



Relationship between techniques and injuries among judo practitioners

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ABSTRACT

Judo is a Martial art created in 1882 characterized by a great number of techniques and philosophical basis, and it has been mentioned in several studies as one of the sports presenting a higher amount of injury occurrences. Nevertheless, there are few detailed surveys to allow performing a causal correlation between the technical aspects and the percentage picture of the injuries found in this sportive modality. The sampling was constituted by seventy-eight case reports attained after applying a close questionnaire in forty-six 23 years old \pm 10 years male athletes, and thirty-two 19 years old \pm 7 years female athletes. The mean time of practice for male athletes was 9 ± 6 years, and their level was distributed as follows: 20% black belt, 50% brown belt, and 30% with lower than brown belt level. The female athletes presented a mean time of practice of 5 ± 3 years, distributed as follows: 9% black belt, 25% brown belt, and 66% with lower than brown belt level. After applying a questionnaire, it was observed that injuries occurred in 23% prevalence in the knee joint, followed by 16% in the shoulder, 22% in fingers and toes, and the remaining occurrences amounted 39%. 10% of injuries were mild, 9% were moderate injuries, and 63% were severe injuries. The relationship of the training injuries attained 71% of the cases, and 42% of that total occurred when heavier fighter participated in the training. The most frequent strokes that caused injuries were the Ippon seoi Nague, with a 23% incidence, the Tai otoshi, with 22%, and the Uchi mata, 9%.

INTRODUCTION

Judo was created in 1882 by Jigoro Kano. This Martial Arts is characterized by a great amount of techniques, and highly valuable philosophical basis that helps in an individual's formation. Presently, it is one of the sports modalities presenting major adhesion index, mainly among prepubescent and pubescent individuals. Maybe this phenomenon has been boosted by the Olympic conquests attained by Aurélio Miguel and Rogério Sampaio, as well as by the deriving divulgation on television, spreading the news on the international participation of the Brazilian team in the last decades⁽¹⁾.

Judo implies in a remarkable risk for injuries, and it has been quite mentioned due to the relevant relative risk analyzed through the comparative analysis there has been performed among different sports modalities⁽²⁻⁸⁾.

In such sense, several researches have focused the relationship of this sports and the occurrence of injuries reporting specific cases, such as, for instance, injuries in the knee, ankle and elbow joints, elbow osteodystrophia and junction of the fingers⁽⁴⁻⁵⁾, and

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even the influence of the high output training on the development of postural deviations in adolescents⁽¹⁾.

Nevertheless, another study has showed that the impact on the judo athletes' cerebral function presented normal levels, and this is similar to what was found in amateur pugilists and the control group, being different from the professional pugilists⁽³⁾.

Due to the increasing promotional wave of the physical and recreational activities among the general public, and with the purpose to reduce the risk for chronic diseases⁽⁹⁻¹⁵⁾, there must be a concern as to the knowledge of the statistical basis on the possible injuries, the risk index to the occurrence of these injuries, or even to other negative effects, in order to allow to the individual to decide whether to practice or not a specific physical activity which may be most appropriate to a given public^(16,17).

The incentive programs to the sports is limited to the risks and benefits related to each modality, in order to allow the individual to make a choice as to the best investment considering his personal needs and the related phase of his motor development. This concern has motivated some authors to develop surveys based on a large group of participant from different physical activities, recreational, and sportive groups, allowing to perform an adequate comparison with the purpose to estimate the risk for injuries^(2,7).

Although there are few studies reporting the follow-up for specific injuries, or even an estimate of the occurrences of an injury per hours of activity, where judo is mentioned as being a high risk sportive modality, presenting a concerning mark of 18.3 occurrence records per 1,000 hours of the activity⁽²⁾, as to our knowledge, there is not a detailed survey on the situations under which the injuries occurred, in order to allow a causal correlation between the technical aspects and the percentage of injuries found.

Thus, the questionnaire applied in this study has collected information such as the stroke applied at the moment when the injury occurred, characteristics of the fighters, the rating of the injury as to its severity, time of practice and the athlete's level, among others. The purpose of this paper was to attain a relationship between the percentage of injuries and the technical aspects related to the judo. Such database is of great interest, in order to allow a discussion as to the training methodologies.

MATERIALS AND METHODS

All information was collected through a close questionnaire applied by physical educators in different judo teams from the São José dos Campos city, SP, and in regional competitions performed in 2004. The results represent the percentage of the distribution of the occurrences.

