

Futsal as a therapeutic strategy for individuals with chemical dependence

Futsal como estratégia terapêutica para indivíduos com dependência química

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ABSTRACT

Introduction: Studies show that chronic use of psychoactive substances is associated with reduced cognitive function, in addition to negatively affecting emotional regulation, reinforcing drug use behavior. **Objective:** analyze the acute effect of a futsal match on the state of humor and cognitive function in volunteers with alcohol and drug use disorders attended at CAPS-ad. **Methods:** Participants were divided into two groups: control group (n = 10) and futsal group (n = 10). application of the Brunel mood scale questionnaire and the Corsi cube test at the beginning and end of the match for both groups. **Results:** In the inter-group analysis in the post-intervention stage, rabies (p = 0.008), depression (p = 0.005) and tension (p = 0.009) were observed, and in the intragroup analysis the group playing futsal presented a reduction in factors anger (p = 0.03), depression (p = 0.007) and tension (p = 0.01) evidencing a change in mood. Regarding operational memory, there was an increase in the number of blocks recalled (p = 0.0002) in the inter-group analysis and (p = 0.01) in the futsal group after the intragroup analysis. **Conclusion:** The realization of a futsal match used as a non pharmacological strategy in the treatment of chemical dependents was able to positively modulate mood and cognitive function. However, the futsal game still needs to be further studied as a content option in a regular physical activity program for the treatment of dependents.

Keywords: exercise; affection; cognition; mental health.

RESUMO

Introdução: Estudos mostram que o uso crônico de substâncias psicoativas está associado com redução na função cognitiva, além de afetar de forma negativa a regulação emocional reforçando o comportamento para o uso de drogas. **Objetivo:** analisar o efeito agudo de uma partida de futsal sobre o estado de humor e na função cognitiva em indivíduos toxicodependentes, atendidos no CAPS-ad. **Métodos:** Os participantes foram divididos em dois grupos, Grupo controle (n = 10) e Grupo futsal (n = 10). Para a avaliação do estado de humor foi utilizado à escala de humor de Brunel e o teste de cubos de Corsi para a memória de trabalho visoespacial. **Resultados:** Na análise intergrupos pós-intervenção, verificou-se redução dos fatores raiva (p = 0,008), depressão (p = 0,005) e tensão (p = 0,009). Já na análise intragrupos, o grupo futsal apresentou redução dos fatores raiva (p = 0,03), depressão (p = 0,007) e tensão (p = 0,01) evidenciando mudança no estado de humor. Em relação à memória operacional, houve um aumento na quantidade de blocos recordados (p = 0,0002) na análise intergrupos e intragrupo (p = 0,01) no grupo futsal. **Conclusão:** A realização de uma partida de futsal utilizada como uma estratégia não farmacológica no tratamento de dependentes químicos foi capaz de modular de forma positiva o estado de humor e a função cognitiva destes sujeitos. No entanto, o jogo de futsal ainda precisa ser mais estudado como opção de conteúdo em um programa de atividade física regular para o tratamento de dependentes químicos.

Palavras-chave: exercício; afeto; cognição; saúde mental.

Received: 12 de março de 2020; Accepted: 31 de março de 2021.

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Introduction

Drug addiction has become a serious global health problem [1]. In Brazil, the Unified Health System (SUS) aims to promote the health of the population by providing free care to anyone [2]. Patients with mental disorders, under the SUS, receive care in the Psychosocial Care Network (RAPS) at the points of attendance in Psychosocial Care Center (CAPS) and its different modalities.

CAPS are free community services, designed to treat people with mental illnesses and chemical dependency who need intensive care. The CAPS-ad (ad refers to alcohol and drugs) guarantees specialized care by a multidisciplinary team for people with alcohol and drug use disorders through psychotherapy, pharmacological therapy, biological and social models [3,4].

