

An Analysis the Systematically Develop an Injury Prevention Programme in Judo

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Abstract – There is minimal knowledge of data on epidemiological injuries in judo. In this paper, we thoroughly study the clinical literature on the occurrence & features of judo injuries. The literature accessible up to June 2013 aimed for prospective and also historical research on judo injuries. Data extraction & presentation based on the incident rate, probability of accident, form, position and cause of accident. During the 2008 and 2012 Olympic Games, the total incidence of injuries was about 11–12 per cent. Sprains, strains, & contusions, typically to the leg, elbow, were the most often recorded fractures, whereas being tossed was the most frequent injury mechanism. Serious accidents were very uncommon and generally involved the head and neck, while recurrent accidents generally impacted the joints of the finger, lower back, & neck. Contusions / abrasions, fractures and sprains / strains were the most frequent forms of injuries among young judo athletes.

Key Words – Judo, Injury, DNA, Physical Exercise, Prevention

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INTRODUCTION

Judo, as a fighting sport and an optimal type of physical fitness, is a high-intensity sport in which anaerobic & aerobic processes are engaged to fulfil physiological criteria requiring athletic stamina. It is categorised as a high steady, low dynamic sport requiring high power, marked by high intensity sporadic exercises in preparation for the necessary explosive action. However, while physical fitness appears to improve the antioxidant protection mechanism, regular bouts of exercise contribute to higher production of different types of free oxygen radicals. This excessive production of reactive oxygen species has a negative potential as it can induce oxidative changes in lipids, proteins & DNA.

Excessive exercise & sports activities with simultaneous production of free radicals & oxygen-mediated injury have been documented to trigger DNA damage. Even so, combative exercise was already scarcely tested for hereditary damage.

A variety of prospective and observational reviews as well as case reports on judo accidents are published in the literature. (Green CM, Petrou 2007) However, as far as we know, there is no comprehensive review of this essential topic. The focus of this article was carry out a thorough analysis of the injuries suffered by judo athletes.

METHODS

From its establishment to June 2013, a systematic literature review was undertaken online in various databases. The usage of the Medical Topic Headings (MeSH) of the words 'martial arts' and 'judo' & 'injuries' has created 40 publications through PubMed/Medline. Twelve of these is found to be important to the present work on the basis of reliable knowledge on judo injuries. Further queries using the same words were performed in the Information, Scopus & Cochrane Database of the ISI Site, and accident reports from recent Olympic Games were examined. Of the 61 publications, it was considered to be important for the present study. The exclusion criterion followed for all quest methods is events or case series accounts with fewer than eight participants or Japanese languages. In addition, two chapters on judo, including injury results, were included. Eventually, in comparison to the present study, listed articles referenced in the above-mentioned literature were regarded with minimal details on particular subjects.

Definitions of injury

According to MeSH, injuries are mainly characterised as injury to the body as a direct or indirect consequence of external force, with or without loss to structural cohesion. However, owing to the various styles of the research studied, including prospective and retrospective trials, it was not necessary to follow a consistent description, either of damage or of the degree of seriousness of

injuries. Also during Summer Olympic Games (SOG), injury was characterised as if a competitor required medical treatment for a current injury or rejuvenation after complete involvement after the previous accident, including in-competition and training accidents during the SOG. (Junge A, Engebretsen 2008) Similarly, Green et al characterised the accident as a condition in which the judoka either sought medical care. In the other side, James and Pieter suggested disability as any conditions under which help was required from medical staff, including time-loss accidents, which hindered the competitor from finishing the actual bout and/or subsequent bouts and from engaging in judo for a period of 1 day afterwards. In the case of retrospective research, injury was characterised as any physical complaint suffered by an athlete, irrespective of the need for medical treatment or time-loss of activity, or which resulted in an absence from sports activities for at least 4 days.

Presentation of data

Data extraction & presentation based on the extent, form, position and causes of injuries. Judo accidents were expressed both as actual & relative frequencies. The number of injured athletes separated by the number of at-risk athletes is utilized as an indicator of the average risk of injury. The incident rate is the number of accidents separated by the amount of player exposures, for example, the amount of fights, which is based on the epidemiological definition of person-time at risk. It should be remembered that distinctions could only be made among data utilizing the same denominator.

RESULTS

Frequency of injuries

Online supplementary table S1 provides details on the likelihood of injuries & frequency of judo activity recorded in the relevant literature.

The most recent injury results from the 2008 SOG in Beijing & 2012 in London revealed an average injury risk—12.3 per cent among more than 380 competing judo athletes per SOG. Green et al both observed that 13–14 per cent of the athletes surveyed suffered injury, although the other research revealed an obviously higher injury risk of 23–29 per cent. The highest value was recorded. The discrepancies may be attributed to the various ability ranges of the student athletes, age ranges concerned, research formats and accident descriptions.

