

## [ORIGINAL ARTICLE]

## Prevalence of Musculoskeletal Injuries Among Novice Karate Players

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## ABSTRACT

**Background :** The study aimed to assess the prevalence of injury patterns among novice karate players. Relevance of study - There are many benefits of practising karate as it improves psychological health by promoting relaxation, self-esteem, balance, development of discipline, strength and mind-body coordination. Participation in karate or any sport is not without risk, and injuries can be an adverse outcome.

**Methodology:** In this cross-sectional study, 89 participants were selected according to inclusion and exclusion criteria. The Nordic musculoskeletal Questionnaire is used in the study to assess the injury pattern according to body region. Dr Buckley's injury severity classification is used to assess the injury severity. The injuries were classified as significant, moderate, and severe according to the classification.

**Result:** Punches and kicks were the most common causes of direct contact injuries. It was observed that in the present as well as past, the most common location of injury was found in the lower limbs that is hips/thighs (33.7%), knees (33.7%), ankle (25.84%), followed by head and face (22.47%). The severity of the injury was graded by Dr Buckley's injury severity classification, where the participants suffered from significant injuries(56.17%), moderate injuries (35.9%), and severe injuries(6.74%).

**Conclusion :** From this study, it is concluded that mostly lower and upper limb injuries, followed by head and face, are found to be affected primarily on novice karate players. Karate is associated with a relatively high injury rate but mainly for minor injuries, with a relative risk lower than in most sports; severe injuries are rare.

**Keywords :** *Karate, Novice Players, Martial art, Self-defence, Severity of injuries, Injury prevention*

## Introduction

Over the last several years, martial arts have become an increasingly popular activity that has benefited people of all ages. They can lower levels of aggression, improve self-reliance and self-discipline, and improve the physical body, such as cardio-respiratory and musculoskeletal systems and body composition<sup>[1]</sup>. Karate has been practised widely for more than 40 years across the world. It is an unarmed sport, the "bare hand technique" of self-defence, developed by Master Gichin Funakoshi in Okinawa in, Japan in 1922<sup>[2]</sup>. Karate has become a popular sport, not only among the younger generations seeking to learn self-defence and improve self-esteem but also among adult men and women as a sport to improve cardiovascular fitness and flexibility<sup>[3]</sup>. Karate is one of the most popular

martial arts, and the word "karate", meaning an empty hand, describes that karate involves using kicks, punches, and blocking techniques without using weapons<sup>[4]</sup>. A karate fight is a three-minute fight comprising high-intensity bouts where repeated unilateral dynamic defensive and offensive kinetic patterns, such as frontal, lateral, and circular kicks, occur<sup>[4]</sup>. Predictors for injuries are age, Body Mass Index (BMI), gender variances, style, and training duration<sup>[5]</sup>.

Sports injuries are considered to be one of the most common forms of injury in modern Western societies, and karate is often cited among the sports with a high risk of injury. Treatment of sports injuries is medically complex, time-consuming, and expensive. Therefore, implementing and evaluating new injury preventive measures and strategies is of

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great scientific, medical, and financial importance<sup>[6]</sup>. To achieve injury prevention, new rules are stricter about prohibited behaviour for competitors, including excessive force used in dealing blows to permitted areas, to the forbidden areas (throat, arms, legs, groin, joints, and instep), blows to the face with open hand techniques, and dangerous or prohibited throwing techniques. Any illegal behaviour results in a warning or penalty<sup>[6]</sup>. In karate, injuries are primarily associated with the striking surfaces of both sides- hands and feet- and therefore, they can often be damaged by attack, and other body parts can be damaged because of receiving a hit<sup>[11]</sup>.

The most common injuries sustained include sprains/ strains, abrasions/contusions, and fractures. The head and neck were the most common sites of injury, and punch blows were the leading cause of injuries. The reasons for injury may be training mistakes, overtraining, wrong technical training, excessively one-sided specialization, unsuitable preparation of the location for training or equipment, wrong weather conditions, inappropriate warm-up, or lack of necessary protection measures<sup>[4]</sup>.

Higher injury rates were associated (in this order) with the following factors: (a) Greater number of hours of practice per week. (b) Not performing warm-ups. (c) Using inadequate sports facilities. (e) Not performing physical preparation. (f) Inappropriate training load. (g) Not performing injury-preventive activities. (h) Performing sports techniques without the supervision of one sports coach<sup>[7]</sup>.