According to the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (DSM-V), drug addiction is classified as a substance use disorder and other associated disorders [5]. According to the International Classification of Diseases (ICD-10), drug addiction is characterized by the presence of a set of behavioral, physiological, and cognitive symptoms, evidencing the continuous use of a substance, despite significant problems related to the physical and mental health of the use [6].

Neuroimaging studies show that the chronic use of psychoactive substances can promote functional and structural changes in the brain [7]. Changes such as reduced metabolic activity in the prefrontal cortex [8] decreased oxygenation [9] and reduced amount of gray matter in the anterior and prefrontal cingulate cortex have already been reported [10]. Physical exercise has been recommended as a treatment alternative capable of promoting positive effects on cognitive performance, cerebral oxygenation level [13], reduced desire for drugs, improved self-esteem and mood [14]. These results reinforce the role of exercise as an adjunct in the treatment of impaired frontal cortex activity and cognitive function in individuals with drug use disorder. However, as far as we are aware, no study has investigated the effect of sports as a form of non-drug treatment on cognitive function and mood in addicted people.

Thus, the aim of this study was to verify the acute effect of a futsal match on mood and cognitive function in drug addicts treated at the CAPS-ad in the city of Lins/SP.

Methods

Twenty men under treatment for alcohol and drug dependency, attended at CAPS-ad in the city of Lins/SP, voluntarily participated in the study. All the participants in the research sample had practiced futsal for 3 months with a frequency of once a week, unanimously chosen from the options presented as forms of non-pharmacological treatment in CAPS-ad. The inclusion criteria were: aged between 18 and 45 years; diagnosis of drug dependence, guided by the International Classification of

Diseases (ICD-10) regardless of the time of treatment and dependence; no health restrictions and limitations identified by the PAR-Q questionnaire; and no impairment in mental state identified by the mini-mental state examination.

Regarding diagnosis, 15% of participants presented cocaine dependence (erythroxylyum coca), 10% crack (erythroxylyum coca), 60% marijuana (tetrahydrocarbionol), and 80% alcohol. Regarding the use of prescription drugs, 5% used olanzapine, depakote, nortriptyline, amitriptyline, and topiramate, 10% carbamazepine, biperiden, levomepromazine, sertraline, quetiapine, haldol decanoate, and biperdene, 15% respite, and 20% clonazepam.

The project was approved by the research committee under the protocol CAAE: 98155118.2.0000.5379 opinion no. 2,991,593.

After approval by the ethics committee and signing of the TCLE, the subjects participated in two moments of the study. At first, after recruiting the participants, a meeting was held to present the methodology used in the research. At this meeting, the anamnesis, physical activity readiness questionnaire (PAR-Q) [15] and mini-mental status examination [16] were applied. In the second moment, the participants were randomly divided into two groups: (a) "Control group" (GC, n = 10) and (b) "Futsal group" (GF, n = 10). The control group remained at rest in the location, while the futsal group played a futsal match with two 20-minute periods. These periods were separated by a 05-minute interval. The "Brunel Humor Scale Questionnaire" and "Corsi Cube Test" were applied to both groups at the beginning and end of the match.

Protocols

Physical activity readiness questionnaire (PAR-Q): Participants responded to the physical activity readiness questionnaire to identify the need for assessment by a physician before beginning or increasing the level of physical activity.

Mini-state mental examination (MEM): The subjects answered the questionnaire, composed of 11 items that evaluate five areas of cognitive function: orientation, attention, calculation, memory, and language. The maximum possible score is 30 points. All individuals with scores below 29 points were considered to present cognitive impairment.

