04); 91.9±7.1 - 93.6±6.3 (p=0.08); 405.2±17.9 – 402.8±19.6 (p=0.13) (II) Group B, 16.3±0.9 – 16.4±0.8 (p=0.63); 88.7±4.8 – 89.3±4.4 (p=0.43); 401.9±11.3 – 409.8±23.8 (p=0.49) (iii) Group C, 18.4±2.9 – 17.6±1.4 (p=0.29); 94.3±4.9 – 94.1±4.8 (p=0.49); 420.2±12.9 – 418.9±11.7 (p=0.47)

Conclusion: The present study has shown that supplementation with beta-alanine does not improve the indicators of time and power on various performance tests on rowing-ergometer or induces significant changes in body weight, BMI and percentage of fat mass. Further studies are needed altering the amounts of beta-alanine to ingest and periods of supplementation.

Key words: Rowing, Ergogenic supplementation, Beta-alanine, exercise performance, rowing-ergometer, Aerobic power, Anaerobic power, Anaerobic capacity
INTRODUCTION
The sports training is embodied by judicious articulation of the following parameters - stimulus-load, recovery and nutrition. The diet and nutrition of the sportsman can play a critical role not only in the capacity of training and competition but also as a co-factor in the recovery process (Position of the American Dietetic Association, 2000).

The sports performance can be affected when it does not meet the nutritional assumptions (Maughan, King, & Lea, 2004) precluding the ability to adapt to training loads.

In normal functional corresponding to current life situations or light training seems that a balanced diet, ie a diet that provides the amount of energy and nutrients required by the demands of these types of activity may be sufficient to prevent nutritional deficiencies and / or energy.

However, in situations of intense athletic training daily, a normal diet may not be sufficient to balance energy expenditure and nutritional induced by a sport very intense and prolonged (Williams, 1989).

In elite sport recurrence of nutritional supplementation is, nowadays, a fact normal and well accepted by athletes, coaches and family.

Several objectives have been sought by the effect of supplementation: (i) reduction of protein degradation, increased muscle mass and aerobic metabolism through potentiation of beta-hydroxy-beta-metilbutirado (Alvares & Meireles, 2008; Eley et al., 2007; Mokerji & Tisdale, 2007), (ii) improving the regeneration of phosphagens by creatine (Mahan & Escott-Stump, 2007; Chwalbinska-Moneta, 2003), (iii) an increase in fat oxidation by caffeine (Mahan et al., 2007; Schneiker et al, 2006), (iv) improving the buffering acid by sodium bicarbonate (Edget et al. 2006, Stephens et al., McNaughton et al in 2002, 1999).

Among the substances with potential ergogenic potential has recently highlighted the beta-alanine.

Beta-alanine has been used in sport aimed at (i) improving the isokinetic strength (Kendrick et al., 2008), (ii) improving the maximum force (Hoffman et al., 2008), (iii) increase the anaerobic threshold metabolic (Zoeller et al., 2007) and ventilatory (Stout et al., 2007) (iv) improvement of VO2max (Smith et al., 2009; Hill et al., 2007), (v) effects on exercise performance in high intensity and short duration (Derave et al., 2007; Suzuki et al. 2002), (VI) attenuation of neuromuscular fatigue (Stout et al., 2007) (vii) work peak power (Van Thienen et al., 2009), (viii) running performance of 400 m planes (Derave et al. 2007), (ix) oxidative stress (Nagasawa et al. 2001), etc. ..

The use of beta alanine supplementation in sports is
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widespread and the results are conflicting which may be related to inadequate doses selected. Typically, the effects of supplementation have been studied from the daily doses stabilized. Thus, this study aimed to verify the effect of supplementation of two different doses of beta-alanine - 1.6 g / day and 6.4 g / day in sports performance and body composition in elite rowers Portuguese.

MATERIAL AND METHODS

Twenty rowers Portuguese elite participated in the study. All are athletes rowing team of Real Club Porto river and compete nationally and / or internationally.