Injuries were graded as major, moderate or minor according to the World Karate Federation injury severity classification developed by Dr. Buckley in 1990<sup>[3]</sup>. The Nordic Musculoskeletal Questionnaire can be used as a questionnaire, as significantly higher frequencies of musculoskeletal problems were reported. The Questionnaire was developed from a Nordic Council of Ministers project. The Questionnaire was developed from a Nordic Council of Ministers project. Using a test-retest methodology, the Nordic Musculoskeletal Questionnaire's reliability found that the number of different answers ranged from 0 to 23%. The authors concluded this was acceptable in a screening tool. The Nordic Musculoskeletal Questionnaire has been applied to various occupational groups to evaluate musculoskeletal problems, including computer and

call centre workers, car drivers, and nursing and forestry workers<sup>[8]</sup>.

Practicing karate has many benefits, as it improves psychological health by promoting relaxation, self-esteem, balance, development of discipline, strength and mind-body coordination. Participation in a sport like karate or any sport is not without risk, and injuries can be an adverse outcome. Although several articles regarding karate injuries have been published, they are limited in nature and martial arts. More epidemiological studies are needed to understand the mechanism or location of injuries during training and compare them to injuries sustained in competition<sup>[5]</sup>. So, it is necessary to determine the prevalence of injury patterns among novice karate players.

### Methodology

A cross-sectional study was conducted on 89 novice karate players at National Shotokan Academy and Police Karate Academy in Jalgaon. The study duration was 6 months. The sampling technique used in this study is convenient sampling. The study population included novice karate players of the age group 8 to 15 years. The total sample size was 89. Sample size calculation - Minimum sample size to estimate population mean formula

$$N = Z^2 Pq / d^2 \alpha$$

where,

P = guess of population P = 0.82

$$q = 1 - P = 0.18$$

Z = 1.96 at  $\alpha = 5\%$  level of significance

d = absolute precision =  $\pm 0.08$

$$n = (1.96)^2 (0.82) (0.18) / (0.08)^2$$

$$n = 89$$

Total = 89

Subjects included in the study were according to inclusion criteria, and subjects excluded were according to exclusion criteria. Inclusion criteria were: 1) Subject in age group 8 to 15 yrs, 2) Subject who has been practising karate for 3 months, 3) Subject is physically fit, 4) Subject with no recent surgeries. 5) Both Males and females and subjects who are willing to participate. The exclusion criteria were) Subjects with any trauma, 2) Any spinal deformity, and 3) Subjects having a fracture. Outcome measures included in the study were:

1) Nordic musculoskeletal Questionnaire. The Nordic Musculoskeletal Questionnaire can be used

as a questionnaire, as significantly higher frequencies of musculoskeletal problems were reported. The Questionnaire was developed from a Nordic Council of Ministers project. Using a test-retest methodology, the Nordic Musculoskeletal Questionnaire's reliability found that the number of different answers ranged from 0 to 23%. The authors concluded this was acceptable in a screening tool. The Nordic Musculoskeletal Questionnaire has been applied to various occupational groups to evaluate musculoskeletal problems, including computer and call centre workers, car drivers, and nursing and forestry workers.

2) Dr Buckley's injury severity classification. The injuries were graded as major, moderate or minor according to Dr. Buckley's World Karate Federation injury severity classification.

**Procedure**

Approval was obtained from the Institutional Ethical Committee (IEC) of Dr Ulhas Patil College of Physiotherapy, Jalgaon, to conduct the following study. Permission should be taken from Academies. Subjects were taken according to the inclusion and exclusion criteria. Before starting the study, the procedure was explained, and the subjects received an informed written consent form. Subjects were taken individually. They were explained about the study. This study used the Nordic Musculoskeletal Questionnaire and Dr Buckley's injury severity classification. Initially, all the demographic data was taken from the subject. The Questionnaire was distributed & explained to the subject. Then, the therapist filled out the questionnaire according to the answers to the questions. Data was collected, managed, and statistically analyzed.

**Results**

This study included 89 participants, 50 of whom were men and 39 of whom were women. The data obtained from the participants was statistically analyzed. The entire study data was entered and cleaned in MS Excel before being statistically analyzed. All the results are shown in tabular and graphical format to visualize the statistically significant difference more clearly.