Brums' mood scale (Brunel) - instrument for detecting the mood state: For the evaluation of mood state, the subjects answered the Brunel questionnaire, which is sensitive and reliable in the evaluation of emotional states [17]. The mood assessment instrument contains 24 items and measures six mood factors: anger, mental confusion, depression, fatigue, tension, and vigor. The items in each subscale are: Anger: annoyed, bitter, angry, bad-tempered; (items 7, 11, 19, 22); Confusion: confused, muddled, mixed-up, uncertain (items 3, 9, 17, 24); Depression: depressed, downhearted, unhappy, miserable; (items 5, 6, 12, 16); Fatigue: worn out, exhausted, sleepy, tired (items 4, 8, 10, 21); Tension: panicky, anxious, worried, nervous; (items 1, 13, 14, 18); Vigor: lively, energetic, active, alert (items 2, 15, 20, 23). The respondents answered

red regarding how they feel about these sensations by means of a 5-point scale (from 0 = none to 4 = extremely).

Corsi blocks test - instrument for assessing visuospatial working memory: The test consisted of the random arrangement of nine blocks in a panel. The evaluator pointed out an increasing sequence of two to nine blocks and the participant was required to repeat the sequence. The test was terminated when the subject reached the maximum sequence, or in the case of two consecutive errors within the same sequence. The score was determined by the maximum sequence of remembered blocks [18].

For analysis of the results, we used descriptive statistics with mean and standard deviation and the data are presented in graphs as median and inter quartile interval. The memory and mood test data were assessed for normality using the Shapiro-Wilk test. The Wilcoxon test was used for the intragroup analysis and the Mann-Whitney test for the intergroup analysis pre and post-match for the mood scale and memory tests. Statistical analysis was performed using GraphPad Prism 6 software. Significance values ($p \leq 0.05$) were considered significant.

Results

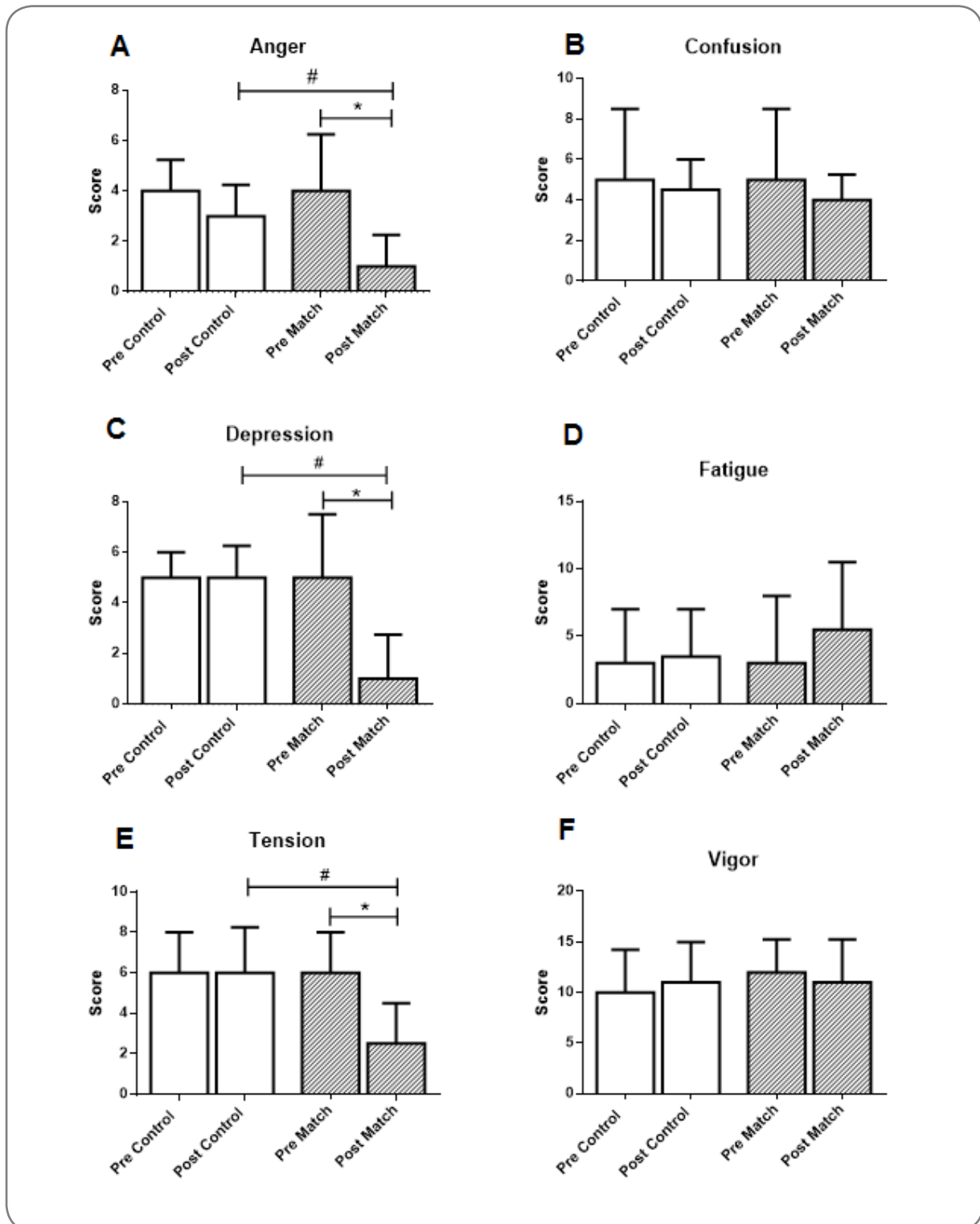
The descriptive data (mean and standard deviation) of the participants characterization variables are shown in table I. There was no difference between the groups.