The study was carried out in accordance with the Declaration of Helsinki, adopted by the World Medical Association, respecting ethical principles for medical research involving human subjects and was approved by the Ethics Committee of the Faculty of Sport, University of Porto, Portugal. The subjects were informed of the procedures and possible risks associated with their participation before voluntarily giving written consent.

Have undergone assessment body composition and performance tests at distances of 100 meters, 500 meters and 2000 meters rowing-ergometer.

The selection criteria for the experimental groups was conceived after the time of the test ergometer 2000 meters. After the pre-tests-ergometer rowing 2000 meters, has produced a ranking of the results (from best to worst time) and where was the first place given the higher dose of BA (6.4g) and the runner-dose lower (1.6g) and the third entered in the control group. Successively ranked fourth dose group entered the top fifth in the lower dose group and sixth in the control group. The rest followed the same order until the twentieth participant.

This was a randomized, double-blind, placebo-controlled consists of the following groups: Group A, supplemented daily with 6.4 g of BA (8 capsules of 800 mg), Group B was supplemented daily with 1.6 g of BA (2 capsules of 800 more 6 capsules maltodextrin) and group C received 8 capsules daily maltodextrin (placebo). The study lasted 72 days. The supplements and placebos were provided by maltodextrin DietSport - dietary supplements and sports equipment, LDA, and the Beta-alanine used Acid Killer Pure Beta-alanine Scitec Nutrition, Orlando Florida.

Their main physical and training background characteristics were as follows (Mean ± SD) values assessed in pre-test: age 23.2±6.1 years; Height 180±6.1 cm; IMC 22.9±1.5; Weight 74.2±6.7 Kg; Fat
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5.9±2.2 %; Time 100m (Sup100m) 17.2±1.9 seconds; Power 100m (Sup100w) 594.8±115.1 watts; Time 500m (Sup500m) 91.8±5.9 s; Power 500m (Sup500w) 459.3±76.6 watts; Time 2000m (Sup2000m) 409.48±15.9 s; Power 2000m (Sup2000w) 328.4±40.5 watts.

EXPERIMENTAL PROTOCOL

All of athletes performed a test-rowing ergometer (Concept2 Model D PM4 indoor rower) at a distance of 2000 meters to measure their time for the initial ranking. The all-out test in distance of 2000 m was preceded by a warm-standard set internally at the club and that is to rowing for 10 min under T1 (low intensity exercise, paced the next 20 strokes per minute and heart rate 60% HRmax) specific for each rower. The integrated warming period, at the end, two series of 10 strokes with maximum 2 min interval between sets.

None of the participants received verbal and visual encouragement in the pretest. For each participant, the time was measured at 2000 meters, such as cadence, the partial and final power.

The following day the times and power were obtained in the tests of 100 meters and 500 meters. The heating procedures were exactly the same test applied to 2000 meters.

The test than 2000 meters was performed in 3 different points: (i) the first moment, namely the pre-test to measure the initial performance, (ii) the second moment after the pre-test was administered for five weeks (36 days) supplementation each group and evaluate the performance on the 36th day, (iii) the third moment, immediately after supplementation, translated into five weeks (36 days), where all groups were subjected to restriction supplementation until the last day where they held the last moment of evaluation.

At all moments of evaluation was assessed body composition of each athlete prior to warm up protocol test 2000 meters.

Statistical analysis

All calculations were performed using SPSS (version 20.0 for Windows). Standard statistical methods were used for the calculation of means and standard deviations (SD). Normal Gaussian distribution of the data was verified by the Shapiro-Wilks test. ANOVA with repeated measurements and nonparametric test and Independent samples T test and Paired samples T test was used and comparisons were made with Friedman test. The significance level was previously set at p<0.05.
RESULTS

FIRST MOMENT OF EVALUATION

All measurements of the pre-test (1st moment of evaluation) between the study sample, showed homogeneity between groups (Table 1) there is no difference (p> 0.05) (Table 1).

