Aerobic fitness is associated with improved repeated sprints ability of basketball players after six weeks of training during preseason

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Abstract – The repeated sprints ability (RSA) is considered an important attribute for basketball, being aerobic fitness pointed out as limiting factor for repetition of sprints. The aim of the study was to verify if the change in VO2peak is related to the improvement of RSA after six weeks of training during preseason. Twelve male college basketball players aged 18-24 participated in the study. Players were submitted to body composition evaluation, maximum incremental treadmill test and RSA test (6x30-m) before and after six weeks of training. For the purpose of the study, the calculation of the change percentage delta was used. Paired t-test was used to verify differences after training and Pearson’s correlation and simple linear regression were used to verify the relationship between ∆%VO2peak and ∆%RSA. There were improvements in RSA |PEAK |MEAN |TOTAL |PICO |MEAN |TOTAL |PICO |

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Aerobic fitness is associated with improved repeated sprints ability of basketball players after six weeks of training during preseason

Aptidão aeróbica é associada com a melhora da capacidade de sprints repetidos de atletas de basquetebol após seis semanas de treinamento durante o período preparatório

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Resumo – A capacidade de sprints repetidos (CSR) é considerada um importante atributo para o basquetebol, sendo a aptidão aeróbica apontada como fator limitante para a repetição dos sprints. O objetivo do estudo foi verificar se a mudança no VO2peak se relaciona com a melhoria da CSR após seis semanas de treinamento durante o período preparatório. Doze atletas de basquetebol universitário do sexo masculino com idade entre 18-24 anos participaram do estudo. Os atletas foram submetidos a uma avaliação da composição corporal, teste incremental máximo em esteira e teste de CSR (6x30-m) antes e após seis semanas de treinamento. Para efeito do estudo recorreu-se ao cálculo do delta percentual de mudança. Teste t pareado foi utilizado para verificar diferenças após o treinamento e a correlação de Pearson e regressão linear simples foram utilizadas para verificar a relação entre o ∆%VO2peak e ∆%CSR. Observou-se melhoria nos índices CSR |PEAK |MEAN |TOTAL |PICO |MEAN |TOTAL |PICO |MEAN |TOTAL |PICO |

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INTRODUCTION

To conduct a training program for a specific sport, understanding its physical and physiological demands is crucial for coaches and other professionals involved in preparing athletes. In team sports, it has been demonstrated that one of the main movements carried out is high-intensity and short-duration sprints, interspersed by short periods of low-moderate intensity recovery that may involve walking and running actions. Specifically in basketball, athletes perform on average 55-105 sprint movements, which can be repeated every 21-39s, with maximum or near maximum sprints being maintained as an important condition for competitive performance.

The ability to maintain the best performance in successive sprints is called repeated sprints ability (RSA), which is characterized by short high-intensity (<10-s) stimuli interspersed by short recovery periods (<60-s). RSA has proved to be a validated and reliable field test to be used in modalities such as soccer, indoor soccer, basketball, handball and tennis, mainly because they present characteristics similar to physical and physiological demands during the game.

Considering the information above, the importance of understanding which factors may be associated with the improvement of RSA becomes evident. From the point of view of energy demand, despite a greater anaerobic contribution in RSA, previous studies have reported the importance of aerobic fitness in RSA performance, and a significant and negative correlation with greater aerobic power was found. These authors have argued that this relationship is mainly due to the importance of oxidative metabolism in providing adenosine triphosphate (ATP) for resynthesis of phosphocreatine (PCr) and removal of metabolites (H+ and [P_i]). In this context, previous studies have shown that the PCr resynthesis rate is dependent on the oxygen supply. Additionally, it was reported that as sprints repeat, the aerobic contribution to energy supply is greater, which may delay the onset of fatigue.

In order to evaluate the relationship between RSA and aerobic power, most studies have presented transversal designs and did not aim to investigate the relationship between increase in aerobic power and RSA performance. Moreover, these studies have not presented consistent data on the relationship between aerobic power and RSA, and some studies have found a significant linear relationship, while others have not observed this relationship. In view of the above, it is important to investigate whether the increase in aerobic power is related to the improvement in RSA through experimental designs, considering the importance of this attribute for athletic performance in basketball and similar modalities, as illustrated above. Therefore, the aim of the present study was to verify the relationship between improvement of aerobic power (Δ% VO2peak) and RSA performance after 6 weeks of preseason training of college basketball athletes. It has been hypothesized that the improvement of aerobic power would be related to the improvement of RSA indexes related to the repetition of efforts.
METHODOLOGICAL PROCEDURES