Table I - Morphofunctional characteristics and treatment time of CAPS-ad volunteers in the city of Lins/SP

Variable	Control group (n = 10)	Futsal group (n = 10)	p
Age (years)	35.1 ± 8.81	34.4 ± 9.51	0.34
Weight (kg)	68.44 ± 12.22	70.33 ± 11.34	0.16
Height (cm)	173.55 ± 0.56	169.55 ± 1.06	0.30
BMI (kg/m ²)	24.75 ± 4.83	23.25 ± 3.99	0.10
Treatment time (months)	35.8 ± 20.74	40.1 ± 16.07	0.13

Values expressed as mean ± standard deviation (SD), BMI (body mass index)

Figure 1 presents the intergroup analysis. During the first stage of the study (pre), none of the mood state factors presented differences (anger, $p = 0.84$, mental confusion $p = 0.79$, depression $p = 0.69$, fatigue, $p = 0.91$, tension $p = 0.95$, and vigor $p = 0.28$). On the other hand, during the second stage (post), the intergroup analysis showed a significant difference in the factors of anger (A, $p = 0.008$), depression (C, $p = 0.005$), and tension (E, $p = 0.009$).

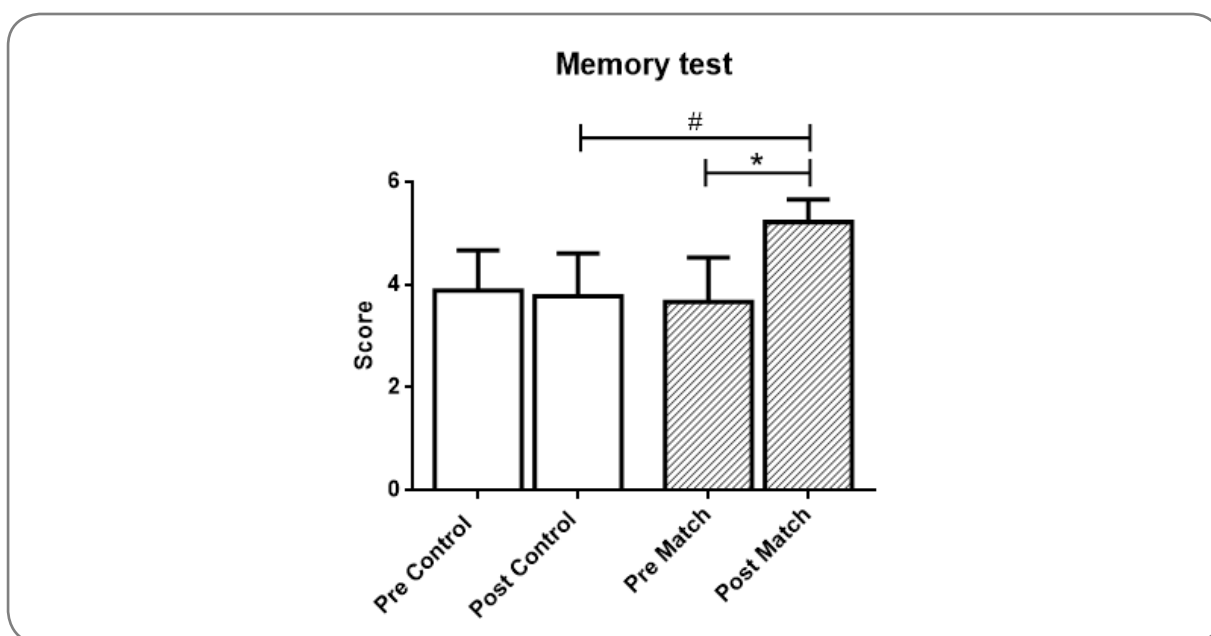


The data correspond to the median and inter quartile difference of $n = 10$ participants per group; * $p \leq 0.05$ significant difference in the pre and post futsal intragroup analysis. # $p \leq 0.05$ significant difference intergroup of the control group and intervention after futsal match

Figure 1 - Presentation of the results on mood (A), confusion (B), depression (C), fatigue (D), tension (E), and vigor (F) levels; from the division of groups in table 1

In the intra-group analysis between the pre and post stages, the control group did not present significant differences in any of the factors of the mood scale (rage $p = 0.17$, confusion $p = 0.79$, depression $p = 0.75$, fatigue $p = 0.71$, tension $p = 0.37$, and force $p = 0.15$), whereas the intervention group with futsal presented significant differences in the factors of anger (A, $p = 0.03$), depression (C, $p = 0.007$), and tension (E, $p = 0.01$).