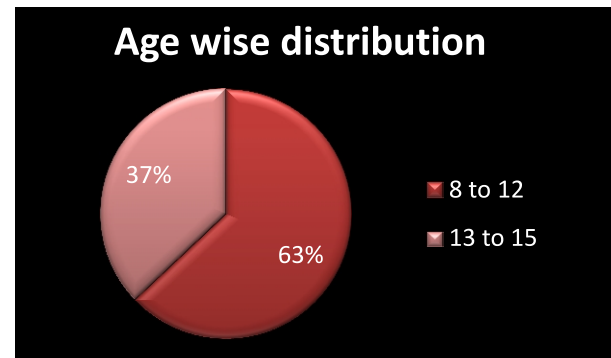
**Observation and Tables**

**Table 1 : The age-wise distribution of study subjects**

AGE	MALE	FEMALE
8-12	33	23
13-15	17	16

In the study, 56 participants were between 8-12 years of age, and 33 were between 13-15 years of age.

**Graph 1: The age-wise distribution of subjects**



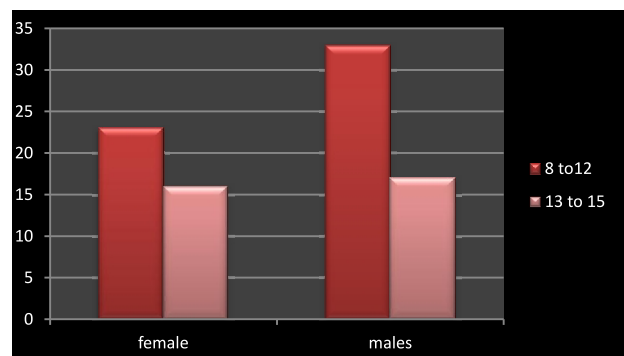
**Graph 1: The age-wise distribution of subjects**

Comment- The graph shows the age-wise distribution of study subjects.

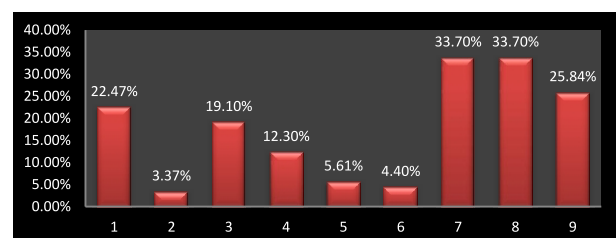
**Table 2 : Gender wise distribution of study subject**

AGE	MALE	FEMALE
8-12	33	23
13-15	17	16

In the group of 8-12 years, 33 were male, and 23 were female, and in the group of 13- 15 years, 17 were male, and 16 were female.



**Graph 2 : The gender distribution of study subjects Comment- The graph shows the gender distribution of the study subject.**



**Graph 3 : The result of the Nordic Musculoskeletal Questionnaire according to the body region**

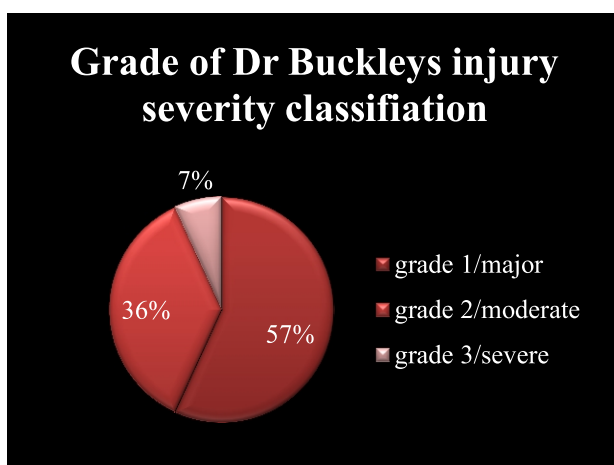
**Table 3 : The result of the Nordic Musculoskeletal Questionnaire according to the body region**

BODY REGION	TOTAL PERCENTAGE
Neck/Face	22.47%
Shoulder	3.37%
Elbow	19.1%
Wrist/Hands	12.35%
Upper Back	5.61%
Lower Back	4.49%
Hips/Thighs	33.7%
Knees	33.7%
Ankle/Feet	25.84%

Comment- Here, the graph shows the representation of the Nordic Musculoskeletal questionnaire according to the location of the body parts.

