Injuries in Novice Male Jiu Jitsu Practitioners

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Sports, especially combat sports, carry an inherent risk of injuries compared with purely exercise-based physical activities. Reports on combat sports injuries mainly focus on injuries obtained during competition, and the incidence may not be as severe when done recreationally. Jiu Jitsu is a unique martial art style that emphasizes on takedowns, throws, joint locks, and choke holds to immobilize, control, or submit an attacker. The purpose of this research is to evaluate the common injuries in recreational, novice Jiu Jitsu practitioners. A descriptive epidemiology using a self-inventory of injuries was utilized in this study. The subjects participated in 32 twice-per-week, one-hour No-gi Jiu Jitsu lessons spanning a total of 17 weeks. There was a 77% incidence of injuries among the participants. Those injured had an average of 3.9 injuries each. The data revealed that, of all reported injuries, abrasions, wounds/cuts, and strains occurred most frequently while the anatomical regions at risk the most were the feet and knees. Despite the high incidence of injuries, they were all considered to be minor, acute injuries with none requiring serious medical attention or causing the participants to discontinue the course. The recreational practice of Jiu Jitsu is generally safe with an inherent risk for minor injuries that can be further managed with good coaching and personal protective equipment.

Keywords: injuries, novice, Jiu Jitsu

INTRODUCTION

Modern day Jiu Jitsu has greatly increased in popularity along with the rise of the sport of mixed martial arts (MMA). It is a unique martial art

style which emphasizes on takedowns, throws, joint locks, and choke holds to immobilize, control, or submit an attacker. Victory may also be achieved via an opponent's tapout, a maneuver wherein a combatant concedes by tapping the opponent, tapping the mat or verbally signaling a tapout. A tapout typically occurs when a combatant is caught in an inescapable situation such as a choke hold or joint lock but may also occur when he or she can no longer continue because of fatigue or injury. While it is deeply rooted in the Japanese martial art of Judo, Jiu Jitsu has evolved into a different discipline on its own developed in the 20th century in Rio de Janeiro, Brazil (Gracie & Gracie, 2000). It has two subcategories — Gi, wherein participants use a Gi or Kimono similar to that in Judo, and No-gi, wherein participants wear more regular clothing like shorts and t-shirts.

The efficacy of Jiu Jitsu became internationally recognized when Royce Gracie, a descendant of the originator of Brazilian Jiu Jitsu Helio Gracie, became a multiple champion of the Ultimate Fighting Championship (UFC) using Jiu Jitsu techniques. The first UFC, called "War of the Worlds", featured a sumo wrestler, a boxer, a savateur, two kickboxers, a karate fighter, a shootfighter and the lone Brazilian Jiu Jitsu representative who eventually won the event (Gentry III, 2001). Through the years MMA fighters have learned to integrate Jiu Jitsu into their fighting style in order to be an effective combatant. Even as MMA evolved and became more popular, Jiu Jitsu still remains an essential skill for MMA fighters. Furthermore, it continues as a sport and self-defense system in its own right with more and more competitors participating in various tournaments worldwide (Scoggin et al., 2014).

Based on studies on the physiological responses to the demands of Jiu Jitsu, it is considered as a predominantly aerobic activity (Franchini et al., 2005; Del Vecchio, 2007; Andreato et al., 2012) with a high demand for isometric grip strength and muscular endurance. Because of the physical nature of the sport, Jiu Jitsu is a good form of exercise even when not pursued as a professional career. As a recreational activity in itself, Jiu Jitsu provides a well-rounded base of health benefits because of the wide variety of skills incorporated in the activity. Body size and weight discrepancies are not much of a concern as practices are often done with a partner who is in the same weight category.

The Medical Subject Headings primarily defines injuries as damage inflicted on the body as the direct result of an external force, with or without

disruption of structural continuity (MeSH, 2015). As such, injuries may vary in severity as well as in type. Although by definition any part of the body can be injured during sport or exercise, the focus of sports injuries is typically limited to musculoskeletal injuries which include damage to muscles, bones, and surrounding tissue like ligaments and tendons. Sports, especially combat sports, carry an inherent risk of injuries compared with purely exercise-based physical activities. Gould's (1987) research has shown that injury is a major factor in dropout from sports. Svoboda and Vanek (1982) believe that the repeated stress and strain of injury affect longevity in sport for recreational as well as professional athletes. Since the threat of injury is ever-present in sport, Heil (1993) warns that the ability to remain relatively injury-free and to recover rapidly when injured is important to any athlete's longevity and success.