With respect to possible gender gaps, the results published were contradictory. Some study reported little gender disparity, although other research indicated a greater probability of injuries between men & women. Again, these variations could be attributed in part to varying ability levels & age ranges.

The significance of age as a risk factor is still unclear, particularly since it can interfere with experience as a causal factor. Latest reports on elite judokas showed a higher incidence of injury (49–88 per cent) during competition relative to preparation. Other scholars, on the other hand, showed an approximately 70% higher risk of injury during training compared to competition, especially in women (94 per cent; see online supplementary tables S1–S3). The inconsistent proportion of time invested in preparation and competition during the various experiments may have contributed to disparities in performance, which could also have been affected by memory bias.

Frey et al recorded a greater rate of accidents throughout lower-level tournaments relative to higher-level incidents. In comparison, contests with a significant disparity in the results of the competitors reported a higher rate of accidents.

Injury types

The distribution of injury forms tends to be heavily affected by the nature of the sample (online supplementary tables S2 & S3). Regardless of the design and sex of the sample, the most serious injuries were sprains (5.6–59.8 per cent), strains (7–33.8 per cent) and contusions (5.6–56 per cent; see online supplementary tables S2 & S3). The prevalence of fractures reported in retrospective research focused on institutional documentation (RD) was substantially higher than in retrospective study employed questionnaires (RQ) and prospective studies. The prospective results reported a larger variation in the number of severe accidents, but the proportion of severe incidents was smaller relative to the RD tests. Apart from a marginally higher number of sprains amongst female judo athletes & strains among male judo athletes, there were no major discrepancies between the sexes (see online supplementary tables S2 & S3).

Dislocations & sprains occurred in both adult and top-class athletes, although upper-body fractures were more common in both younger & lower-ranked judokas.

Injury location

Judo injuries mainly involve the body's extremities, particularly the knee (up to 28 per cent), shoulder (up to 22 per cent) and hand / finger (up to 30 per cent), as seen in the online supplementary table S4. Based on the concept of injuries used, fingers have also been described as the most frequent injury sites during battle as a result of grip combat, which is also the most time-consuming in the fight. However, these accidents were commonly categorised as 'soft.' RQ research, on the other hand, listed the knee and shoulder as the most common injury sites as a result of throwing or

kicking. No disparity in the site of injuries has been recorded between male & female judokas. In children (12.6±2.8 years, 5–17 years of age), shoulder / upper arm (19 per cent), foot / ankle (16 per cent) and elbow / lower arm (15 per cent) were the most frequent injury sites.

Injury causes

Data on the causes of injuries in judo was provided in the supplementary online table S5. About 85 per cent of judo incidents happened during a standing fight compared to a ground battle, possibly because more time is expended in a standing battle, where competitors must gain care of their adversary before fighting. Indeed, as has already been reported, grip combat is a source of injuries to hands and fingers. Throwing tends to be the most common incidence of judo accidents, comprising around 70 per cent (range 42–90 per cent) of incidents, including certain extreme and severe injuries (see online supplementary table S5). In fact, it has been recognised that the loss of ability to fall is often correlated with accidents,³⁶ both acute and chronic accidents. No age-related or sex-related factors have been reported in the literature. Indeed, a biomechanical study of judo tactics has found that both men and women utilise common methods in contemporary Olympic tournaments. However, women tend to be more prone during field combat, where their casualties are mostly resulting from arm lock techniques. In addition, the lack of control in women was the major source of injury while tossing and falling down. Among persons, these triggers were prevalent in younger age groups, i.e., from 10 to 19 years of age (about 48%), whereas the opponent's mat or the opponent's collapse occurred more frequently from the age of 20 years (33%).

In comparison, Seoi Nage techniques, i.e. 'lever lever implemented with variable arm,' were meant to be high-risk techniques for shoulder accidents and for knee accidents in both age ranges and for both sexes. However, the data on the occurrence of knee fractures remain discordant when conducting this procedure. In addition, there is a strong likelihood of multiple fractures after the first lesion suffered during these shoulder flips, often attributed to a very sudden resumption of physical activity after a severe trauma. In addition, an incorrect procedure is assumed to be used in the rotating process of the injury.

