

**Blood Lactate Response After Brazilian Jiu-Jitsu Simulated Matches**B.V.C. da Silva¹, M. Marocolo Júnior², G.G.F.S. de Monteiro³, L.O.S. Junior³, M.A. de Moura Simim², E.L. Mendes², G.R. da Mota²¹Master Science in Physical Education, Federal University of Triângulo Mineiro, Uberaba, MG, Brazil, ²Department of Sport Sciences, Post Graduation Program in Physical Education, Federal University of Triângulo Mineiro, Uberaba, MG, Brazil, ³Academia Champion BH**ABSTRACT**

da Silva BVC, Marocolo Júnior M, de Monteiro GGFS, Junior LOS, M. de Moura Simim MA, Mendes EL, da Mota GR. Blood Lactate Response After Brazilian Jiu-Jitsu Simulated Matches. **JEPonline** 2013;16(5):63-67. The objective of this study was to determine and compare blood lactate response of two Brazilian Jiu-Jitsu (BJJ) groups with different graduation levels and training experience after three simulated matches. Fourteen BJJ male athletes (mean age 23.2 ± 5.2 yrs, body mass 74.6 ± 7.4 kg, and height 174.1 ± 5.5 cm) were placed into two graduation groups: (a) the advanced (AD, n=7) brown and black belt group; and (b) the non-advanced (NA, n=07) blue to purple belt group. The blood lactate responses [Lac] of each subject were measured at rest before the matches and warm-up (Pre) and at 1 min and 15 min after the 3 simulated matches (Post). No statistically significant differences ($P>0.05$) in blood lactate responses were found when comparing the AD and NA groups at rest, Pre, and Post. Compared to rest, blood lactate increased significantly ($P<0.05$) in both groups at 1 min and 15 min after the simulated matches. Also, it decreased significantly ($P<0.05$) at 15 min Post in both groups (after the simulated matches) compared to 1 min. The blood lactate profile information presented in this study should help coaches to develop conditioning programs to help train athletes with similar metabolic responses.

Key Words: Anaerobic, High-Intensity, Combat Sport, Athletes

INTRODUCTION

Brazilian Jiu-Jitsu (BJJ) is classified as a grappling combat sport that is characterized by high and low intensity-intermittent-efforts (8,10). It is similar to judo and wrestling, although there are stylistic differences that involve gripping, throwing, ground grappling, chokeholds, and joint locks (8).

In addition to these differences, the time structure of a BJJ fight is also reported to be different from wrestling and judo (2). Therefore, the various patterns of effort and pause for each sport are unequal during the match (2). Due to this consideration, the energy demand in BJJ, as measured by blood lactate response ([Lac]), has been observed to be similar (9), sometimes lower than wrestling (3), and very close to the Judo (6).

Different studies that have evaluated BJJ athletes and [Lac] have done so primarily after official matches (1,7). To our knowledge, there are no data available on [Lac] dynamics after BJJ simulated matches. Therefore, the aim of this study was to determine and compare the [Lac] profile of two groups of BJJ athletes with different graduation levels and training experience after three simulated matches. We hypothesized that [Lac] would be different between the groups.

METHODS

Subjects and Procedures

This study was approved by the local Ethics Committee, and was performed in accordance with the international ethical standards. The subjects signed an informed consent form. Fourteen BJJ male subjects voluntarily participated in this study. The subjects were placed into two graduation groups. The Advanced Group (AD, $n=7$) that consisted of players with the brown and black belt (29.3 ± 2 yrs; 72.6 ± 5.6 kg; 1.73 ± 4 m; 10.2 ± 1.7 yrs of BJJ experience), and the Non-Advanced Group (NA, $n=07$) with the blue to purple belt (19.2 ± 4.5 yrs; 74.5 ± 9.7 ; 1.74 ± 7 m; 4.6 ± 1.3 yrs of BJJ experience). The following criteria were used to identify the subjects: (a) at least 3 yrs of experience in BJJ; (b) at least 9 to 18 hrs·wk⁻¹ of training; (c) no physical limitations; (d) non-users of nutritional supplements or potential ergogenic aids of any kind; and (e) familiarization with the exercises.

Simulated Brazilian Jiu-Jitsu Matches

Before the matches, the subjects engaged in a 10 min standardized warm-up that consisted of 5 min of general stretching and 5 min of specific BJJ exercises. Afterwards, each subject performed 3 BJJ matches. The opponents in the matches were approximately of the same weight class and technical level. Each match lasted for 10 min with a 15 min rest interval between them. In cases where a submission occurred, the match was continued into overtime in order to complete the initial stipulated training volume.

