Analysis of the relationship between low back pain and jiu-jitsu: A cross-sectional study

Análise da relação entre dor lombar e jiu-jitsu: um estudo transversal

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Abstract

Introduction: Jiu-jitsu is a contact sport with great physical demand, which presents a high prevalence of injuries in its practitioners. Low back pain (LBP) is among the most common problems in sport, however there are some gaps in the literature regarding its relationship with the practice of jiu-jitsu. **Objective:** To identify the prevalence and factors associated with LBP in recreational jiu-jitsu practitioners. Methods: This is a cross-sectional and analytical observational study, carried out using an online form, containing information related to the practice of jiu-jitsu and injury history. The chi-square test was used to analyze the association between variables and Poisson regression with robust estimation to determine the prevalence ratio for variables with more than two categories, considering significant values of $p < 0.05$. **Results:** One hundred three jiu-Jitsu practitioners participated, 72.8% male and 27.2% female, with an average age of 29 years. The prevalence of LBP among practitioners was 49%. There was no association with low back pain and preferred position in jiu-jitsu practitioners. **Conclusion:** Factors such as length of practice and previous episode of low back pain appear to be associated with a higher prevalence of low back pain in jiu-jitsu practitioners. Furthermore, practitioners believe that performing jiu-jitsu can be a protective factor for low back pain episodes.

Keywords: Martial arts. Athletic injuries. Cross-sectional studies. Low back pain.

Resumo

Introdução: *O jiu-jitsu é um esporte de contato e grande demanda física, que apresenta uma alta prevalência de lesões em seus praticantes. A dor lombar (DL) está entre os problemas mais comuns no esporte, no entanto existem algumas lacunas na literatura quanto a sua relação com a prática do jiu-jitsu.* ***Objetivo:*** *Identificar a prevalência e os fatores associados à DL em praticantes recreacionais de jiu-jitsu.* ***Métodos:*** *Trata-se de um estudo observacional do tipo transversal e de caráter analítico, realizado por meio de um formulário online, contendo informações relacionadas à prática do jiu-jitsu e histórico de lesões. Utilizou-se o teste qui-quadrado para análise de associação entre as variáveis e a regressão de Poisson com estimação robusta para determinação da razão de prevalência para variáveis com mais de duas categorias, considerando significativos valores de p < 0,05.* ***Resultados:*** *Participaram 103 praticantes de jiu-jitsu, sendo 72,8% do sexo masculino e 27,2% do sexo feminino, com média de idade de 29 anos. A prevalência de DL entre os praticantes foi de 49%. Não houve associação com a dor lombar e posição de preferência dos praticantes de jiu-jitsu.* ***Conclusão:*** *Fatores como tempo de prática e episódio anterior de dor lombar parecem estar associados à maior prevalência de dor lombar em praticantes de jiu-jitsu. Além disso, os praticantes acreditam que a realização do jiu-jitsu pode ser um fator de proteção para episódios de dor lombar.*

Palavras-chave: *Artes marciais. Lesões do esporte. Estudo de prevalência. Dor lombar.*

Introduction

Jiu-jitsu is a contact martial art developed over 2,500 years ago, with the goal of promoting body self-awareness and self-defense. Also known as the "gentle art", it gained greater recognition in Japan, where it is widely practiced, and was introduced to Brazil during World War II through Japanese immigrants. Its rise in popularity occurred in the 1990s with the establishment of the Jiu-Jitsu World Championship in Rio de Janeiro.[1] In Brazil, it is referred to as Brazilian jiu-jitsu.[2]

This sport involves specific movements and body leverage techniques used for chokes, throws (take-downs), and joint locks.[3] In jiu-jitsu practice, tactical movements are performed to execute offensive and defensive actions, which are based on the phases of setup, sweep, guard passing, and guard control. Accordingly, there are preferred positions in the sport, in which the practitioner may be on top, aiming to pass the opponent's guard this role is known as the "passador" (passer). Conversely, when the practitioner is positioned underneath during a match and attempts to reverse or submit the opponent, they are referred to as the "guardeiro" (guard player) (Figure 1).

