EPIDEMIOLOGY OF ORTHOPEDIC INJURIES IN JIU-JITSU ATHLETES

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ABSTRACT

Objective: This study aims to identify the epidemiology of orthopedic injuries in jiu-jitsu practitioners. Methods: Ninety-six jiu-jitsu practitioners aged between 18 and 45 years, male and female, answered a questionnaire addressing personal data and history of injuries related to the sport during the last 24 months. Results: In the period covered, 85% of the sample presented injuries related to the practice of jiu-jitsu, with an average of 60 days of absenteeism from sports practice. Fingers, shoulders, and knees were the joints most affected by orthopedic injuries. Conclusion: Orthopedic injuries are quite prevalent among jiu-jitsu practitioners, often distancing athletes from the sport. Level of Evidence IV, case series / cross sectional study.

Keywords: Athletic Injuries. Martial Arts. Epidemiology.

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INTRODUCTION

Jiu-jitsu originated during feudal times in Japan as an art based on throwing, hitting, kicking, striking, choking, twisting members, and immobilizing the opponent. However, only after the second half of the 16th century jiu-jitsu began to be practiced and taught in a systematized manner. Many Japanese migrated to the West after World War I, especially to Brazil, spreading jiu-jitsu throughout the country; since then, jiu-jitsu has been a widely spread and practiced martial art. Currently, jiu-jitsu is worldwide known as Brazilian jiu-jitsu and represented by the International Brazilian Jiu-Jitsu Federation (IBJJF). Athletes are divided according to belts (graduation), age group, and weight. Fighting time is determined based on combatants’ belt and category. Within the adults category (18 to 29 years), fighting time ranges from 5 to 10 minutes according to belt. In the Master category, fighting time is 5 minutes regardless of belt. In jiu-jitsu, the goal is to finish the fight using projections, chokes, twists, and immobilizations, often with joint blockage, which may result in various types of lesions, predominantly orthopedic.¹⁻⁵

These fights are characterized by unexpected, fast, repetitive, and high-intensity effort movements, subjecting joints and muscles to an intense overload. Added to the large number of competitions and training intensity, these factors incur in many musculoskeletal injuries.⁵ Many epidemiological studies in the world literature investigate injuries suffered in various martial arts, such as judo, karate, taekwondo, and mixed martial arts (MMA). However, studies associating injuries with jiu-jitsu practice are still scarce. Studies show that the incidence of musculoskeletal injuries associated with jiu-jitsu practice is similar to that found for other martial arts, and that knees, elbows, and other joints commonly subjected to the torsional mechanism are the most common injury sites.²⁻³,⁵ Studies that assess various modalities epidemiology and compare injuries incidence among them on competitions such as the Olympics and high school and university championships are fairly common in the literature.⁶⁻⁹ And, although these studies do not include jiu-jitsu, they serve as basis for comparing the epidemiology of other modalities, including fights as judo and wrestling.²⁻⁷⁻¹⁰⁻¹²

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The study was conducted at the Universidade Federal de São Paulo, Paulista School of Medicine, Sports Traumatology Center. Correspondence: Alexandre Pedro Nicolini, Rua Estado de Israel, 636, São Paulo, SP, Brazil, 04022001. apnicolini@uol.com.br

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Musculoskeletal injuries account for about 80% of sports injuries. Thus, the number of orthopedic injuries has increased alongside the exponential increase in sports practice by the general population (including at age groups extremes).\textsuperscript{12-14}

Many are the categories attributed for sports injuries, such as: those that lead to the interruption of sports practice and/or competitions, those that lead to a decrease in activity level, or those that require treatment, whether surgical or non-surgical. Injuries may be classified according to their severity, absence period from sports practice, length of treatment, nature of the injury, and injury profile (type).\textsuperscript{13-15} indicating that understanding sports injuries helps to predict and prevent future injuries.\textsuperscript{8,15}

Most musculoskeletal injuries are minor contusions, sprains, and muscle injuries (54%) that entail but a short absence from activities.\textsuperscript{12-16}

This study aims to identify the epidemiology of orthopedic injuries in jiu-jitsu practitioners. Epidemiological studies are extremely important for establishing literary data, developing preventive methods, comparing sports modalities, and even implementing or changing rules.

MATERIALS AND METHODS

Study design

This is a questionnaire-based cross-sectional study conducted with jiu-jitsu practitioners over 18 years old. The questionnaire (Appendix 1) collected personal data and history of orthopedic injuries related to the sport in the last 2 years through questions addressing the number of injuries, affected site, whether injuries occurred during training or competition, and the treatment received. This project was approved by the Ethics and Research Committee of the Universidade Federal de São Paulo – UNIFESP (opinion no: 52533815.2.0000.5505).