Subjects
This is a non-controlled experimental study involving male basketball athletes. The sample selection was intentionally performed, being composed of 12 athletes of the same team, aged 18-24 years (age = 21.50 ± 2.73 years, body mass = 80.61 ± 14.31 kg, height = 180.25 ± 1.60 cm, fat percentage = 23.03 ± 1.24, free fat mass = 60.53 ± 1.62), participants of college competitions at regional and national level. Athletes trained on average 2 hours daily, often three times a week. To be included in the study, athletes should: a) be in competitive basketball activity for more than three years; b) not present any lesion that would make the study procedures unfeasible; c) do not use ergogenic nutritional substances that could influence the study data. Athletes with attendance less than 85% were excluded in the training sessions. At the end of the experimental protocol, one athlete was excluded (attendance <85% in the training sessions), resulting in 11 athletes. The study was approved by the Ethics Research Committee of the Federal University of Rio Grande do Norte (CAAE: 58886816.2.0000.5537) and complied with the norms of Resolution 466/12 of the National Health Council for research on human beings, also in compliance with the ethical principles contained in the Declaration of Helsinki (2013) of the World Medical Association. Athletes were informed about the study and signed the informed consent form.

Study Design
The present investigation was conducted at the end of the athletes’ preparatory period and lasted nine weeks (one week for the test familiarization sessions, one week for pre-test, six weeks of training and one week for post-test). The tests included were dual-energy radiological absorptiometry (DEXA), incremental maximal treadmill test and RSA, which were performed in the pre- and post-intervention period, with a 72-h interval between tests. After a 48-hour period from RSA, athletes performed six weeks of training, which consisted of technical-tactical and repeated sprint actions, as shown in Figure 1. All athletes received verbal stimuli and were instructed not to perform vigorous physical activities during the 24 hours preceding the tests, in addition to avoiding the consumption of ergogenic nutritional substances and to make the last meal in a period of 3 hours before each test.

![Figure 1. Experimental design](image-url)
Vertical lines represent the recovery between procedures; experimental session (technical-tactical + repeated sprints training)
Protocols and instruments

• Body composition
Body mass and stature were measured using an electronic scale (Welmy®, São Paulo, Brazil), with 300 kg capacity and 50-g precision and a stadiometer, with 0.1 cm precision, respectively. Body composition, fat percentage and free fat mass were measured using dual energy radiological absorptiometry (DEXA) (Lunar® / G.E PRODIGY - LNR41.990, United States).

• Maximum incremental test
Aerobic fitness was identified by maximal treadmill running protocol (Centurion 200®, Micromed, Brasilia, Brazil) using an ergospirometry system. Athletes were maintained at initial velocity of 8km / h for three minutes, and then velocity was increased by 1km / h every minute until voluntary exhaustion. During the protocol, heart rate was constantly monitored through a Polar frequency meter (RS800cx, Polar Electro®, Oy, Kempele, Finland). To characterize maximum effort during the test, the following criteria were adopted: a) ratio of respiratory changes R > 1.1; b) peak heart rate > 90% predicted by age (HRmax = 220-age); and c) ratings of perceived exertion (RPE) = 19 reported by the Borg scale. Ventilatory analyses were recorded every 20-s by a gas analyzer (Metalyzer® 3B, Cortex Biophysik GmbH, Leipzig, Germany), calibrated for gas and volume according to the manufacturer’s recommendations. The ambient temperature in the laboratory was ~24° during the incremental test.

• Repeated sprint ability (RSA)
RSA test involved 06 repetitions of 30-m all-out sprints, with passive 20-s recovery between each sprint. Sprints were recorded through a photocell system (Speed Test 6.0 CEFISE®, São Paulo, Brazil), positioned for every 10 of the total 30 m. After specific warm-up exercise (5-7-min), athletes performed a maximum 30-m velocity test (V30). For RSA test acceptance criteria and to avoid pacing strategy, athletes were instructed to achieve a score > 90% of individual performance on the V30 test in the first sprint. In addition to the six sprints, the following indexes were used for analysis: the best performance among sprints (RSA_PEAK); total time of all sprints (RSA_TOTAL); mean time between all sprints (RSA_MEAN) and sprint decrease (RSA_DEC), the latter being identified by the following equation: Sprint decrease = [(total time / ideal time) -1] x 100. The ideal time is the best performance multiplied by six.