The risk of injury in combat sports is further increased during competition and continues to increase as the level of competition increases. In a comparative study of injuries in martial arts and combat sports (Kickboxing, Judo, Jiu Jitsu, Karate), Cynarski and Kudlacz (2008) observed an 88.9% occurrence of serious injuries in the competitors' careers not including minor injuries such as bruises and abrasions. These included a 21% occurrence of broken bones and 16% occurrence of damage to knee ligaments with most injuries occurring either during competition or while training in preparation for competition. A one-year retrospective cohort on martial arts injuries by Zetaruk et al. (2005) on Karate, Aikido, Taekwondo, and Tai Chi practitioners revealed that the rate of injuries that required time off from training varied according to style as different martial arts showed significantly different types and distribution of injuries. Moreover, martial arts appear to be safer for young athletes especially those at the beginner or intermediate level as those with at least three years experience were found to be twice as likely to sustain injuries.

James and Pieter's (2003) research on British Judokas revealed a higher degree of injuries in men (48.54 for every 1000) than in women (34.25 for every 1000). As expected, the main cause of injury was the throws done during a match. This was previously observed by Sterkowicz (1987) when he estimated that the accident risk in Judo practice is over four times higher than the average risk in other sporting activities. Macan et al. (2001) found that among male Karate practitioners in Croatia, injuries occurred the least in the young group (17.7%) and got significantly higher in the older groups

(juniors, 27% and seniors, 26.7%). Injuries in Kickboxing were found to be more serious (Cynarski & Kudlacz, 2008) wherein the most frequent injury was a broken nose (60%) and other broken bones (16%). Interestingly, they found that most injuries occurred during training for competition (79%) while only 14% happened during competition fights.

In Taekwondo, the foot receives about 18% of the injuries usually during sparring according to Burks and Satterfield (1998). The toes are easily jammed, resulting in contusion, dislocation, or fracture. More serious foot injuries can occur in sparring, particularly fracture of the metatarsals (Birrer, 1996). Fractures also occur because of the stresses placed on the foot during kicks and jumps (Shamus & Shamus, 2001). Of the traumas of the extremities, however, most occur at the knee. Knee traumas are predominantly soft-issue in nature (Burke et al., 2003). The knee is prone to both accidental and intentional traumas in Taekwondo. Classic injuries caused by a kick to the lateral aspect of the knee are fractures of the proximal fibula, contusions on the shin, and sprains to the knee joint (Birrer, 1996). A collective study by Hapek (1981) that followed participants of Karate and Taekwondo courses cited "incorrect conduct of classes" as the main cause of injuries which mostly lead to sprains and bruises.

Research by Bledsoe et al. in 2006 concerning professional MMA competitions documented that the majority of recorded injuries were on the face/head region. Hand injuries were the second most common injury followed by injuries to the nose and eyes. They also stated that the giving and receiving of high-velocity blows seem to show the best correlation of whether a sport will have an increased risk of injury. Styles that include striking — such as Boxing (Bledsoe, Li, & Levy, 2005), Kickboxing (Gartland, Malik, & Lovell, 2001; Zazryn et al., 2003), and Taekwondo (Kazemi & Pieter, 2004) — have been shown to have a higher incidence of injury than styles that involve only grappling (Jarret, Orwin, & Dick, 1998) such as Wrestling, Judo, and Jiu Jitsu. Strikes from elite athletes, especially professional boxers, can generate a significant amount of force (Walilko, Viano, & Bir, 2005) which seems to explain why many injuries in the striking arts are prevalent not only in the target areas of the face and torso but also the extremities used for striking such as the hands for boxing and the upper and lower extremities in kickboxing and karate.