All participants signed the informed consent form. Data was collected using the Referred Morbidity survey, tested by Pastre et al.\textsuperscript{17} and validated for the modality at stake.

Participants

Male and female jiu-jitsu practitioners for at least 12 months, from different training centers in the Metropolitan Region of São Paulo from October to December 2019, and over 18 years of age were considered eligible for the study.

Inclusion criteria

Male and female jiu-jitsu practitioners for at least 12 months, aged between 18 and 45 years, and with a minimum training frequency of twice a week were included in the study.

Exclusion criteria

Individuals outside the stipulated age range, practicing jiu-jitsu for less than 12 months and less than twice a week, who had recently undergone surgical procedure and returned to the practice within 1 year of the evaluation were excluded from the research. In total, 96 practitioners answered the questionnaire, 82 males and 14 females.

RESULTS

The initial analysis concerns participants’ data (Table 1). Regarding gender, 85% of the participants were male and 15% female. The sample average age was 27.65 (± 1.42).

As for athletes’ graduation, we observed the following distribution:

| Belts | Athletes |
|-------|----------|
| White | 25       |
| Blue  | 25       |
| Purple| 16       |
| Brown | 9        |
| Black | 21       |
| Total | 96       |

Eighty-one participants (84% of the sample) suffered some type of orthopedic injury in the last 2 years (Figure 1), totaling 229 injuries. Of these, 69 were male (84%) and 12, female (86%).

With that, we analyzed the moment at which injury occurred and which anatomical region was affected. Regarding affected site, we found the following distribution (Table 4):

Table 1. Representativeness of graduation.

| Belts | Athletes |
|-------|----------|
| White | 25       |
| Blue  | 25       |
| Purple| 16       |
| Brown | 9        |
| Black | 21       |
| Total | 96       |

Table 2. Description of weekly training frequency.

| Frequency training sessions/week | n   | %    |
|----------------------------------|-----|------|
| 2                                | 26  | 27%  |
| 3                                | 17  | 18%  |
| 4                                | 13  | 13%  |
| 5                                | 18  | 19%  |
| 6                                | 7   | 7%   |
| 7                                | 3   | 3%   |
| 8                                | 3   | 3%   |
| 9                                | 4   | 4%   |
| 10                               | 4   | 4%   |
| 11                               | 1   | 1%   |
| Total                            | 96  | 100% |

Table 3. Yearly number of competitions.

| Competitions frequency | n   | %    |
|------------------------|-----|------|
| Not reported           | 25  | 26%  |
| None                   | 19  | 20%  |
| 1                      | 10  | 10%  |
| 2                      | 14  | 15%  |
| 3                      | 1   | 1%   |
| 4                      | 5   | 5%   |
| 5                      | 5   | 5%   |
| 6                      | 5   | 5%   |
| 8                      | 4   | 4%   |

Figure 1. Number of participants who reported orthopedic injuries.
Table 4. Injury site

| Site         | Male | Female | Total |
|--------------|------|--------|-------|
| Cervical spine | 4    | 2      | 6     |
| Thoracic spine  | 2    | 1      | 3     |
| Lumbar spine  | 12   | 5      | 17    |
| Chirodactyls | 44   | 11     | 55    |
| Wrist        | 11   | 2      | 13    |
| Elbow        | 16   | 5      | 21    |
| Shoulder     | 37   | 4      | 41    |
| Hip          | 7    | 0      | 7     |
| Knee         | 32   | 5      | 37    |
| Ankle        | 19   | 3      | 22    |
| Pododactiles | 5    | 2      | 7     |
| Total        | 189  | 40     | 229   |

Chirodactyls were the most injured site during jiu-jitsu practice, with 24% of total injuries, followed by shoulder, knee, and ankles (Figure 2).

Regarding the moment of injury, practitioners reported whether it occurred during training or competition, and injuries during training were more common than those occurred during competitions, as shown in Figure 3.

After investigating lesions and most affected anatomical regions, we studied treatment approaches. The first variable concerned the search for medical intervention. Only 65% of the practitioners who got injured in the last 24 months sought medical attention. Among the 35% who did not, 21% reported self-treatment (Figure 4).

As for received medical treatment, we obtained the following distribution (Table 5):

Table 5. Received medical treatment.

| Performed procedure | n   |
|---------------------|-----|
| Surgery             | 4   |
| Immobilization      | 11  |
| Physical therapy    | 21  |
| Medication          | 18  |

Table 6 shows data on subjects who performed self-treatment.