• Training Sessions
Training sessions began with a ~10-min warm-up that involved specific basketball actions (e.g. dribbling and throwing) followed by repeated sprint training (RST). The remaining training time has been devoted to general and specific exercises for athletes according to their playing positions (e.g. point guard, small forward and center). The daily training routine involved technical-tactical actions and simulated games. The technical training in-
cluded exercises of throws, passes, dribbles and rebounds. Tactical training included zone, individual and pressure defense exercises, counter-attack moves, half-court and offensive actions. RST consisted of all-out sprints in the straight line. In the first week, 2 series of 6x30-m, in the second to the fifth week, 3 series 6x30-m, and in the sixth week, 2 series of 6x30-m were performed. Sprints were interspersed with a 20-sec period of passive recovery and each series was separated by 5-min active recovery involving running at low intensity, ratings of perceived exertion = 9 (easy) on the 6–20 scale.

**Statistical analysis**

Data are presented as mean and standard deviation. The normality of data was verified through the Shapiro-Wilk test. T-test for paired sample was used to compare the RSA and VO$_{2\text{PEAK}}$ performance after experimental session. The effect size was calculated using the Cohen’s equation $d = (\text{post-test} / \text{pre-test})$, with the adoption of the following thresholds: <0.2 trivial, > 0.2 to <0.6 small, > 0.6 to 1.2 moderate, > 1.2 to 2.0 large, > 2.0 to 4.0 very large. The change percentage ($\Delta\%$) of RSA and VO$_{2\text{PEAK}}$ was calculated according to equation: $\Delta\% = (\text{post} - \text{pre}) / \text{pre} \times 100$. The relationship between $\Delta\%$RSA and $\Delta\%$VO$_{2\text{PEAK}}$ was verified through Pearson’s correlation, and a simple linear regression analysis was performed for dependent variables that were significantly related to $\Delta\%$VO$_{2\text{PEAK}}$. The following correlation thresholds were considered: coefficient $r <0.01$ reflects trivial correlation; 0.1 < $r$ < 0.3 small; 0.3 < $r$ < 0.5 moderate; 0.5 < $r$ < 0.7 strong; 0.7 < $r$ < 0.9 very strong; 0.90 – 0.99 almost perfect; and 1.0 perfect. Data were analyzed using Statistical Package for Social Sciences (SPSS) software version 20.0 (New York, USA). The significance level was set at 5%.

**RESULTS**

Table 1 shows the effect of the six weeks of training on athletes’ physical performance. Significant improvements were observed for RSA$_{\text{PEAK}}$ ($t_{(1.11)} = 2.7, p = 0.023$); RSA$_{\text{MEAN}}$ ($t_{(1.11)} = 2.8, p = 0.019$); RSA$_{\text{TOTAL}}$ ($t_{(1.11)} = 2.6, p = 0.028$); RSA$_{\text{DEC}}$ ($t_{(1.11)} = 2.9, p = 0.015$); and sprints 4 ($t_{(1.11)} = 2.4, p = 0.037$); 5 ($t_{(1.11)} = 3.14, p = 0.010$); and 6 ($t_{(1.11)} = 3.65, p = 0.004$); however, no improvement was observed in sprints 1 ($t_{(1.11)} = 1.9, p = 0.077$); and 3 ($t_{(1.11)} = 1.8, p = 0.104$). Figure 2 shows the significant improvement of VO$_{2\text{PEAK}}$ after training ($t_{(1.11)} = -5.4, p <0.001, d = 1.6$). No differences were observed between fat percentage values pre- (22.45 ± 4.0) and post-training (22.38 ± 3.8, $p = 0.630$), as well as in the free fat mass pre- (59.53 ± 6.27) and post-training (59.78 ± 6.4; $p = 0.89$).

Table 2 shows correlation and linear regression (adjusted $r^2$) between $\Delta\%$VO$_{2\text{PEAK}}$ e a $\Delta\%$RSA after six weeks of training. Significant negative relationships were observed in indexes associated with sprints repetition, $\Delta\%$RSA$_{\text{MEAN}}$, $\Delta\%$RSA$_{\text{TOTAL}}$, $\Delta\%$ Sprints 3, 4, 5 and 6; on the other hand, no relation of $\Delta\%$VO$_{2\text{PEAK}}$ was observed with the indices and sprints as-
associated with the initial stimuli $\Delta%\text{RSA}_{\text{PEAK}}$, $\Delta%\text{Sprints 1 and 2}$ and $\Delta%\text{RSA}_{\text{DEC}}$.