The results of the inter-group analysis of the operational memory test (Corsi blocks) at the pre-futsal moment presented no significant difference ($p = 0.59$), on the other hand there was a significant difference post-intervention ($p = 0.001$), with the futsal group recalling a larger number of blocks when compared to the control group. In the intra-group analysis, no significant difference was found in the control group ($p = 0.99$), but a significant difference was observed in the number of blocks remembered in the intervention group with futsal ($p = 0.01$).



Values presented as median and inter quartile range. * $P \leq 0.05$ significant difference in the pre and post futsal intragroup analysis. # $p \leq 0.05$ significant difference intergroup of the control group and intervention after futsal match

Figure 2 - Corsi memory test, $n = 10$ participants per group

Discussion

In the context of the treatment of chemical dependence, the search for intervention strategies that aid in treatment and recovery continues to challenge researchers [19]. In this study, the results suggest that the acute effect of exercise in a futsal match can produce beneficial changes in the state of mood and cognitive function, corroborating with the growth of information in the literature that evidence the beneficial effects of exercise as a non-pharmaceutical form of treatment in people affected by disorders resulting from the use of alcohol and drugs, such as attention deficit and changes in mood state [20,21]. Analyzing the data collected by the BRUMS mood scale in the present study, it is possible to observe significant changes

suggested as positive [22] in the variables “anger”, “depression” and “tension” of the participants, after the futsal match. In relation to the mood state, a previous study with soccer for drug addicts, showed that the sports practice was able to improve the mood state for up to four hours after the activity [14]. Another relevant factor is the preference for the type of exercise in a playful way [24,25]. According to the authors, there was an improvement in well-being after the exercise sessions in which the participants chose their favorite exercise, when compared to the session of less desirable exercise. In the present study, the futsal match was the favorite exercise chosen by the participants with a ludic objective and self-selected intensity as a form of treatment in the CAPS-ad in Lins/SP.