Mechanisms of most prevalent judo injuries

The mechanisms for injury to judo are different. A research performed by the French Judo Federation²⁴ on 150 067 battles found that fractures to the shoulder resulted in 28.7% of situations, elbows in 13.5%, knees in 12.2% and ankles and fingertips less often. Glenohumeral dislocations are often induced by resistance to dropping from the defender who, in an effort not to land on the back

(which would entail losing the fight), eventually falls with an outstretched arm. Instead, slipping to the peak of the shoulder induces acromioclavicular or sternoclavicular disjunctions⁴², or indeed, fractures of the clavicle especially in children and adolescents with fragile bones.

Elbow dislocations are primarily induced by an incorrect protection as the defender leans on the mat with a twisted shoulder. Armlocks can lead to medial collateral ligament (MCL) lesions. In athletic activity, judo damage tends to be the source of harm to anterior cruciate ligament (ACL) breach in 5.6% of instances. Knee sprains, which primarily involve MCL and ACL in the judo community, are also induced by leg strategies such as O Soto Gari. Often, using a distinct handling type than the opponent tends to be a contributing factor for ACL injuries.³⁸ Collateral ligament damage vary based on the violence of the wound. Isolated MCL accidents may be induced by flexion and valgus trauma. Ankle fractures are typically sprains of the collateral lateral ligament arising in the varus through torsion. Aggressive external rotation can contribute to a breakup of the anterior inferior tibiofibular ligament.

Finger accidents are typically dislocations or sprains of the interphalangeal joints, often attributable to an incorrect grasp on the finger / s that is blocked in the swell of the judogi (kimono). Choking strategies are based on a larynx or carotid push paired with a neck brace. A lack of conscience may occur if the human rights advocate does not give up the battle in time.

Severity of accidents and time lost Online Supplementary Table S6 reveals that judo is not at high risk for time-loss accidents during the Olympic Games: an average incidence of injury of 6.4–8.9 per cent has been shown in the last two SOGs. As stated in the online supplementary table S7, the mean absence from preparation and competition varied from 1 to 7 days (maintained by 5.7% of competitors) after injuries suffered during the SOG⁹ to 21–29 days after injuries incurred during low-level competitions.

No variations in the extent and/or length of loss of time following judo accidents could be identified when evaluating athletes of varying degrees of proficiency or sex. Retrospective research recorded 65–70 per cent of time-loss accidents occurred during exercise. The greatest probability of time loss was reported between the ages of 20 and 24 years, presumably attributed to the most rigorous preparation and competition era. In adult sports, the knee was the most frequent site of time-loss injuries accompanied by shoulder injuries, while in children (12.6±2.8 years) there were more shoulder / upper arm injuries, lower leg / foot / ankle injuries and elbow / lower arm injuries.

Severe injuries

The brain & spinal spine are the key sites of catastrophic judo accidents. Kamitani et al recorded being the leading injury source of serious head injuries (70 per cent) among judo practitioners, 35 who were mostly younger than 20 years of age (90 per cent) and 60 per cent who had been studying judo for less than 3 years. The authors believed that lack of willingness to fall was a significant cause of serious head injury in unexperienced judokas.

Generally, judo choking causes only subclinical electroencephalographic effects, but may often contribute to brain injury as the 'choker' retains strain on the opponent's throat, with blood supply obstruction for a long duration to be detrimental to the central nervous system; in the worst scenario, it may contribute to death. In Japan, 26 judokas had a spinal cord injury in 3 years 55 and 19 had a spine injury in 8 years. 63 percent of the neck injuries happened when practising a throwing method, such as Uchi Mata.

Chronic injuries

Practicing judo may trigger chronic injuries, particularly to the joints of the fingers, lower back, & ears. Repeated finger joint fractures related to intensive judo training are a contributing factor for the onset of osteoarthritis. Okada et al documented a frequency of non-specific lower back pain (nsLBP) and lumbar radiological anomalies (LRA) in elite Japanese judokas of 35.4% and 81.7% respectively. The prevalence of LRA in the lightweight categories was lower than among middleweights & heavyweights, and the co-prevalence of LRA & nsLBP was higher in the middleweight categories.

Judo injuries to children & adolescents

The most frequent forms of injuries in young judo athletes (5–17 years of age) are contusions / abrasions (25–45%), fractures (28–31%) & sprains / strings (19–24%). Findings on sport accidents in young age groups showed identical findings with fractures. It is possible that several of the fractures recorded happened during the throwing a& dropping techniques learning phase, or during the match with the heavier competitor. While there is no agreement in the literature on age groups at risk, Frey et al observed higher rates of competition injury in judo athletes between 16 & 20 years of age, that the judo athletes are rather combative but whose technological & tactical skills are still immature.