Every athlete was informed on the accomplishment of the study, and they voluntarily allowed in having their data published after signing a consent term assuring the privacy feature of their personal information.

The results were statistically analyzed through the χ^2 test at a 5% significance level.

The data were classified according to preestablished criteria related to the location, etiology, and diagnosis, and it was considered **mild** those injuries that did not result in removal from the training or the competition; **moderate**, injuries were those that caused a removal from the training and/or competition; and **severe**, when the removal was higher than one day from the training and/or the competition^(2,7,18).

It was also considered in this study the uke situations when the athlete receives the stroke, and the tori, when the athlete applies the stroke.

RESULTS

It was interviewed forty-six 23 ± 10 years old mean male athletes, and thirty-two 19 ± 7 years mean female athletes, and they were submitted to a close questionnaire. For each referred case, it was applied a sequence of questions searching for detailed information, such as: spot of the injury, if the athlete was in the Tori or Uke condition; if the occurrence was during a training or competition; if the opponent was lighter or heavier, among other information (attached 1).

ATTACHED 1

Questionnaire

Correlation between techniques and injuries in judo practitioners

Age _____ years Gender () male () female

Time of practice _____ Level _____

1 - Do you have any type of injury consequence of the judo practice? () yes () no.

2 - What portion of your body was affected?

() knee () wrist () head

() ankle () elbow () fingers () feet () hands

() hip () shoulder () spine () others _____

3 - The injury was consequence of:

() a stroke from the opponent () your own stroke

() other factors _____

4 - Which was the stroke applied or received during the injury?

5 - The injury occurred while:

() in a championship

() in a training

6 - As to the opponent:

() lighter () same weight () heavier

() lower level () same level () higher level

7 - As consequence of the injury:

() there was no removal from the training or competition - mild

() there was a removal from the training and/or competition - moderate

() there was a more than one day removal from the training and/or competition - severe

I accept to participate as volunteer in this research, whose technical information is intended to be published.

I inform that I am aware on my right of privacy as to the identification of my personal data.

I agree.

The time of practice for each male athlete was 9 ± 6 years, and the level of expertise was distributed as follows: 20% black belt, 50% brown belt, and 30% lower than brown level. The female athletes presented a mean time of practice of 5 ± 3 years, being 9% black belt, 25% brown belt, and 66% a lower level.

Those injuries consequence of situations such as warming up, isolated accidents, and other cases, such as absence of an opponent were not considered when distributing the percentage of each of the aspects, such as: type of the stroke, opponent's profile (weight and level). Therefore, in these situations, the total analyzed was 64 cases.

After performing the analysis of the data attained, it was observed that the injuries occurred with a 23% prevalence considering the total reports of the knee joint, followed by 16% of the shoulder, 22% of the toes and fingers, and the other occurrences amounted 39% (table 1).

TABLE 1
Location of injuries according to the gender

Location	Gender		General total	Percentage (%)
	M	F		
Knee	11	7	18	23
Shoulder	8	4	12	16
Ankle	8	3	11	14
Toes	4	5	9	12
Fingers	7	1	8	10
Thorax	4	1	5	6
Wrist	2	1	3	4
Clavicle	2	0	2	3
Lumbar spine	2	0	2	3
Elbow	1	1	2	3
Groin	1	1	2	3
Anterior tibia	1	0	1	1
Arm	1	0	1	1
Nose	0	1	1	1
None	1	0	1	1
Total	53	25	78	100

Related to the severity of the injuries, it was found 10% mild injuries and 64% were severe occurrences, and among this total, the data was regathered as to the training or competition situation. Thus, it was attained 8% injuries in training situations classified as mild, 9%, moderate, and 54% severe.

So, in competition situations, it was attained 5% mild injuries, 2% moderate, and 22% severe injuries (table 2).

TABLE 2
Severity of injuries and relationship of the occurrence Training vs. competition

	Gender		General total	Total (%)	Training			Competition		
	M	F			M	F	(%)	M	F	(%)
Grade I - mild	7	1	8	10	5	0	8	2	1	5
Grade II - moderate	1	6	7	9	0	6	9	1	0	2
Grade III - severe	30	19	49	63	23	11	54	7	8	22
None	1	0	1	1	0	0	0	0	0	0
Total injuries	38	26	64	83	28	17	71	10	9	29

Another aspect observed in the injury occurrence process it was the relationship between the difference or equality of the opponent's profile as to his weight and the level. It was observed that in 21% of injuries the opponent was lighter, 42% occurred having a heavier opponent, and 31% with an opponent of the same weight. Only 6% of the interviewed athletes were not aware on this detail.