Table 1. Mean (±SD) values for the selected variables for the three groups in the first moment of evaluation

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>72.2±4.7</td>
<td>78.4±7.0</td>
<td>72.5±7.4</td>
<td>0.19</td>
</tr>
<tr>
<td>IMC</td>
<td>23.3±0.6</td>
<td>23.2±1.3</td>
<td>22.2±2</td>
<td>0.33</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>5.2±2</td>
<td>6.3±2.2</td>
<td>6.4±2.4</td>
<td>0.59</td>
</tr>
<tr>
<td>100 m (s)</td>
<td>16.7±0.7</td>
<td>16.3±0.9</td>
<td>18.4±2.9</td>
<td>0.71</td>
</tr>
<tr>
<td>100 m (W)</td>
<td>617.1±71.7</td>
<td>655.3±104.5</td>
<td>520.4±130.4</td>
<td>0.82</td>
</tr>
<tr>
<td>500 m (s)</td>
<td>91.9±7.1</td>
<td>88.7±4.8</td>
<td>94.3±4.9</td>
<td>0.24</td>
</tr>
<tr>
<td>500 m (W)</td>
<td>464.4±74.9</td>
<td>499±77.2</td>
<td>420.1±67.9</td>
<td>0.18</td>
</tr>
<tr>
<td>2000 m (s)</td>
<td>405.2±17.9</td>
<td>401.9±11.3</td>
<td>420.2±12.9</td>
<td>0.07</td>
</tr>
<tr>
<td>2000 m (W)</td>
<td>340.9±42.1</td>
<td>346±28</td>
<td>300.9±37.1</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Note. Performance tests (100, 500 and 2000-m) were realized in a rowing-ergometer

SECOND MOMENT OF EVALUATION

After the first moment of, followed by 36 days of supplementation, which took place after the second assessment. The results (table2) do not allow for significant differences between groups in several variables.

Table 2. Mean (±SD) values for the selected variables for the three groups in the second moment of evaluation.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>71.6±4.2</td>
<td>77.7±7</td>
<td>72.3±7.4</td>
<td>0.20</td>
</tr>
<tr>
<td>IMC</td>
<td>23.1±0.8</td>
<td>23±1.22</td>
<td>22.1±1.8</td>
<td>0.37</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>5.3±1.9</td>
<td>6.1±2.1</td>
<td>6.6±3.1</td>
<td>0.64</td>
</tr>
<tr>
<td>100 m (s)</td>
<td>16.9±0.9</td>
<td>16.4±0.8</td>
<td>17.6±1.4</td>
<td>0.18</td>
</tr>
<tr>
<td>100 m (W)</td>
<td>593.6±71.4</td>
<td>647±96.2</td>
<td>538.4±126.8</td>
<td>0.18</td>
</tr>
<tr>
<td>500 m (s)</td>
<td>93.6±6.3</td>
<td>89.3±4.4</td>
<td>94.1±4.8</td>
<td>0.23</td>
</tr>
<tr>
<td>500 m (W)</td>
<td>441.7±67.2</td>
<td>482.5±61.6</td>
<td>423.4±55.8</td>
<td>0.28</td>
</tr>
<tr>
<td>2000 m (s)</td>
<td>402.8±19.6</td>
<td>409.8±23.8</td>
<td>418.9±17.7</td>
<td>0.29</td>
</tr>
<tr>
<td>2000 m (W)</td>
<td>346.7±48</td>
<td>323.2±69.2</td>
<td>303.9±32.6</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Note. Performance tests (100, 500 and 2000-m) were realized in a rowing-ergometer

Table 2 also shows homogeneity between groups, even after the groups have been supplemented with different doses of BA and placebo. Apparently, BA does not appear to produce any improvement in the performance looking at the
times performed at 100, 500 meters, 2000 meters. Supplementation also produced no significant change in weight, BMI and percentage of fat mass.

**THIRD MOMENT OF EVALUATION**

After the second assessment was performed five weeks of supplementation restriction. During 36 days, all athletes returned to their normal routine training but without any supplementation, being made the assessment of all indicators to the 36th day. The results (table 3) to check that the groups continue to show similarity in performance indicators, weight, BMI and percentage of fat mass ($p>0.05$).