Table 1. Effect of training on the repeated sprints ability

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre</th>
<th>Post</th>
<th>$\Delta%$ (CI 95%)</th>
<th>Cohen’s $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{RSA}_{\text{PEAK}}$ (s)</td>
<td>4.58 ± 0.21</td>
<td>4.37 ± 0.13</td>
<td>-4.24 (-7.66. -0.80)*</td>
<td>0.8 (moderate)</td>
</tr>
<tr>
<td>$\text{RSA}_{\text{MEAN}}$ (s)</td>
<td>4.84 ± 0.31</td>
<td>4.67 ± 0.19</td>
<td>-3.28 (-5.88. -0.60)*</td>
<td>0.8 (moderate)</td>
</tr>
<tr>
<td>$\text{RSA}_{\text{TOTAL}}$ (s)</td>
<td>29.00 ± 1.91</td>
<td>28.05 ± 1.15</td>
<td>-3.10 (-5.79. -0.41)*</td>
<td>0.8 (moderate)</td>
</tr>
<tr>
<td>$\text{RSA}_{\text{DEC}}$ (%)</td>
<td>7.64 ± 5.76</td>
<td>3.27 ± 1.72</td>
<td>-45.73 (-70.73. -20.74)*</td>
<td>0.9 (moderate)</td>
</tr>
<tr>
<td>Sprint 1 (s)</td>
<td>4.55 ± 0.24</td>
<td>4.52 ± 0.15</td>
<td>-0.34 (-5.03. 4.35)</td>
<td>0.1 (trivial)</td>
</tr>
<tr>
<td>Sprint 2 (s)</td>
<td>4.69 ± 0.28</td>
<td>4.56 ± 0.17</td>
<td>-2.53 (-2.83. -2.19)</td>
<td>0.6 (moderate)</td>
</tr>
<tr>
<td>Sprint 3 (s)</td>
<td>4.79 ± 0.37</td>
<td>4.66 ± 0.19</td>
<td>-2.45 (-5.57. 0.66)</td>
<td>0.5 (small)</td>
</tr>
<tr>
<td>Sprint 4 (s)</td>
<td>4.91 ± 0.41</td>
<td>4.73 ± 0.22</td>
<td>-3.44 (-6.36. -0.51)*</td>
<td>0.7 (moderate)</td>
</tr>
<tr>
<td>Sprint 5 (s)</td>
<td>4.97 ± 0.39</td>
<td>4.75 ± 0.22</td>
<td>-4.08 (-6.72. -1.44)*</td>
<td>1.0 (moderate)</td>
</tr>
<tr>
<td>Sprint 6 (s)</td>
<td>5.07 ± 0.42</td>
<td>4.80 ± 0.24</td>
<td>-5.01 (-7.76. -2.26)*</td>
<td>1.1 (moderate)</td>
</tr>
</tbody>
</table>

RSA = repeated sprints ability; RSA$\text{DEC}$ = sprint decrease; $\Delta\%$ = change percentage; * $p <0.05$; CI 95% = 95% confidence interval.

Figure 2. Effect of training on VO2PEAK
$\Delta\%$ = change percentage; * $p <0.05$; 95% CI = 95% confidence interval.

Table 2. Relationship between $\Delta\%$ VO2PEAK and $\Delta\%$ RSA and $\Delta\%$ Sprints after six weeks of preseason training.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$\Delta%\text{VO}_{\text{PEAK}}$ (ml/kg/min)</th>
<th>$r$</th>
<th>$r^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{RSA}_{\text{PEAK}}$</td>
<td>-0.481</td>
<td>-</td>
<td>0.134</td>
<td></td>
</tr>
<tr>
<td>$\text{RSA}_{\text{MEAN}}$</td>
<td>-0.667</td>
<td>0.383</td>
<td>0.025*</td>
<td></td>
</tr>
<tr>
<td>$\text{RSA}_{\text{TOTAL}}$</td>
<td>-0.673</td>
<td>0.393</td>
<td>0.023*</td>
<td></td>
</tr>
<tr>
<td>$\text{RSA}_{\text{DEC}}$</td>
<td>-0.360</td>
<td>-</td>
<td>0.277</td>
<td></td>
</tr>
<tr>
<td>Sprint 1</td>
<td>-0.315</td>
<td>-</td>
<td>0.346</td>
<td></td>
</tr>
<tr>
<td>Sprint 2</td>
<td>-0.541</td>
<td>-</td>
<td>0.085</td>
<td></td>
</tr>
<tr>
<td>Sprint 3</td>
<td>-0.669</td>
<td>0.387</td>
<td>0.024*</td>
<td></td>
</tr>
<tr>
<td>Sprint 4</td>
<td>-0.659</td>
<td>0.371</td>
<td>0.027*</td>
<td></td>
</tr>
<tr>
<td>Sprint 5</td>
<td>-0.689</td>
<td>0.413</td>
<td>0.021*</td>
<td></td>
</tr>
<tr>
<td>Sprint 6</td>
<td>-0.678</td>
<td>0.400</td>
<td>0.022*</td>
<td></td>
</tr>
</tbody>
</table>