Related to the level, 31% of the injuries occurred with a higher leveled opponent, 24% with a lower leveled opponent, and 39% with an opponent of the same level. Only 6% athletes was not aware as to this point (table 3).

TABLE 3
Relationship injuries vs. Profile of opponents

	Gender		Total geral	Total (%)
	M	F		
Profile as per Weight				
Lighter	8	5	13	21
Heavier	17	10	27	42
Same weight	12	8	20	31
Does not remember	1	3	4	6
Total	38	26	64	100
Profile as per Level				
Higher level	10	10	20	31
Lower level	11	4	15	24
Same level	16	9	25	39
Does not remember	1	3	4	6
Total	38	26	64	100

Two strokes can be detached, and the Ippon seoi Nague was responsible by 23%, and the Tai otoshi was responsible by 22% of the reports. The Uchi mata attained the mark of 9%, and 22% of athletes did not remember the associated stroke. The other injuries accounted for in the questionnaire represented 24% (table 4).

TABLE 4
Relationship injuries vs. Type of stroke

	Gender		General total	Total (%)
	M	F		
Stroke				
Ippon seoi Nague	12	4	16	23
Tai otoshi	10	4	14	22
Uchi mata	2	4	6	9
Harai goshi	1	3	4	6
Briga de pegada	3	0	3	3
Chave de braço	1	1	2	3
O uchi gari	1	0	1	2
Sassae tsurikomi ashi	0	1	1	2
O goshi	1	0	1	2
Seoi otoshi	1	0	1	2
Hon-kesa-gatame	1	0	1	2
Koshi-guruma	0	1	1	2
Does not remember	8	5	13	22
Total	41	23	64	100

TABLE 5
Relationship of the more frequent strokes vs. Affected spots

Stroke	Ippon seoi Nague			
	Gender		General total	Total (%)
	M	F		
Shoulder	3	2	5	31
Fingers	3	0	3	19
Knee	2	0	2	12
Ankle	2	0	2	12
Others	0	2	2	12
Toes	1	0	1	7
Clavicle	1	0	1	7
Total	12	4	16	100
Stroke	Tai otoshi			
	Gender		General total	Total (%)
	M	F		
Knee	4	3	7	51
Ankle	3	0	3	21
Fingers	1	1	2	14
Toes	1	0	1	7
Shoulder	1	0	1	7
Total	10	4	14	100

As the Ippon seoi and the Tai otoshi are the strokes presenting higher prevalence of injuries, it can be observed the percentages related to the anatomic portions hit (table 5).

DISCUSSION

As main limitations of this study, it is important to point out the fact that the interviewed athletes were from the same geographic region (Vale do Paraíba), and this may influenced the use of certain techniques.

The questionnaire that was applied did not allow to know the exact weight of the athletes, but it is commonly among athletes to know how to differentiate their opponents (whether they are or not of the same level). In future studies, this parameter must be more precisely evaluated, due to the high amount of complaints related to this aspect.

The analysis of the results found in this study must consider that the interviewed athletes were not able to remember the injuries suffered. Nevertheless, it is necessary to point out that this possible omission actuated only in a sense to decrease the amount of the occurrences. However, the details associated to the severe cases were considered trustworthy, probably because they were more remarkable than others.

An alternative to increase the detailing of the data and to introduce clinic aspects it would be to deepen this study through a partnership with the medical department responsible by the athletes' attendance in big clubs. In this case, besides of mentioning the technical aspects related to the injuries, it will be possible to add the diagnosis supplied by the medical department.

On a survey performed during the 1995 Mar del Plata Pan American Games, the amount of clinic and traumatologic attendance recorded that judo was the fourth sports in the general rating of medical attendances, considering clinic and traumatologic attendances, and it was the first place when it was considered the traumatologic attendances⁽⁸⁾.

Related to the site of the injury (table 1), this survey has shown a 23% total occurrences in the knees, and this was the anatomic spot with the higher index of complaints. A paper performed during the 1995 Pan American Games has shown the existence of medical attendances predominance of joint injuries. According to the authors, judo together with volleyball is mentioned as being the sportive modality with a higher incidence of this nature of injuries⁽⁸⁾. The predominance of injuries in the ankles and knees has been mentioned in several papers, and the ankle joint is one of the spots with higher incidence of occurrences among those athletes^(19,20). In our study, the ankle injuries attained an expressive mark of 14%, being the third most mentioned item.