Figure 1 - Passer (brown gi) and guard player (blue gi).

Despite being referred to as the "gentle art", this sport involves high physical demands due to the repetitive nature of training, the falls experienced, the forces applied during both offensive movements and defensive maneuvers, as well as accidental collisions between practitioners.[4] As a result, various parts of the body especially the joints are susceptible to overload and, consequently, at higher risk of injury.

It is estimated that nine out of ten jiu-jitsu practitioners have experienced some type of injury related to the sport,[5] with the most commonly affected areas being

the knee (71%), spine (29%), shoulders (29%), elbow (26%), and ankle (19%).[4,6] In 2021, the Global Burden of Disease study[7] reported that low back pain (LBP) affected approximately 691 million people worldwide and emerged as one of the leading contributors to global disability, ranking ninth in terms of global disease burden, as measured by disability-adjusted life years.

LBP is identified as the leading cause of disability in adults, regardless of age group. According to data provided by the World Health Organization (WHO),[8] musculoskeletal disorders are among the most disabling clinical conditions.

In most cases, LBP is considered nonspecific when there is no apparent cause for its occurrence.[9] However, certain factors have been described in the literature as being associated with its onset, such as sedentary behavior, obesity, and overload, among others.[10] A previous study reported a high prevalence of chronic LBP among recreational and professional jiu-jitsu athletes, with a higher incidence among professionals, which may be related to the greater training demands experienced by this group.[11]

There are few studies involving practitioners of this sport, especially regarding potential factors associated with lumbar spine issues. A previous study by Reis et al.[11] reported the prevalence of LBP in recreational and professional jiu-jitsu practitioners but did not explore the factors that could be associated with this condition. The present study aims to provide a deeper understanding of these factors among jiu-jitsu practitioners, taking into account characteristics of the sport, such as preferred fighting position, training methods, and length of practice, as well as pain-related characteristics, including duration, intensity, and other repercussions that may be associated with the condition. Thus, the objective of this study is to identify factors associated with LBP in recreational jiu-jitsu practioners.

Methods

This is an analytical cross-sectional observational study that followed the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) for observational epidemiological research.[12] The study protocol was approved by the Research Ethics Committee of the Federal University of Rio Grande do Norte (FACISA/UFRN), under approval number 4.923.538 (CAAE: 50855021.5.0000.5568).

Data were collected through an online questionnaire created by the researchers using the Google Forms platform, targeting recreational jiu-jitsu practitioners from all regions of Brazil. The questionnaire was developed based on the characteristics of the sport and the main risk factors identified in previous studies on the topic, such as that of Reis et al.[11] in 2015. The questionnaire was divided into two sections, containing both closed-ended and open-ended questions.

The first section included personal information and ten questions related to jiu-jitsu practice, such as belt rank, weekly training frequency, duration of each training session, history of LBP associated with the sport, and participation in other physical activities. The second section comprised 16 questions focusing on pain characteristics, addressed to participants who reported LBP in the past three months, assessed through recall. Pain intensity was self-reported using the Numeric Pain Rating Scale (NPRS), which consists of 11 points, where zero indicates "no pain" and ten represents "the worst pain imaginable."[13] Additional questions addressed treatment methods, recovery time, and whether participants returned to the sport or discontinued practice.

The inclusion criteria adopted were: age over 18 years, a minimum of six months of jiu-jitsu practice, and training frequency of at least once per week. A recreational practitioner was defined as someone who does not participate in international competitions and does not compete in more than one national-level event per year.

Participants were invited to take part voluntarily and were recruited through martial arts academies and clubs, as well as via social media platforms including Whats App, Instagram, and YouTube. Individuals who submitted incomplete or incorrectly filled questionnaires, or who did not complete the survey by submitting their responses, were excluded.