Table 6. Self-treatment performed.

| Treatment            | n   |
|----------------------|-----|
| Immobilization       | 7   |
| Physical therapy     | 5   |
| Medication           | 12  |

Average absenteeism period was 63.33 (± 4.48) days among men and 58.63 (± 8.40) among women. Regarding post-injury return to sports, 22% of practitioners reported returning at the same or higher level than pre-injury, 60% reported returning at a level lower level, and approximately 18% did not inform.

DISCUSSION

Among the 96 practitioners who answered the questionnaire, 13 men and two women reported having suffered no injury during jiu-jitsu practice in the last 2 years, whereas 81 participants had at least one orthopedic injury – a significant percentage. These injuries incur long periods of sport absence and loss of training, physical fitness, and even financial resources for professional athletes. In our sample, chirodactyls, shoulder, knee, ankle, elbow, and lumbar spine were the most affected sites, which may be explained by the movements mechanics and strikes inherent to jiu-jitsu. Chirodactyl injuries are quite common due to kimono grips, strikes, and blocks. Shoulder and elbow injuries are due to falls and armlocks, which may place the elbow in hyperextension positions and/or adduction-abduction stress. Knee injuries are quite common after falls, opponents’ falls over one’s knee, “guard pass,” and in kicking/tripping someone. Cervical spine is usually compromised after choke and post-fall direct trauma, whereas ankle injuries usually occur after “foot lock.” Pododactile injuries are also common after torsional trauma on the mat.

Epidemiological studies are required to understand the mechanisms of injury, most prevalent injuries, most affected anatomical regions, as well as treatments received and absenteeism length related to the practice of jiu-jitsu. This enable better preventive and treatment conducts for reinserting the athlete into sports practice.
McDonald et al. found sprains to be the most common type of injury in jiu-jitsu and mixed martial arts (MMA) in the United States. The authors conducted a questionnaire-based study with 70 jiu-jitsu practitioners to establish the epidemiology of injuries suffered in the sport. In line with our findings, they reported 91% of injuries to occur during training and a high prevalence of injuries in the neck, fingers/hand, knees, shoulders, and elbows.

Regarding post-injury moment, participants mostly reported seeking medical care (65%) and receiving non-surgical treatment, including immobilization, rest, physical therapy, and medication. We found injury-related absenteeism period to be two months on average, indicating minor to moderate injuries with short and medium treatment duration. However, even short absence periods can incur loss of technique and physical fitness.

This study aims to provide a better understanding about the types of musculoskeletal injuries jiu-jitsu practitioners are exposed to and their implications. These data may help coaches and athletes to develop better techniques and educational methods to prevent and mitigate lesions.

Considering this is a questionnaire-based study, our data may not reflect the totality of injuries, since minor injuries often go unnoticed or are forgotten by patients. Moreover, participants did not report lesion type, constituting a limitation for this study. Prospective studies closely monitored by a healthcare professional may advance knowledge on this subject.

CONCLUSION

The prevalence of orthopedic injuries among jiu-jitsu practitioners is quite high (84%). Chiroactylx, shoulder, elbow, knees, and ankles are the most affected sites, and injuries occur more frequently during training. Most practitioners receive non-surgical treatment and remain absent from sports practice for 2 months on average.

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APPENDIX 1

QUESTIONNAIRE

NAME:
AGE:
DOMINANT LIMB: RIGHT ( ) LEFT ( )
BELT: WHITE ( ) BLUE ( ) PURPLE ( ) BROWN ( ) BLACK ( )

WHAT IS YOUR WEEKLY TRAINING FREQUENCY?

WHAT IS YOUR COMPETITION FREQUENCY DURING THE YEAR?

DO YOU PRACTICE ANY OTHER SPORT? YES ( ) NO ( )
IF SO, WHICH ONE?

HAVE YOU SUFFERED ANY INJURIES WHILE PRACTICING JIU-JITSU IN THE LAST 2 YEARS? YES ( ) NO ( )

LESION SITE:

| Lesion Site | Training | Competition | Other |
|-------------|----------|-------------|-------|
| CERVICAL SPINE | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| THORACIC SPINE | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| LUMBAR SPINE | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| FINGER | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| WRIST | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| ELBOW | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| SHOULDER | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| HIP | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| KNEE | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| ANKLE | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |
| PODODACTILES | R ( ) L ( ) | R ( ) L ( ) | R ( ) L ( ) |

DID YOU LOOK FOR MEDICAL CARE? YES ( ) NO ( )

RECEIVED TREATMENT:
SURGERY ( ) PHYSICAL THERAPY ( ) IMMOBILIZATION ( ) MEDICATION ( )

FOR HOW LONG WERE YOU ABSENT FROM SPORTS PRACTICE?

ONCE YOU RETURNED TO THE SPORT PRACTICE, WERE YOU AT THE SAME LEVEL AS BEFORE THE INJURY?