Blood Lactate Responses

Blood samples were collected from subjects' earlobe. Blood lactate for each subject was measured at rest before the matches and warm-up (Pre) and at 1 min and 15 min after the 3 simulated matches (Post). It was obtained using a portable lactate analyzer (Accusport; Boehringer Mannheim, Germany), which was validated using reference methods with a high intra-class correlation with the Yellow Springs lactimeter ($R = 0.963$) (9).

Statistical Analyses

The normality of distribution was assessed with Kolmogorov-Smirnov test. A Two-Way ANOVA with [Lac] as one factor and time as the other and the Bonferroni *post hoc* tests were employed to compare the [Lac] responses between the AD and the NA groups at pre, 1 min post, and 15 min post

simulated matches. The statistical level of significance was set at $P \leq 0.05$ (GraphPad Software, San Diego California USA).

RESULTS

Blood lactate increased significantly ($P < 0.05$) at 1 min ($10.3 \pm 2.6 \text{ mmol} \cdot \text{L}^{-1}$) and at 15 min ($6.2 \pm 2.3 \text{ mmol} \cdot \text{L}^{-1}$) vs. the Pre (i.e., rest before the matches and warm-up) of 3.6 ± 1.0 for both groups (AD and NA). The subjects' [Lac] decreased significantly in both groups ($P < 0.05$) at 15 min Post compared to the 1 min post. On the other hand, there was no difference ($P > 0.05$) in [Lac] between the AD group and the NA group at Pre, Post 1 min, and Post 15 min (Table 1).

Table 1. Blood Lactate ($\text{mmol} \cdot \text{L}^{-1}$) Responses in Both the AD and NA Groups.

Variables	[La] Pre	[La] Post 1 min	[La] Post 15 min
AD (n = 7)	3.0 ± 0.3	$10.4 \pm 3.6^*$	$6.3^* \pm 3.0^\dagger$
NA (n = 7)	4.3 ± 1.1	$10.2 \pm 1.3^*$	$6.5^* \pm 1.7^\dagger$

AD = Advanced; NA = Non-Advanced

*Significant ($P < 0.05$) difference to Pre

†Significant ($P < 0.05$) difference to 1 min Post

Data are mean \pm SD

DISCUSSION

The purpose of this study was to investigate blood lactate response after three BJJ simulated matches. The results indicated a considerable activation of the glycolytic system after BJJ matches. Contradicting the initial hypothesis, there are no significant differences in blood lactate response between AD and NA group after the three BJJ simulated matches. After 15 min of recovery, [La] was still significantly higher than the basal values for both groups. The blood lactate concentrations are consistent with other BJJ studies after a simulated fight (2,7). Pereira et al. (10) reported [Lac] values as high as $14.2 \pm 5.9 \text{ mmol} \cdot \text{L}^{-1}$ after the completion of specific bouts of the BJJ. In general, lactate concentrations have been found to be in the range of $13.23 \text{ mmol} \cdot \text{L}^{-1}$ or greater $20.0 \text{ mmol} \cdot \text{L}^{-1}$ after wrestling matches (3,9) compared to Judo (6) and BJJ (2,7).

Recently, Karninčić and colleagues (9) investigated the differences in blood lactate profiles of club and elite level Greco-Roman wrestlers. After the first-round, it was observed that the club wrestlers required greater energy from anaerobic glycolysis. However, opposite results were observed in our investigation. There were no differences in [La] response between AD and NA BJJ players. Thus, we suggest that factors other than techniques and tactics explain the difference in energy expenditures and, therefore, the difference in lactate profiles during combat.

Regarding the effect of the recovery period, previous findings (2,6) have indicated that the duration of a 15 min recovery period is insufficient for [La] to be re-established to the basal levels. Although the [La] does not return to the resting value, it has been demonstrated that it is long enough for a full

performance recovery of highly trained judokas when considering the anaerobic performance in a non-specific test, a specific high-intensity test, and in the capacity to generate high leg power (6).

Limitations

While [La] was not determined before matches 2 and 3, it does not distract from the pre to post analysis. Also, it is clear from the work of Thomas and colleagues (11) that no significant difference in peak [Lac] was reported between the matches.

CONCLUSIONS

The findings in this study indicate that the glycolytic pathway has an important role to play in energy production during BJJ matches. The blood lactate response seems to be independent of the graduation levels and training experience for BJJ athletes. We suggest further studies incorporating more complex physiological variables (e.g., oxygen consumption, VO_2) during or after the combat to investigate other cardiorespiratory factors that may promote or limit the performance of BJJ athletes.

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