Table 3. Mean ($\pm SD$) values for the selected variables for the three groups in the third moment of evaluation

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>71.1±3.6</td>
<td>77.7±1.1</td>
<td>71.9±7.5</td>
<td>0.15</td>
</tr>
<tr>
<td>IMC</td>
<td>22.7±0.9</td>
<td>23±1.3</td>
<td>21.9±1.7</td>
<td>0.36</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>5.2±1.9</td>
<td>6.5±2.4</td>
<td>6.9±2.1</td>
<td>0.34</td>
</tr>
<tr>
<td>100 m (s)</td>
<td>16.6±0.7</td>
<td>16.4±0.8</td>
<td>17.6±1.3</td>
<td>0.08</td>
</tr>
<tr>
<td>100 m (W)</td>
<td>603.1±3.9</td>
<td>636.2±92.8</td>
<td>532.4±118.1</td>
<td>0.17</td>
</tr>
<tr>
<td>500 m (s)</td>
<td>92.9±6.9</td>
<td>89±4.4</td>
<td>94.5±4.3</td>
<td>0.21</td>
</tr>
<tr>
<td>500 m (W)</td>
<td>459.4±81.6</td>
<td>496.7±71.2</td>
<td>418.9±11.7</td>
<td>0.18</td>
</tr>
<tr>
<td>2000 m (s)</td>
<td>400.9±21.9</td>
<td>396.7±12.9</td>
<td>415.5±17.4</td>
<td>0.16</td>
</tr>
<tr>
<td>2000 m (W)</td>
<td>355.3±56.7</td>
<td>358.5±33.5</td>
<td>310.6±33.2</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note. Performance tests (100, 500 and 2000-m) were realized in a rowing-ergometer

**Comparison inter-groups between the first and the second moment of evaluation**

Comparing each group between the first and second moment we found that either group B or group C showed no significant change in any of the indicators studied. As to the group supplemented with the highest dose of BA, there is a tendency to worsen the performance indicators (Table 4).
Table 4. Groups’ variation between the first and the second moment of evaluation

<table>
<thead>
<tr>
<th>Group</th>
<th>1st mom.</th>
<th>2nd mom.</th>
<th>p</th>
<th>Group</th>
<th>1st mom.</th>
<th>2nd mom.</th>
<th>p</th>
<th>Group</th>
<th>1st mom.</th>
<th>2nd mom.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>72.2±4.7</td>
<td>71.6±4.2</td>
<td>0.29</td>
<td>100 m (W)</td>
<td>67.1±7.1</td>
<td>593.6±1.4</td>
<td>0.07</td>
<td>500 m (s)</td>
<td>94.3±4.8</td>
<td>94.1±4.6</td>
<td>0.49</td>
</tr>
<tr>
<td>IMC</td>
<td>23.3±0.6</td>
<td>23.1±0.8</td>
<td>0.21</td>
<td>100 m (s)</td>
<td>401.9±13.1</td>
<td>409.8±23.8</td>
<td>0.13</td>
<td>2000 m (s)</td>
<td>346.7±48.2</td>
<td>355.3±56.7</td>
<td>0.44</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>5.2±2.2</td>
<td>5.3±1.9</td>
<td>0.76</td>
<td>100 m (s)</td>
<td>409.8±23.8</td>
<td>396.7±12.9</td>
<td>0.22</td>
<td>2000 m (s)</td>
<td>323.2±69.2</td>
<td>358.5±33.5</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Note. Performance tests (100, 500 and 2000-m) were realized in a rowing-ergometer.

Comparison inter-groups between the second and the third moment of evaluation

Table 5 shows that the alterations verified between the second and the third moments of evaluation were not statistically significant (p>0.05) for all the groups.