Before inclusion in the study, all participants accessed and signed an online informed consent form, in which they were informed about the study's objectives and relevance. Anonymity and autonomy were guaranteed. To ensure the safety and protection of participant data, only one computer, secured with antivirus software, was used, and only one researcher had access to the data.

The sample size was calculated based on the prevalence of the outcome of LBP, which is 6.5% among jiu-jitsu practitioners, according to data from Moriarty et al.[6] The sample size calculation was performed using the following equation: $\{[\mu^2 \times p(1-p)]\}/\varepsilon^2$, where μ is the confidence limit for a 5% sampling error (μ = 1.96), p is the estimated prevalence of the outcome (p = 6.5%), and ε is the margin of error for the estimated prevalence (ε = 5%). Based on this formula, a sample size of 87 practitioners was projected. However, to account for selection bias and systematic errors, the sample size was increased by 20%, resulting in a total of 105 participants anticipated for this study.

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 20.0 for Windows. Descriptive analysis was conducted to characterize the sample and the questionnaire responses, using absolute and relative frequencies for categorical variables. For the analysis of associations between variables, the chi-square test was used for bivariate analysis, and Poisson regression with robust variance estimation was applied to determine the prevalence ratio for variables with more than two categories, considering p-values < 0.05 as statistically significant.

Results

The online form collected 103 responses, reaching 98% of the expected sample size. Participants weight, height, and age were described using mean and standard deviation. The mean age was 29 ± 7.63 years, with a predominance of male participants. The average body weight was 80.90 ± 18.40 kg, and the average height was 1.72 ± 0.09 meters. Regarding body mass index (BMI), according to the WHO classification, the majority of participants (70%) were above the ideal weight for their height.

With respect to jiu-jitsu ranking level, 32% of participants were considered beginners (white belt), while most (45%) were at the intermediate level (31.1% blue belt and 13.6% purple belt). A smaller proportion were advanced practitioners (10.7% brown belt and 12.6% black belt). Regarding training experience, approximately 75% of the participants had more than one year of practice. In terms of preferred fighting position, 66% identified as "passadores" (top position fighters) in most sparring situations, while 34% identified as "guardeiros" (bottom position fighters). As for training duration, the majority (95%) reported training for more than one hour per session. The data are presented in Table 1.

Table 1 - Descriptive analysis of the jiu-jitsu study participants

Variable	n (%)
Sex	
Male	75 (72.8)
Female	28 (27.2)
Body mass index	
Normal weight	31 (30.1)
Overweight	52 (50.5)
Obesity	20 (19.4)
Belt/Rank	
White	33 (32.0)
Blue	32 (31.1)
Purple	14 (13.6)
Brown	11 (10.7)
Black	13 (12.6)
Training duration	
6 months to 2 years	26 (25.2)
2 to 5 years	29 (28.1)
5 years or more	48 (46.6)
Preferred position in pratice	
Passers	68 (66.0)
Guard players	35 (34.0)
Training frequency per week	
1 to 2 times	14 (29.2)
3 to 4 times	48 (46.6)
5 to 6 times	41 (39.8)
Low back pain prevalence	
Yes	50 (49.0)
No	53 (51.0)

The overall prevalence of LBP in the sample was 49%, corresponding to 50 participants, of whom 52% reported experiencing LBP prior to practicing the sport and 48% after starting it. In inferential statistics, Poisson regression analysis revealed a significant association between LBP in jiu-jitsu practitioners and the following variables: length of time practicing the sport (p = 0.035) and a previous episode of LBP (p = 0.014). Table 2 presents the association tests for all variables analyzed in the study.