These numbers reinforce the impression found by other authors suggesting the use of bandages or stabilizers in the ankle and knee joint to decrease or minimize the sprain injuries^(5,21,22).

Second, the shoulder joint represented 16% of the occurrences. This amount may be result of the high competitiveness and the expressive physical evolution of the athletes. Thus, there is a yet non-investigated possibility but quite discussed among the judo professionals, who have observed an increasing change in the techniques that has generated biomechanical adaptations of the strokes. Other possible factor is also related to the competitiveness that the opponents have been assumed a risky posture during the fall, in order to avoid the perfect stroke, the ippon, where the looser player hits the ground in the whole extension of his back.

A treatment suggested in athletes presenting such type of injury was to apply the cryotherapy (ice) and the immobilization using the Velpeau bandage for two weeks, presenting good results in high physically active individuals⁽²³⁾.

Related to the injured spot, our results recorded an amount of 22% complaints related to the toes and fingers, and this confirms a

study performed encompassing a 15 year period, where judo seems to be a risk factor to develop the osteodystrophia in the finger joints due to the micro and macro chronic-repetitive injuries⁽⁵⁾.

As to the severity of the injuries (table 2), this study found 10% severe injuries, 9% moderate injuries, and 63% severe occurrences. From the total cases, it was observed that 71% of the processes happened during the training, and only 20% occurred during competitions. These differences are statistically significant at a 5% significance level, when it is applied the χ^2 test. It is extremely relevant the fact that the prevalence of the training occurrences is approximately 2.5 times higher than the already expressive amount found in other studies⁽²⁻¹⁸⁾. Similar to other sportive modality, judo presents a training volume that can originate the discussion on its influence on the results, but we did not find other studies that allowed a more appropriate comparison in such extent.

Anyhow, this uneven relationship is a concerning fact, and it may be related to some factors. Due to the high number of variables that may be involved, a more accurate concept is really quite complex. In this research, the suggested main factor seems to be the uneven weight between athletes. In this aspect, it was found 21% injuries involving lighter opponents, 31% involving opponents of the same weight, and 42% involving heavier opponents (table 3). However, these differences are not statistically significant at a 5% level.

At this moment, it is appropriate to consider the vantagens and disadvantages towards the athletes' technical improvement facing situations at a higher difficulty level, as for instance the utilization of heavier or highly leveled opponents.

In this item, we have found 24% injuries involving lower leveled opponents, 31% higher leveled opponent, and 39% of opponents of the same level. However, these differences are not statistically significant when they are considered at a 5% level. As the combinations presented did not show quite expressive differences as the prior ones, the choice to mix graduation levels as to improve the technical performance of the athlete seems to be best indicated than the choice to use opponents of different categories (table 3).

At last, another interesting observation is that the percentage relationship of the strokes connected to the occurrence of injuries where the Ippon seoi Nague stroke represented 23% of the mentioned cases, the Tai otoshi represented 22%, and the Uchi mata, 9% (table 4).

These results suggest that the type of stroke can have a direct relationship to the anatomic spot hit. Nevertheless, in order to clarify this issue, future studies must comprise a large sampling, since the collection of similar case-reports expressively decreases the amount of each occurrence related to the total reports attained in the study. Due to this reason, the correlation between techniques and injuries cannot be confirmed using the χ^2 test that did not consider statistically significant those differences found at a 5% level.

The relationship between the Ippon seoi Nague stroke and the shoulder injuries presented 31% of the occurrences (table 5). From this amount, 100% occurred in the Tori situations. The tai otoshi presented a 51% relationship to the knee injuries (table 5). From this amount, 86% occurred in the Uke situations. This situation is also very interesting, since the projected opponent was also subject to a great percentage of risk when he chooses to sacrifice his own shoulder to keep on fighting, and thus avoiding the ippon. Nevertheless, it must be performed a larger survey of cases in order to allow to clarify such issues.

CONCLUSIONS

The knee, shoulder and ankle injuries were the most frequent injuries found.

The more frequent strokes that have caused injuries were the Ippon seoi Nague, the Tai otoshi, and the Uchi mata.

The Ippon seoi Nague presented a relationship with the shoulder injuries, all of them consequence of the Tori. The Tai otoshi presented a relationship with the knee injuries, in the majority in the Uke situation.

The relationship of the training injuries is very concerning, mainly due to the evidence that the major part of the reports occurred whenever a heavier opponent participated, and that is a quite common situation in the trainings.

The authors declared there was no potential conflict of interest related to this article.

All the authors declared there is not any potential conflict of interests regarding this article.

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