Table 5. Groups’ variation between the second and the third moment of evaluation

<table>
<thead>
<tr>
<th>Group</th>
<th>2nd mom.</th>
<th>3rd mom.</th>
<th>p</th>
<th>Group</th>
<th>2nd mom.</th>
<th>3rd mom.</th>
<th>p</th>
<th>Group</th>
<th>2nd mom.</th>
<th>3rd mom.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>71.6±4.2</td>
<td>71.1±3.6</td>
<td>0.43</td>
<td>100 m (W)</td>
<td>67.1±7.1</td>
<td>593.6±1.4</td>
<td>0.07</td>
<td>500 m (s)</td>
<td>94.3±4.8</td>
<td>94.1±4.6</td>
<td>0.49</td>
</tr>
<tr>
<td>IMC</td>
<td>23.1±0.8</td>
<td>22.7±0.9</td>
<td>0.11</td>
<td>100 m (s)</td>
<td>401.9±13.1</td>
<td>409.8±23.8</td>
<td>0.13</td>
<td>2000 m (s)</td>
<td>346.7±48.2</td>
<td>355.3±56.7</td>
<td>0.44</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>5.3±1.9</td>
<td>5.2±1.9</td>
<td>0.76</td>
<td>100 m (s)</td>
<td>409.8±23.8</td>
<td>396.7±12.9</td>
<td>0.22</td>
<td>2000 m (s)</td>
<td>323.2±69.2</td>
<td>358.5±33.5</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Note. Performance tests (100, 500 and 2000-m) were realized in a rowing-ergometer.

Comparison inter-groups between the first and third moment of evaluation

With the exception of a significant variation (p = 0.04) for BMI checked no other indicators unchanged statistically significant (p> 0.05), between the first and third moment of evaluation (table 6).
DISCUSSION

This study intended to verify the effects of supplementation of two different dosages of beta-alanine (BA) – 1.6 g/day and 6.4 g/day in the sports performance and body composition of Portuguese elite rowers. The importance of beta-alanine (BA) as an ergogenic mean derives from its direct contribution alongside with L-histidine to the formation of carnosine, an important neutralizer of the acidosis induced by exhaustion due to physical exercise done between 1 to 4 minutes (Harris & Stellingwerff, 2013). BA has been referred to as a supplement that favors aerobic power (Stout et al. 2007; Zoeller et al. 2007; Stout et al. 2007), verifying an improvement of 2.5% of the aerobic power in exercises in cycle-ergometer till exhaustion is reached.

Several studies support the hypothesis that intramuscular carnosine increases with the adaptation of high intensity training done for a long period of time (Parkhouse et al. 1985; Tallon MJ et al. 2005) yet other data refutes this statement clearly (Mannion et al. 1994; Kim et al. 2005; Kendrick et al. 2008 e Kendrick et al. 2009). Suzuki et al. (2004), were able to show that sedentary individuals subjected to a high intensity training protocol for 8 weeks increased their intramuscular content of carnosine in a significant way. On the contrary, other researchers demonstrated that one cannot verify the increase of intramuscular carnosine after 10 weeks (Kim et al. 2005; Kendrick et al. 2008) and after 16 weeks (Mannion et al. 1994) of high intensity training. Previously some researchers showed 800 mts runners, bodybuilders and rowers as the athletes that possessed major quantities of intramuscular carnosine when compared with endurance athletes and not trained individuals (Parkhouse et al. 1985; Tallon MJ et al. 2005).

Note. Performance tests (100, 500 and 2000-m) were realized in a rowing-ergometer.
The investigation data casts some doubts on the effect of training on the increase of muscle reserves of carnosine. When talking about the supplementation with beta-alanine, the results are conflicting, not when it comes to the increase of intramuscular carnosine caused by the supplementation with beta-alanine verified in several studies but when it comes to the positive effects on performance.

Harris et al. (2006) was able to prove that different supplementation protocols (3.2 g/day for the first week and an increase of 6.4 g/day of BA in the next 3 weeks) had an effective increase of intramuscular carnosine on individuals with no training protocol.

The present study not having analyzed the intramuscular variation of carnosine, intends to establish conexions between the BA supplementation and the performance and body composition.