In Jiu Jitsu competitions, a 6-year injury review by Scoggin et al. (2014) observed an injury incidence of 9.3 per 1000 exposures. Orthopedic injuries

were the most common accounting for 78% of all injuries followed by rib injuries and lacerations requiring medical care. The elbow was found to be the most commonly injured joint during Jiu Jitsu competition with the arm bar — a joint lock which involves forcefully hyperextending an opponent's elbow — being the most common cause. They further stated that, compared to injury data from Judo, Taekwondo, Wrestling, and MMA competitions, Jiu Jitsu competitors were at a substantially lower risk of injury.

Reports on combat sports injuries mainly focus on injuries obtained during competition. As established earlier, most injuries are reported to occur either during competition or when training in preparation for competition. The less competitive nature of recreational practice of combat sports may lead to fewer as well as less severe injuries compared with that of competitive practices. Since most people who engage in sports are recreational practitioners rather than serious competitors, information from this research will cater to a larger proportion of sports enthusiasts especially those involved in Jiu Jitsu.

Thus, the purpose of this study was to evaluate the common injuries in recreational, novice Jiu Jitsu practitioners. Specifically, the study aimed to determine the incidence rate of injuries, injury types, anatomical regions affected, and common mechanisms for injury through a self-reported injury inventory. The participation of uninjured, novice Jiu Jitsu practitioners aimed to limit the contributing factors to any injuries that may have occurred. Furthermore, this may help in the risk awareness and expectations of people who may want to start engaging in Jiu Jitsu but are hesitant because of the nature of the sport and physical dangers it may pose.

MATERIALS AND METHODS

Research Design

A descriptive epidemiology using a self-inventory of injuries was utilized in this study. An inclusion criterion that they should not have had any previous training in combat sports and were not suffering from any chronic or acute injuries prior to the intervention period was imposed. The responses were then tallied as obtained through the Sports Injury Report (Duco, 2005; Reyes, 2005). Data was collected through a recall of injuries incurred over a period of 16 weeks.

Participants of the Study

Thirty-five Filipino males (Mage 18 ± 1.7 years), previously-untrained (novice) in Jiu Jitsu, participated in the study. A survey of the subjects' injuries was done at their training area during the respective training sessions for their convenience.

Instruments of the Study

The survey instrument used was the Sports Injury Report adapted from Duco (2005) and Reyes (2005). Modifications were done to make it more suitable for Jiu Jitsu injuries. These included (1) the message in the project information box, (2) details in the demographic information being asked for, (3) addition of other types of injuries, (4) the definition of the types of injuries, (5) a more detailed enumeration of musculoskeletal regions, and (6) a specified area for other injuries that may not have been covered in the questionnaire such as other anatomical areas or multiple injuries in the same anatomical region.

Data obtained included name, age, and gender. The injury inventory was divided into 20 different anatomical regions namely head/face, neck, spine, upper back, lower back, shoulders, ribs, abdominals, arms, elbows, forearms, wrists, hands, groin, thighs, knees, shin and calves, ankles, and feet and toes. From the 20 anatomical regions, twelve (12) different types of injuries were identified and defined in the questionnaire for the respondent's convenience. The defined types of injuries were abrasion, concussion (for the head), contusion, crushing, dislocation, fracture, inflammation, sprain, strain, stress fracture, tendinitis, and wound/cut.

Test Procedure

The subjects participated in 32 twice-per-week, one-hour No-gi Jiu Jitsu lessons spanning a total of 17 weeks. An additional two days were needed — the first day for orientation and introduction and a final "refresher" day to review all the techniques that were covered in the 16-week program. Letters asking for consent for participation were handed out prior to data collection. Once the survey questionnaire was finalized, the researcher individually gave out the survey forms. The researcher explained the purpose of the study

and was available for questions or clarifications if the respondents had any as they read through the information and the instructions page. The subjects were clearly instructed to indicate all injuries incurred from participating in the program. Their ability to accurately indicate all their injuries was thus limited to their ability to recall all incidences in the past 16 weeks.

Tools for Analysis

Data gathered are interpreted using descriptive statistics and presented in frequency and percentage distribution tables. Graphs are also used to present the data while pictographic views on the summary of injuries are employed to provide a portrait of injury trends in novice Jiu Jitsu participation.

RESULTS

Incidence and injury rate

There was a 77% incidence of injuries among the participants. Those injured had an average of 3.9 injuries each. Despite this rate and occurrence, none of the injuries required serious medical attention and/or hospitalization.