DISCUSSION

During the 2008 & 2012 Olympic Games, the total incidence of injuries was about 11–12 per cent. Sprains, strains, and contusions, typically to the leg, elbow, and hand, were the most often recorded fractures, whereas being tossed was the most

frequent injury mechanism. In the two most recent SOGs, the injury rate of about 11–12 per cent is well aligned with the overall injury frequency of 11 per cent across all sport disciplines included in the 2012 SOG. In contrast, Taekwondo has the greatest chance of injuries at 39.1 per cent during the London Games, while fewer than 5 per cent of the competitors were wounded in archery, canoeing and sprinting, road cycling, rowing, shooting and horse riding.

Effects of nutrition, hydration & weight cycle on judo injuries

While nutrition, hydration & weight lifting are known to be significant risk factors for injury in combat sports, detailed judo study is still very scarce. A higher prevalence of injury and deterioration in muscle activity was observed in weight-cycle judokas and in those experiencing accelerated pre-competition weight loss relative to control groups in judo athletes. In addition, even though bone fractures were not greater in judokas with poor eating behaviours, the greater likelihood of bone damage related to shifts in bone metabolism was reported as a function of judo weight cycling. However, the strength criteria and functional features of the judo discipline can also be prevention factors for bone damage and bone fractures. In addition, it's been documented that the fluid restriction exercised by many judo athletes while participating in weight reduction operations, coupled with extreme judo training in hot temperatures, has resulted in significant dehydration, which may contribute to heat-related accidents. Death has seldom been recorded as a result of dehydration in judo & wrestling. Despite the dangers mentioned, most judo athletes decrease their weight shortly before the match. Methods employed include fluid restraint, sauna or disposable garments, diuretics or laxatives, or dietary controls, among others.

Psychological factors relevant to judo injuries

The findings of recent years of studies support the belief that social variables are important in the creation of sports injuries. The presumed correlation and regulation appear to relate specifically to the perceived danger of injuries. The presumed comparison of an individual with the 'typical judoka who is hurt when performing judo' may, in fact, be a route to time and effort invested objectively evaluating danger details, which may contribute to preventive intervention. Some research in non-judokas refer to the three core elements of self-determination theory (autonomy, integrity and relatedness) that promote inner encouragement and appear to be connected to return to sport after injury. Similarly, there is tentative evidence that positive psychological responses (encouragement, faith & low fear) are correlated with a higher incidence of return to sport.

Preventive injury across preparation & competition

Awareness of judo accidents is indispensable for the creation of protective assessments. Considering the comparatively high occurrence of upper-body injuries that are introduced into judo, the development of dropping techniques, by strong and regular breakdown preparation, the avoidance of dropping to the top of the shoulder or to the palm of the hand,⁸⁷ judo coaches should be given the highest priority, particularly when teaching beginners & young practitioners. Often, the balance of preparation as well as the assessment of training results in young judokas can be helpful in determining and minimising the likelihood of falls. Because throwing may still be risky, throwing strategies could also be cautiously and correctly apprehended from the outset. It is also necessary to have strong physical readiness, in particular through stimulating long-term resistance training routines, concentrating primarily on women's upper body power, as a high degree of strength and endurance has demonstrated a substantially lower injury risk. A clear ACL injury reduction curriculum including proprioceptive activities & awareness of risk conditions, as well as stronger focus on reciprocal grasp during preparation, will be helpful in minimising knee injuries. Changing the laws, including the ban of overt hand-to-hand assaults on trousers, tends to minimise knee sprains. However, this can be more thoroughly tested in forthcoming tests.

Educational programmes

Prevention of injuries may be strengthened by ensuring instruction for players, instructors, officials and tour operators and ensuring minimum levels of qualification and expertise for trainers and officials. They can also be trained in processes for the prevention and care of accidents. In addition, judokas need to be mindful of the value of practising completely healed from previous injuries. In addition, the results in the Specific Judo Performance Examination (SJFT) may be a definitive measure for the willingness to perform. During the recovery period, judo trainers will equate the specific gains achieved in the SJFT with the goal of maintaining the results the participants had before the injury was suffered. In addition, athletes should be advised to give up in time in case of armholes and choke tactics, as well as to avoid battling in case of minor injury. On the other side, the position of the referee is often important, particularly during armlocks and choking tactics, to stop fighting if the competitor is unwilling to give up.

CONCLUSION

The present analysis presents the current information on the occurrence and features of judo accidents. There are also health advantages of training in judo, such as improved physical ability and emotional endurance. In order to safeguard the welfare of its

competitors, the International Olympic Committee introduced and implemented an accident and disease monitoring programme during the 2008 Beijing & 2012 London Olympics. Comprehensive awareness of the likelihood of injuries through sport events and associated risk factors is an important foundation for the implementation of successful injuries reduction strategies. The implementation of an ongoing injury tracking scheme in judo is thus of the utmost priority.

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