**Table 4 :The result of Dr Buckley's injury severity according to grading**

Grade of injury	Percentage
Grade 1/Major	56.17%
Grade 2/Moderate	35.9%
Grade 3/Severe	6.74%



**Graph 4: The result of Dr Buckley's injury severity according to grading**

This graph shows the distribution of injuries according to classification grade.

**Result**

This study was conducted on 89 novice karate players. According to gender distribution, there were 50 male and 39 female novice karate players. The participants were divided into two age groups: 8 to 12 years and 13-15 years. In total, 89 novice karate players, 8.9% of participants, do not suffer from any

injury. The mechanism of injury in karate players was found to occur mostly by direct contact.

The most common causes of direct contact injuries were found to be punches and kicks.

It was observed that, in the present as well as the past, the most common locations of injury were found in lower limbs, that is, hips/thighs (33.7%), knees(33.7%), and ankle(25.84%), followed by head and face(22.47%). The severity of the injury was graded by Dr Buckley's injury severity classification, where the participants suffered from major injuries (56.17%), moderate injuries (35.9%), and severe injuries(6.74%).

**Discussion**

This study aimed to evaluate the prevalence, location of injury and type of injury severity in 8 to 15-year-old novice karate players. The severity of the injury was graded according to Dr Buckley's injury severity classification, where the participants suffered from significant injuries(56.17%), moderate injuries (35.9%), and severe injuries(6.74%). The author Sajjan Pal conducted a study on the Prevalence of Injury patterns among Karate Players in the Delhi-National Capital Region A Cross-sectional Survey. He concluded that the most common cause of injury was punching in karate. Mechanism of the injury during kicking was found through being kicked (26.9%), falling (20.8%), and kicking (18.0%). This study reported the mechanism of injury as sudden onset (57.15%). This finding was supported by a study that reported that most injuries in karate players were acute<sup>[5]</sup>.

Nazim et al. conducted a study of sports injury in karate; according to the new scoring rules, leg techniques are awarded 2 or 3 points, and hand techniques 1 or 2 points, making leg techniques more popular among competitors than before. Frequent use of kicks during a fight results in more leg injuries. Leg injuries mainly occur during the instep or shin contact with the opponent's elbow, hip, or forearm. The leg is also often injured when both opponents perform a leg manoeuvre at the same time. Considering that the head is one of the vital points for hitting, there are also prevalent injuries to this part of the body.<sup>[12]</sup> The author Sajjan Pal conducted a study on injury profiles in karate athletes and reported that injuries are mild, which implies the fact that karate is not a severe-harsh sport, although damaging rates are high; however, severe injuries are uncommon and too low. So, according to this study and other



research, one can conclude that most of the injuries are mild in karate, and one can guarantee the players and their parents that karate is a sport with suitable safety, unlike the public opinions based on the severe harshness of this sport. Although severe injuries are uncommon in karate, these results agree with the finding that karate is a relatively safe sport, with injuries being somewhat inevitable.<sup>[4]</sup>

### Conclusion

This study concludes that karate is associated with a high prevalence of injuries. Mostly, lower and upper limb injuries, followed by head and face, are found to be affected primarily on novice karate players. Karate is associated with a relatively high injury rate but mainly for minor injuries, with a relative risk lower than in most sports; severe injuries are rare. From this study, we can conclude that the most common location of injury found in novice karate players is in the lower limb, hips and thighs(33.7%), knees(33.7%), and ankle(25.84%) and mainly head and face(22.47%). The severity of the injury was graded by Dr Buckley's injury severity classification, where the participants suffered from significant injuries(56.17%), moderate injuries (35.9%), and severe injuries(6.74%).

### Limitations

The limitation of the study was based on the injuries regarding regular training. It did not include data on injuries from competitions and tournaments. Although the sample size was relatively small, the study can be demonstrated better in a larger population.

### Future Scope

Educating karate players, coaches, referees and tournament directors about common injuries and their preventive strategies will help prevent injuries. Proper instruction and knowledge should be given to them about the mechanism of injury and the treatment and prevention of injuries. Overall, we can conclude from the findings that with variations of regulations, using protective instruments in the head and face region, and informing coaches and athletes more often about current karate injuries can decrease many incidents and accidents of injuries in this sports field.

### Conflict Of Interest

There is no conflict of interest.

### Funding

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