Types of injuries

The data revealed that, of all reported injuries, the following occurred most frequently: abrasions (52%), wounds/cuts (15%), and strains (12%). The percentage distribution of injury type is outlined in Figure 1.

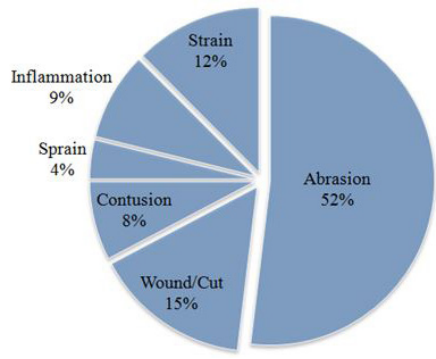

Figure 1. Percentage distribution of injury types.

The overwhelming majority of all the injuries were abrasions (52% of all injuries). Of these, most were on the feet (35%), knees (20%), and toes (15%). The occurrence of abrasions in other anatomical regions was less than 15%. Anecdotal follow-ups on the subjects indicated that the abrasions were in the form of mat burns (friction burns on the skin) as a result of brushing against the padded floor. Padded floors or mats are a prerequisite in combat sports like Jiu Jitsu, Judo, and Wrestling so as to protect the practitioners from hard impact on the floor. The mats, usually in the form of Judo mats or Wrestling mats, need to have some texture so as not to be slippery. As a result, abrasions are almost inevitable in body parts that are in constant contact with the mats. They can be minimized through protective measures such as athletic tapes, knee pads and elbow pads. Naftulin and McKeag (1994) have previously advised that protective equipment is most important in combat sports. These should prevent injury and protect injured areas from further injury. Ideally, the equipment should not interfere with function and performance nor be harmful to other athletic participants. Hutson (1996) further reports that major strides in injury prevention have been made in certain sports though progress is slow particularly where there are financial implications. Table 1 summarizes the result for the occurrence of abrasions.

Table 1. Descriptive statistics on the occurrence of abrasions.

	Frequency	%
Feet	19	35
Knees	11	20
Toes	8	15
Elbows	4	7
Hands	3	6
Arms	3	6
Forearms	2	4
Neck	1	2
Head/Face	1	2
Ankles	1	2
Abdomen	1	2
Total	**54**	**100**

The second most common injuries were wounds and cuts accounting for 15% of all reported injuries. Wounds and cuts were reported on the hands (38%), head/face (31%), forearms (13%), and neck (13%). Wounds and cuts on the hands and forearms would have been completely avoidable as the respondents noted that these were brought about by inadvertent scratches from the opponent. Just like all grappling sports, controlling the opponent is important. One of the ways to control an opponent is by grabbing the wrists and hands. Long fingernails combined with the resistance by the other combatant sometimes lead to scratches. Since the first session, which includes the orientation and introduction, the participants were reminded to keep their fingernails short. However, as the weeks went on and as their fingernails grew back, some may not have remembered to clip their nails regularly. As such, inadvertent scratches occur as they try to grab an opponent's wrist and hands. Thus, it is important to constantly remind Jiu Jitsu practitioners to maintain short fingernails. Furthermore, keeping nail clippers at the training area is deemed necessary.

The respondents also commented that wounds and cuts in the head/face region were on the lips and mouth area and incurred as a result of defending against chokes — strangle holds that are meant to cut off the opponent's breathing causing them to either submit or pass out. In order to effectively defend against chokes, one has to tuck the chin down towards the upper chest thereby protecting the neck from the opponent's pressure. In the process, however, the chin and mouth take on the pressure instead of the neck. When the attacker does not let go, the lips continue to push against the teeth and this sometimes causes wounds and cuts on the inner lips. As a precaution, this can be avoided by using mouthpieces. The descriptive statistics on the occurrence of wounds and cuts is presented in Table 2.

Table 2. Descriptive statistics on the occurrence of wounds and cuts.