RSA = repeated sprints ability; RSA$\text{DEC}$ = sprint decrease; * $p <0.05$. 
DISCUSSION

The main findings of this study demonstrated that six weeks of technical-tactical + repeated sprints training promoted significant improvements in RSA and aerobic fitness of basketball athletes, and that ~39% of variance of Δ% RSA\textsubscript{MEAN}, Δ% RSA\textsubscript{TOTAL}, Δ% Sprints 3, 4, 5 and 6 was accompanied by Δ% VO\textsubscript{2PEAK} of ~7.5%. These findings add relevant information to the current knowledge and confirm the hypothesis that increased aerobic power is related to the improvement in RSA.

RSA and aerobic power improvement after RST in addition to the technical-tactical training routine is an interesting finding for the context of team sports, considering their specific physical and physiological demands\textsuperscript{2,3,24}. During a basketball game, high-intensity actions (e.g., sprints, jump and specific moves) are repeated 193–214 times\textsuperscript{1,4}, and a sprint movement is performed every 21-39 s. Muscle biopsy analysis has shown that this short interval is able to resynthesize only ~70% of the PCr content relative to the resting level after a 6-s sprint\textsuperscript{25}. Considering this partial PCr resynthesis, it has been argued that aerobic fitness plays an important role in maintaining the performance of active muscles in successive sprints\textsuperscript{18,26}.

McGawley; Bishop\textsuperscript{17} demonstrated an aerobic contribution of ~10% in the first sprint and ~40% in the last effort of five 6-s sprints. More recently, Milioni et al.\textsuperscript{11} also reported a greater aerobic contribution after sprints repetition. These findings are consistent with those of the present study, showing that ~39% of variance in Δ% RSA\textsubscript{MEAN}, Δ% RSA\textsubscript{TOTAL}, Δ% Sprints 3, 4, 5 and 6 were accompanied by an improvement of ~7.5% in Δ% VO\textsubscript{2PEAK}. These relationships found in our study are an interesting finding for coaches and other professionals involved with basketball specifically for confirming that the increase in aerobic power is negatively and strongly related with the ability to prolong peak performance in successive series of sprints during training and / or games. Therefore, professionals involved in the preparation of athletes are encouraged to increase the aerobic power of basketball athletes during training sessions.

From the energetic point of view, the absence of a relationship between Δ%VO\textsubscript{2PEAK} and Δ%RSA\textsubscript{PEAK} can be easily explained. It is well established that during the initial efforts of high intensity and short duration, there is a predominance of the phosphagenic metabolism\textsuperscript{5,12,27}. Classical studies conducted by Gaitanos et al.\textsuperscript{27} and Bogdanis et al.\textsuperscript{12} reported a 57-84% depletion of PCr content in relation to rest, after sprints of 6 and 30 s, respectively. It is important to note that, in our study, Δ%RSA\textsubscript{PEAK} was characterized by sprints 1 or 2, which may explain the absence of correlation with Δ%VO\textsubscript{2PEAK}. Therefore, it is argued that the improvement in the explosive strength of the lower limbs found in RSA\textsubscript{PEAK} is attributed to increased motor unit synchronization, elastic energy stock efficiency during the performance of the stretching-shortening cycle, or musculotendinous stiffness\textsuperscript{26}.