Table 2 - Association between the outcome of low back pain and the independent variables of the study

Variable	Low back pain n (%)		Unadjusted	
	Absent	Present	p-value	OR (CI 95%)
Sex				
Male	39 (52.0)	36 (48.0)	-	1
Female	15 (53.6)	13 (46.4)	0.888	0.97 (0.61-1.54)
Body mass index				
Normal weight	18 (58.1)	13 (41.9)	-	1
Overweight	27 (51.9)	25 (48.1)	0.595	1.15 (0.69-1.90)
Obesity	9 (45.0)	11 (55.0)	0.356	1.31 (0.74-2.33)
Belt/ranking				
White (beginner)	22 (66.7)	11 (33.3)	-	1
Blue and purple (intermediate)	22 (47.8)	24 (52.2)	0.116	1.56 (0.89-2.74)
Brown and black (advanced)	10 (41.7)	14 (58.3)	0.064	1.75 (0.97-3.16)
Practice duration				
6 months to 2 years	20 (76.9)	6 (23.1)	-	1
2 to 5 years	11 (37.9)	18 (62.1)	0.011	2.69 (1.26-5.76)
5 years or more	23 (47.9)	25 (52.1)	0.035	2.26 (1.06-4.81)
Preferred position during pratice				
Passers	40 (58.8)	28 (41.2)		1
Guard players	14 (40.0)	21 (60.0)	0.061	1.46 (0.98-2.16)
Training frequency per week				
1 to 2 times	6 (42.9)	8 (57.1)	-	1
3 to 4 times	25 (52.1)	23 (47.9)	0.526	0.84 (0.49-1.44)
5 to 6 times	23 (56.1)	18 (43.9)	0.368	0.77 (0.43-1.36)
Previous episode of low back pain				
No	17 (73.9)	6 (26.1)		1
Yes	9 (33.3)	18 (66.7)	0.014	2.55 (1.21-5.38)

Note: OR = odds ratio; CI = confidence interval.

For participants who reported experiencing LBP, three variables were assessed: pain intensity, time away from the sport, and recovery resources used. The overall mean pain score was 5.40 ± 2.68 on the Numerical Pain Rating Scale, corresponding to moderate pain. Regarding time away from the sport, 32% reported being absent for one month or more, 20% needed one week or more, and the remaining 48% either did not stop training or were away for less than one week. As for recovery, 32% recovered with rest only, 28% used medication, 18% underwent physical therapy, and 22% stated they had not fully recovered. Concerning participants' perceptions of the sport, 72% believe that practicing jiu-jitsu may serve as a protective factor against LBP, and only 12% reported considering quitting the sport due to this condition.

Discussion

This study aimed to investigate factors associated with LBP in jiu-jitsu practitioners. The prevalence of LBP among recreational practitioners was 49%, meaning slightly fewer than five out of every ten participants. In the general population, approximately eight out of ten individuals will experience LBP at some point in their lives,[14] and six out of ten within a one-year period.[15] A slightly lower value was observed in our sample, which may be related to the level of physical activity practiced by the participants. Shiri and Falah-Hassani,[16] in a systematic review including 36 studies, found that individuals who engage in regular physical activity have an 11% to 16% lower chance of developing LBP.

Additionally, the reviews by Ciaccioni et al.[17] and Moore et al.[18] have shown that practicing jiu-jitsu is one of the martial arts that effectively promotes mental health and well-being. According to data from Tarver and Levy,[19] jiu-jitsu also provides physical conditioning benefits, including reductions in body fat and blood pressure, as well as improvements in flexibility and cardiovascular function. These effects contribute to increased motivation among practitioners to continue engaging in the sport.

The prevalence of LBP reported during recreational practice was 30%, which is notably lower than the 88.9% found by Reis et al.,[11] whose sample included professional athletes training up to seven days a week and as many as six hours per day. The lack of adequate rest between training sessions may contribute to overload, as the American College of Sports Medicine (ACSM)[20] recommends at least 48 hours of rest for exercised muscle groups something that may not be feasible with training frequencies of five or more sessions per week, especially when more than one session occurs per day.