	Frequency	%
Hands	6	38
Head/Face	5	31
Forearms	2	13
Neck	2	13
Feet	1	6
Total	**16**	**100**

The third most common injuries were strains which represent 12% of all reported injuries. The neck and shoulders seem to be the most vulnerable to strains, accounting for almost half of all reported strains. The participants were quick to comment that strains on the neck were caused by opponents attacking with a choke — the squeezing around the neck combined with the flexion of the neck makes it particularly vulnerable to strains during chokes. The shoulder muscles were susceptible to strains during the application of shoulder locks — twisting the shoulders towards an awkward angle but not to the extent of dislocation. Just like the occurrence of wounds and cuts, strains were most likely to occur during an attempt to defend against an opponent's attack. Since choke holds and joint lock are the essence of Jiu Jitsu offense, practitioners should be more conscious about tapping out or letting go before serious damage occurs. Table 3 further details the occurrence of strains.

Table 3. Descriptive statistics on the occurrence of strains.

	Frequency	%
Neck	3	23
Shoulders	3	23
Thighs	2	15
Lower Leg	2	15
Abdomen	1	8
Lower Back	1	8
Wrists	1	8
Total	**13**	**100**

Other types of injuries reported were inflammation (9%), contusion (8%), and sprain (4%). Table 4 shows the occurrence of these other injuries. They represent a much smaller proportion of the reported injuries, and as mentioned earlier, none of the injuries were severe enough to require serious medical attention or withdrawal from participation. Based on this, Jiu Jitsu may be perceived as a relatively safe activity with minor inherent risks. Additionally, casual conversations with the participants revealed that even at the moment of injury they still continued on until the end of the session. They perceived their injuries as not being serious enough for them to consider taking the rest of a session off.

Table 4. Descriptive statistics on the occurrence of inflammations, contusions, and sprains.

Infammation	Frequency	%
Neck	2	22
Shoulders	2	22
Arms	2	22
Lower Back	1	11
Spine	1	11
Upper Back	1	11
Total	**9**	**100**
Contusion		
Ribs	3	38
Groin	3	38
Neck	1	13
Head/Face	1	13
Total	**8**	**100**
Sprain		
Ankles	2	50
Elbows	1	25
Wrists	1	25
Total	**4**	**100**

Anatomical regions

Regarding the anatomical regions at risk, injuries commonly occurred at the feet (19%), and knees (11%). All other injury sites were reported to be injured at a rate of less than 10%. Table 5 outlines the occurrence of injuries per anatomical region.

Table 5. Descriptive statistics on the incidence of injuries per anatomical region.

Injury Site	Frequency	%
Feet	20	19.2
Knees	11	10.6
Neck	9	8.7
Hands	9	8.7
Toes	8	7.7
Head/Face	7	6.7

Shoulders	5	4.8
Arms	5	4.8
Elbows	5	4.8
Forearms	4	3.8
Ribs	3	2.9
Groin	3	2.9
Ankles	3	2.9
Lower Back	2	1.9
Abdomen	2	1.9
Wrists	2	1.9
Thighs	2	1.9
Lower Legs	2	1.9
Spine	1	1.0
Upper Back	1	1.0
Total	**104**	**100**

Being the most injured anatomical region, the feet suffered abrasions 95% of the time. As mentioned earlier, this was mainly because of mat burns caused by the rough texture of the mats and may be avoided through the use of athletic tapes. As with the feet, abrasions were the main cause of injuries on the knees. In fact, 100% of reported knee injuries were abrasions. As also mentioned earlier, this may be avoided by wearing knee pads. Figures 2 and 3 further outline the distribution of injuries per anatomical region.