The increase in RSA and aerobic power was previously found after similar experimental design including RST and specific technical-tactical
training in different intermittent sports \(^{10,28,29}\). Bravo et al. \(^{28}\) found similar improvement in VO\(_{2\text{MAX}}\) and superior effect in RSA\(_{\text{MEAN}}\) after seven weeks of RST (all-out sprints with change of direction) when compared to high intensity interval aerobic training (4 series of 4’ at 90–95 % of HR\(_{\text{MAX}}\) and 3’ of active recovery at 60–70% of HR\(_{\text{MAX}}\)) during the competitive period of young soccer athletes. Fernandez-Fernandez et al. \(^{10}\) demonstrated improvement in RSA\(_{\text{MEAN}}\) and VO\(_{2\text{PEAK}}\) (Δ% = 5.39) in tennis athletes after six weeks of RST (all-out sprints with change of direction) during preseason. More recently, Kaynak et al. \(^{29}\) observed improvements in RSA\(_{\text{MEAN}}\), RSA\(_{\text{DEC}}\) and VO\(_{2\text{PEAK}}\) in volleyball athletes after six weeks, 3x/week of RST in the preparatory period. Together, these data demonstrated a parallel increase in the ability to extend maximum performance in successive sprints and aerobic power. In addition, Abdelkrim et al. \(^{1}\) demonstrated that the aerobic power estimated by the 20-m multiple stage test with change of direction was positively related to the time spent in high-intensity activities during the game in U-19 basketball athletes. For these reasons, it would be reasonable to expect that Δ%VO\(_{2\text{PEAK}}\) would have a linear and negative relationship with Δ% RSA\(_{\text{DEC}}\), however, this hypothesis was not supported in our study.

Evidence through muscle biopsy has supported that muscle power recovery is dependent on resynthesis of intramuscular PCr\(^{12,16}\), where low aerobic power is considered a limiting factor of RSA\(^{15}\). Therefore, it is possible that this lack of correlation between Δ%VO\(_{2\text{PEAK}}\) and Δ% RSA\(_{\text{DEC}}\) in our study is associated with the learning effect inherent to the repetition of the stimuli that are similar to the RSA test (e.g., increased coordination and pacing strategies) \(^{30}\). It is noteworthy that despite the strong correlations found in our study, Δ%VO\(_{2\text{PEAK}}\) was accompanied by ~39% of variance (e.g., RSA\(_{\text{MEAN}}\), RSA\(_{\text{TOTAL}}\), Δ% Sprints 3,4,5 and 6) not being able to explain most of it. Thus, it is possible that Δ% RSA\(_{\text{DEC}}\) is attributed to other mechanisms (e.g., neural adaptations, promoting increased intermuscular coordination, recruitment and firing rate of motor units) \(^{26}\). Additionally, it is well established that muscle fatigue (decreased performance) is multifactorial and complex. Therefore, it cannot be only associated with aerobic power. Thus, future investigations should seek to identify other factors that may be associated with the improvement of RSA in a longitudinal way.

From the practical point of view, the findings of the present study provide relevant contributions to coaches and other professionals involved in the preparation of basketball athletes and modalities with similar characteristics. First, it was observed that the increase in aerobic power after six weeks of RST additional to the tactical-technical training was negatively and strongly related to the improvement of the ability to extend peak performance in successive sprints. In basketball, RSA is considered one of the most frequent movements in training and games, and plays an important role for success in sport\(^{8}\). Therefore, coaches and professionals involved with the preparation of athletes should aim at improving aerobic power. Second, RST additional to tactical-technical training appears to be
a strategy capable of promoting neuromuscular adaptations (e.g., RSA_{PEAK} and RSA_{DEC}) and aerobic power. However, it is important to note that in the present study, a control group was not used. Therefore, caution should be taken in interpreting the effect of RST additional to tactical-technical training on aerobic power and RSA, and future investigations should be performed considering a control group. Although the present study adds relevant information to the current knowledge on this subject, this study has some limitations such as the absence of a control group, which could promote greater robustness in the study. However, since it included athletes, it is understandable that athletes could not spend a period of six weeks during the preparatory period without specific training. In addition, it is possible that the additional training of repeated sprints by presenting characteristics similar to the RSA test may have promoted learning effect by the repetition of the movement and therefore, other investigations with different training strategies should verify the effect of VO_{2PEAK} on the improvement of RSA.

**CONCLUSION**

It is possible to conclude that ~39% of the improvement in variables associated with the maintenance of repeated sprints (RSA_{MEAN}, RSA_{TOTAL}, Δ% Sprints 3,4,5 and 6) of basketball athletes was accompanied by an increase of ~7.5% in VO_{2PEAK} after six weeks of repeated sprints training in addition to routine technical-tactical training during preseason. These data demonstrate that coaches and coaching staff should be encouraged to incorporate training strategies that focus on athletes’ aerobic fitness (e.g., RST) in order to promote increased ability to maintaining peak performance in successive sprints required during training and games.

**REFERENCES**