Among recreational practitioners, Reis et al.[11] found a persistence of chronic LBP in 72.2% of cases, while in our data, only 10% of the total sample reported not having recovered after one month or more, suggesting a lower likelihood of pain chronification. Factors such as duration of jiu-jitsu practice and previous episodes of LBP were associated with a higher prevalence of LBP among practitioners, which may be related to longer exposure time or to a continued susceptibility resulting from previous episodes.

According to the present study, there was no difference in LBP prevalence between male and female jiu-jitsu practitioners. Similarly, in the study by Moriarty et al.[6] with a sample of 1,287 practitioners, where the prevalence of LBP in women was only 15.5%, sex was not found to influence overall injury risk. These findings contrast with data from the general population, where LBP prevalence in men is approximately two-thirds that observed in women.[21] This may suggest that women who practice jiu-jitsu have a lower prevalence of LBP compared to the general population, which could indicate a potential protective factor of sport participation against LBP development.

In the present study, no association was found between preferred fighting position and LBP among jiu-jitsu practitioners. On the other hand, an association was observed between LBP and duration of practice, a finding also reported in another study with a larger sample size.[6] This factor may be linked to increased exposure time in the sport, as prolonged practice may heighten the risk of LBP, even if it also leads to greater technical experience.

Based on the findings regarding injury severity, it is evident that more than half of the injuries reported did not have a significant impact on the practitioners. When asked about quitting the sport, nearly 90% stated they had never considered this possibility. These results are similar to those found in the study by Reis et al.,[11] in which the Quebec disability questionnaire was applied and athletes scored low, indicating minimal or no disability caused by pain.

Regarding the athletes perceptions, most believe that practicing jiu-jitsu can help prevent LBP. This perception is partially supported by current literature on LBP, which highlights physical activity, muscle strengthening, and body control as effective strategies for both prevention and treatment.[22,23] However, the competitive nature of the sport may present risks, especially when athletes push their physical limits. A lack of body awareness or excessive competitiveness may increase the likelihood of injury.

Future studies with longitudinal designs are needed to establish causal relationships between the associated factors identified in this study, as well as to evaluate the effectiveness of preventive measures that can be inferred from the present findings. These include: favoring the guard position during the initial months of training; accounting for prior history of LBP; assessing core muscle conditioning before starting jiu-jitsu; beginning with a lower training frequency and progressively increasing it while maintaining adequate rest periods. These recommendations are supported by the findings of Zemková et al.,[24] who reported that many athletic injuries result from a rapid increase in training volume or from excessive workloads.

This study has several limitations. These include the absence of specific research instruments for assessing LBP and the lack of physical evaluation of variables such as muscle strength, mobility, and flexibility. The self-reported nature of the questionnaire also requires a certain level of education, potentially limiting participation. Furthermore, the need for an electronic device and internet access may have excluded individuals from lower socioeconomic backgrounds. Another limitation is the lack of a clearly defined criterion for the

duration and recurrence of LBP in the questionnaire. Finally, as this was a cross-sectional study, it is difficult to infer causality between LBP and jiu-jitsu practice, highlighting the need for longitudinal studies to better understand this phenomenon.

Conclusion

This study suggests that factors such as longer jiu-jitsu practice duration and previous episodes of LBP are associated with a higher prevalence of LBP among practitioners, likely due to increased exposure over time. Nevertheless, participants perceive jiu-jitsu practice as a potential protective factor against LBP episodes. This perception reinforces the value of engaging in the sport, even at a recreational level, as a means of promoting physical activity and preventing musculoskeletal injuries.

Authors' contributions

All authors contributed substantially to the conception of this manuscript. MAF, VBL, and CAMS were responsible for all stages of the study, including its conception and design, literature review, data collection, and manuscript drafting. SJCA, CGS, and EMFL contributed to the study design, data interpretation and analysis, and critical review of the manuscript. All authors reviewed and approved the final version.

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