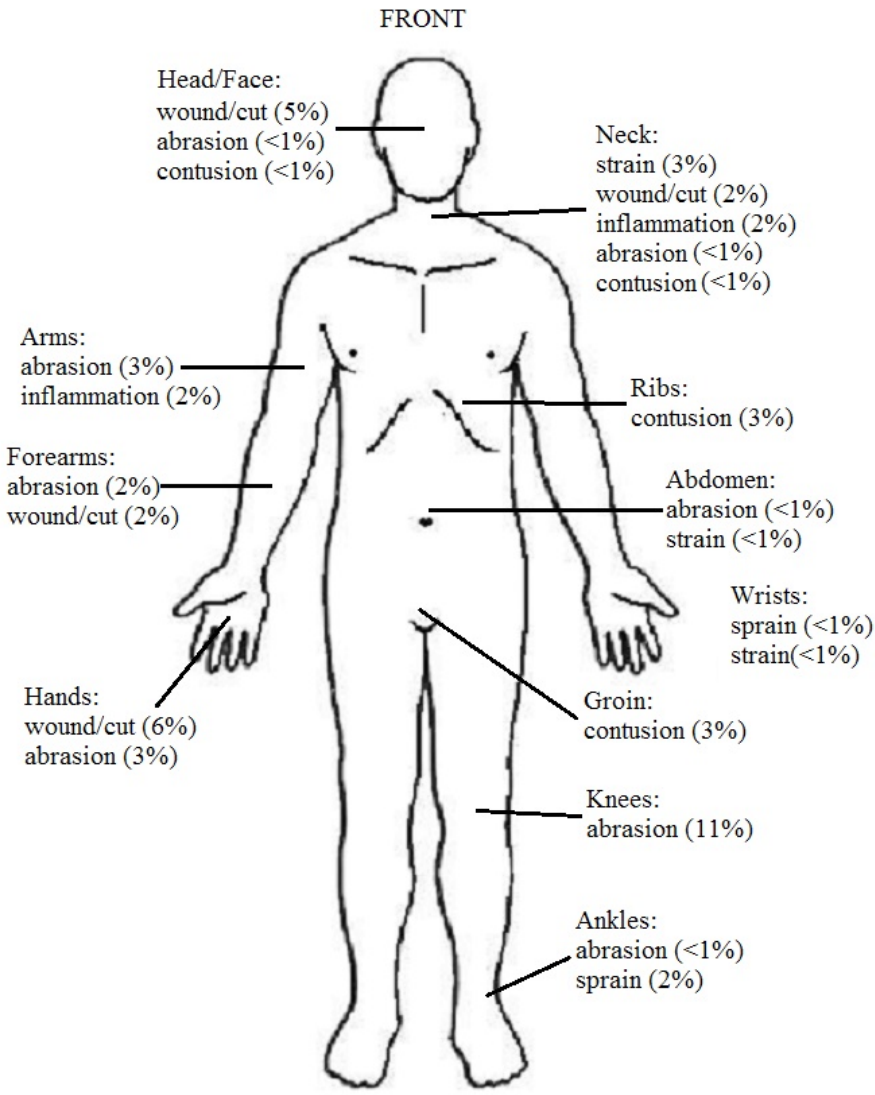

Figure 2. Incidence rate of injuries by anatomical region and type per 100 injuries.