In our study we didn’t find evidences of the ergogenic action of BA in sports performance evaluated by timings and power developed on the 100, 500 and 2000 m tests. We hoped that the BA supplementation would improve the performance on the shorter distances, especially the 100 m that correspond to the starting distance. Being the starting phase in rowing, a moment of high level of effort that triggers the dramatic increase of acidosis, one could expect the supplementation with BA would decrease the acidosis and that would reflect in the performance. Our data do not support that hypothesis. On the contrary, the only significant difference was verified in group A (supplemented with 6.4 g) and in the sense of reducing performance.

One can speculate that the supplemented group with the major quantity of BA saw its plugging system worsen maybe because of feedback mechanisms. That is, the massive ingestion of BA blocked the endogenous and natural plugging mechanisms of acidosis induced by physical exercise.

On a third moment, the verification of the absence of statistically significant differences between the groups demonstrates the inexistence of chronical, ergogenic or anti-ergogenic effects induced by the supplementation of BA.

The existent literature shows that there is a conflict of results as for the effects that BA has in high intensity performance.

Derave et al. (2007) corroborate our results once there were not found improvements in the timings of the 400 m runners after a supplementation period of 4.8 g/day of BA for 5 weeks.

On the contrary, cyclists supplemented with BA for 10 weeks have shown a significant increase (58.8% and 80.1%, on the 4th and 10th week respectively) of the muscular carnosine and of the performance in exercise of high
muscular power (Hill et al., 2007). Despite Smith et al. (2009) did not verify significant improvements in the performance of exercise to exhaustion at 110% of VO2max after BA supplementation.

Baguet et al. (2010) verified that there is a positive correlation between the intramuscular content of carnosine and the performance at 100, 500, 2000 and 6000 m in rowing-ergometer after its sample has been supplemented with 5 g/day of BA for 7 weeks.

This study contradicts directly our results that did not verify any significant alteration in the performance in any of the test distances that were used.

The hypothesis was placed as if after a certain amount of time of supplementation with BA the eventual positive effects on performance would subsist in time. It was verified (Baguet et al., 2009; Stellingwerff et al., 2011) that though the muscular levels of carnosine come back to their initial levels 8 to 9 weeks after the term of the supplementation, the retarded effects on controlling the intramuscular acidosis are kept. Our data point on the opposite direction. That is, even if we accept the hypothesis of maintaining a certain capacity of attenuation of the intramuscular acidosis induced by exercise after the supplementation period with BA, that eventual physiological capacity did not have any effect on the performance.

The other stands on the present study intend to verify the effect of BA supplementation in the BMI and the percentage of fat mass. The BMI and fat mass control is essential in rowing, mainly in the competitive classes that have their body weight as reference.

Our results point out to a great stability of the studied indicators mostly in the two initial moments of this study. None of those indicators has changed significantly (p>0.05) between the 1st and the 2nd moment. There is still a tendency for the BMI reduction eventually determined by the control of the body weight of the individuals that are part of the competitive class – lightweight. As the percentage of fat mass kept a great stability one can accept the hypothesis that the slight reduction of BMI in the A and C groups may be related with an also slight reduction of fat free mass or even water.

This idea agrees with Kern & Robinson (2011), which verified that the wrestling athletes that were supplemented with 4 g/day of BA for 8 weeks lose weight when in comparison with the placebo group, but they assume that this loss may not be due to supplementation whereas it might have been used as a natural resource of food restriction so that the fighters can compete in lower weight classes.

Despite, divergent experimental situations may promote different
answers. So, as Kern & Robinson (2011) verified, a significant amount of weight in the footballers group that was subjected to a supplementation protocol (8 weeks with 4 g/day of BA), students with no routine of strength training supplemented for 10 weeks with 6.4 g/day did not show any alteration either in weight or in body composition (Kendrick et al. 2008).

CONCLUSION

The results obtained, show that supplementation of beta-alanine does not improve the indicators of time and power on performance tests on rowing ergometer, or changes in body weight, BMI and percentage of fat mass. Further studies are needed altering the amounts of beta-alanine to ingest and periods of supplementation.

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