Regarding the tension factor, a positive effect was observed in the post-futsal moment in relation to the control group. This effect can be considered a relevant response to the exercise carried out through the futsal match, helping to combat the mechanisms of positive reinforcement (impulsiveness) and negative reinforcement (compulsion) in chemical dependency [27].

These results corroborate another study [34] that verified the mood state before and after an exercise session of approximately 60 minutes composed of stretching exercise (15 minutes), strength, balance, motor coordination (30 minutes), and a walk (12 minutes).

Another study [28], conducted with a focus on the withdrawal phase in crack users, found a significant improvement in tension after an intermittent workout of non-aerobic exercise with an active interval. These results can be explained by psychophysiological, physiological, and biochemical mechanisms that are involved in the relationship between mood state and physical exercise [29-21].

The confusion, fatigue and vigor variables did not present significant differences between the groups, possibly they were less sensitive to the acute exercise after the futsal match of the studied sample. These results may be associated with low intensity of the match, made possible by the self-selection of the intensity by the participants in the playful context of the game, reducing the psychophysiological stress that affects the state of mood [30]. Data from the literature point out that high-intensity acute physical exercise leads to a temporary hypoxia condition responsible for altering the mood state [31].

Analyzing the data on the operational memory of the visuospatial loop, through the Corsi block test, it was possible to observe a significantly better performance in the extension of the memorized number sequence, after the futsal match (Figure 2).

This relationship between memory of the spatial position of the researcher's finger touching the blocks captured by the eyes of the evaluated individual suggests optimization of the information storage process mediated by the acute effect of the exercise. These results agree with another study that found a significant improvement in the operational memory test in volunteers with chemical dependence after an exercise session [32]. The authors emphasized the importance of exercise and its

beneficial effects on mental health in the daily life of people in the process of treatment for chemical dependence under the guidance of the physical education professional. Attention, memory, and planning are fundamental actions in daily life, helping to recover abilities lost using drugs, besides helping to avoid relapses in people with chemical dependence [4,10].

According to recent data in the literature, exercise has a positive influence on modulation of brain-derived neurotrophic factors (BDNF), insulin-like growth factor-1 (IGF-1), and vascular endothelial growth factor (VEGF), suggested as the main elements involved in mechanisms related to cognition [33]. Studies show that exercise at moderate intensities is capable to improve oxygenation levels, especially in the region of the prefrontal cortex in chemical dependents, contributing to the modulation of epigenetic factors such as the improvement in DNA methylation, and modifications in histone proteins and microRNA expression involved in cognitive performance [13,34].

Together with information in the literature, our data corroborate the hypothesis that the acute effect of exercise can modulate beneficial mood state and cognitive function. The cross-sectional design of the present study can be considered a limitation, since it is not possible to affirm that the results verified here present significant chronic alterations.

Other limiting factors of the study still need to be further studied, such as control to characterize the intensity of the exercise-game, the amount and type of medication administered, as well as classification of the level of dependence and the time of illness/hospitalization. Thus, it was possible to observe that the acute effect of exercise in a futsal match proved to be an effective non-pharmacological strategy in the improvement of mood and cognitive function.

Conclusion

The performance of a futsal match used as a non-pharmacological strategy in the treatment of chemical dependency was able to positively modulate the mood state and cognitive function of the studied population. In view of these findings, it is suggested that the futsal modality may be a viable treatment strategy for this population. However, the futsal game still needs to be further studied to verify the chronic effects on the rehabilitation and treatment of chemical dependents.

Conflict of interest

No conflict of interest with relevant potential.

Financing source

There were no external sources of funding for this study.

Author's contributions

Conception and design of the research: Silva Junior OT, Venditti JR, Santos JW. **Data collection, statistical analysis and writing of the manuscript:** Silva Junior OT. **Critical review of the manuscript:** Silva Junior OT, Venditti JR, Santos JW.

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