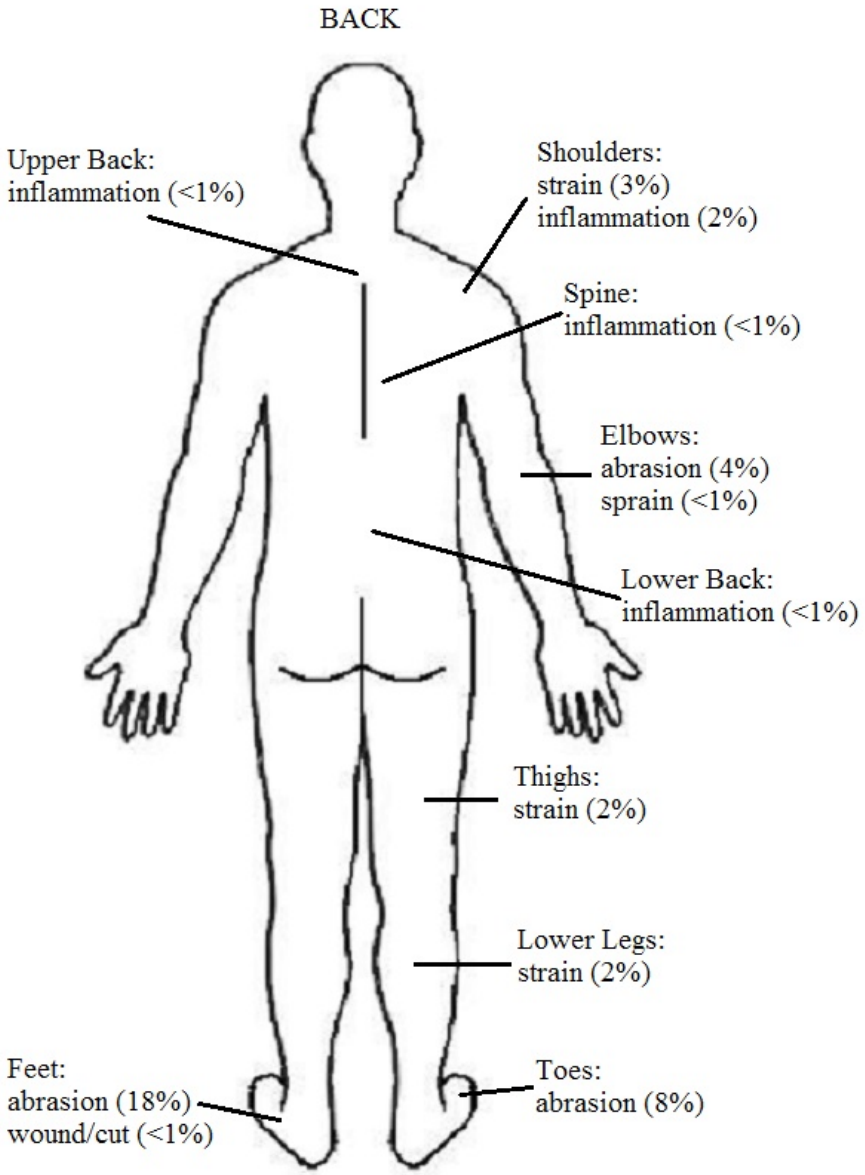

Figure 3. Incidence rate of injuries by anatomical region and type per 100 injuries (continued).

SUMMARY AND CONCLUSIONS

Jiu Jitsu is a unique martial art style which emphasizes on takedowns, throws, joint locks, and choke holds to immobilize, control, or submit an attacker. While it is deeply rooted in the Japanese martial art of Judo, it has evolved into a different discipline of its own. Jiu Jitsu rose to prominence because of its effectivity in MMA competition. As MMA has evolved and become more popular, Jiu Jitsu still remains an essential skill for MMA fighters and continues as a sport and self-defense system in its own right.

Sports, especially combat sports, carry an inherent risk of injuries compared with purely exercise-based physical activities, and the risks of injury further increase during competition and continue to increase as the level of competition increases. When compared with other combat sports practitioners, Jiu Jitsu competitors are found to be at a substantially lower risk of injury.

Reports on combat sports injuries mainly focus on injuries obtained during competition, and the incidence is expected to not be as severe when done recreationally. The purpose of this study was to evaluate the common injuries in recreational, novice Jiu Jitsu practitioners. A descriptive epidemiology using a self-inventory of injuries incurred was utilized in this study. Thirty-five (35) Filipino males, previously-untrained in Jiu Jitsu, participated. A survey of the subjects' injuries was done at their training area during their respective training sessions for their convenience. The subjects participated in 32 twice-per-week, one-hour No-gi Jiu Jitsu lessons spanning a total of 17 weeks. An additional two days were needed — the first day for orientation and introduction and a final "refresher" day to review all the techniques that were covered in the 16-week program.

There was a 77% incidence of injuries among the participants. Those injured had an average of 3.9 injuries each. The data revealed that of all reported injuries, the following occurred most frequently: abrasions (52%), wounds/cuts (15%), and strains (12%). Of all the injuries, the overwhelming majority were abrasions (52% of all injuries). Of these, most were on the feet (35%), knees (20%), and toes (15%). The occurrence of abrasions in other anatomical regions was less than 15%. Anecdotal follow-ups on the subjects indicated that the abrasions were in the form of mat burns (friction burns on the skin) as a result of brushing against the padded floor. The anatomical regions at risk were the feet (19.2%) and knees (10.6%). All other injury

sites were reported to be injured at a rate of less than 10%. Despite the high incidence of injuries, they were all considered to be minor, acute injuries with none requiring serious medical attention or causing the participants to discontinue the course. These minor injuries may be further minimized through the use of personal protective equipment such as mouthpieces, knee pads, and elbow pads.

The researcher thus concludes that the recreational practice of Jiu Jitsu is generally safe with an inherent risk for minor injuries that can be further managed with good coaching and personal protective equipment. Instructors and practitioners alike should thus be aware of these risks and take precautionary measures to further minimize the probability of injury.

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