

# Prevention and treatment of injuries sustained in combat sports by adolescents aged 15-16

Kazimierz Witkowski<sup>ABCDE</sup>, Paweł Piepiora<sup>ABCDE</sup>, Kacper Gembalski<sup>AB</sup>

University School of Physical Education in Wrocław, Wrocław, Poland

Received: 23 October 2018; Accepted: 27 May 2019; Published online: 20 December 2019

AoBID: 12304

## Authors' Contribution:

- ✍ A Study Design
- 📁 B Data Collection
- 📊 C Statistical Analysis
- 📄 D Manuscript Preparation
- 🏠 E Funds Collection

## Abstract

### Background & Study Aim:

In combat sports (martial arts), numerous competitors with short training experience are injured relatively quickly. Such injuries, improperly treated or not treated, turn into a persistent, chronic conditions. The goal of this study was the knowledge about on prevention and treatment methods for martial arts practitioners.

### Material & Methods:

The study enrolled 101 martial arts practitioners aged 15-16; 51 of which were female and 50 of which were male. The study was conducted using a questionnaire consisting of 22 questions that was drawn up specifically to meet its goals.

### Results:

The most of respondents (43 sufficient, 36 good, 13 very good) assess their current state of knowledge about prevention. The largest group of individuals was composed of those that employ both warm-up and stretching in their training units. Many respondents sustained injuries during their career (n = 90 and 11 declared "no"), the most common: soft tissue bruises 39.8%; joint sprain (ankle, elbow, etc.) 26%; joint sprain (ankle, elbow, etc.) 10.4% and below ten percent: complete or partial tear of ligaments and tendons 8.2%; bone fracture 7.3%; head injury 5.2%; spine injury 3.1%.

### Conclusions:

The majority of individuals who start training combat sports are not aware of the risk associated with them. The majority of individuals who start training combat sports are not aware of the risk associated with them. Despite very good access to information about prevention and how to avoid injury, 90% of the respondents sustained an injury while training. This proves that preventive measures are insufficient.

### Key words:

kinesiotherapy • physiotherapy • training units • trauma

### Copyright:

© 2019 the Authors. Published by Archives of Budo Science of Martial Arts and Extreme Sports

### Conflict of interest:

Authors have declared that no competing interest exists

### Ethical approval:

The study was approved by the local Ethics Committee

### Provenance & peer review:

Not commissioned; externally peer reviewed

### Source of support:

Departmental sources

### Author's address:

Paweł Piepiora, University School of Physical Education in Wrocław, Faculty of Sport Science, Department of Sports Education, Paderewskiego St. 35, Multifunctional Sports Hall, room 73, 51-612 Wrocław, Poland; e-mail: pawel.piepiora@awf.wroc.pl

**Training session – noun**

a period of time during which an athlete trains, either alone, with a trainer or with their team [33].

**Trauma – noun 1.** a wound or injury **2.** a very frightening or distressing experience that gives a person a severe emotional shock [33].

**Martial arts – plural noun** any of various systems of combat and self-defence, e.g. judo or karate, developed especially in Japan and Korea and now usually practised as a sport [33].

**Combat sport – noun** a sport in which one person fights another, e.g. wrestling, boxing and the martial arts [33].

**Main relationship between combat sport and martial arts** – “every combat sport is martial arts but not vice versa” [1, p. 18].

**MMA – mix martial arts** (authors of this work join the opinion that MAMA is a form of neo-Gladiatry and support **Częstochowa declaration 2015: HMA against MMA & Gdansk 2nd HMA World Congress Resolution** – see glossary).

**Częstochowa declaration 2015: HMA against MMA** – “continuous improvement of health through martial arts as one of the most attractive form of physical activity for a human, accessible during entire life should constantly exist in public space, especially in electronic media, to balance permanent degradation of mental and social health by enhancing the promotion of mixed martial arts – contemporary, bloody gladiatorship, significant tool of education to aggression in a macro scale”.

**Gdansk 2nd HMA World Congress Resolution – Article 1:** The white flag with five interlocking “Olympic rings” is the most recognizable symbol in the global public space. Neither did the resurrected idea of Olympia, “Citius, Altius, Fortius” save humanity from the horrors of two world wars, nor did the declared mission of the International Olympic Committee (IOC): “1. (...) the promotion of ethics and (...) ensuring that, in sport, the spirit of fair play prevails and violence is banned” (Olympic Charter, p. 18) stop the pathology of permanently

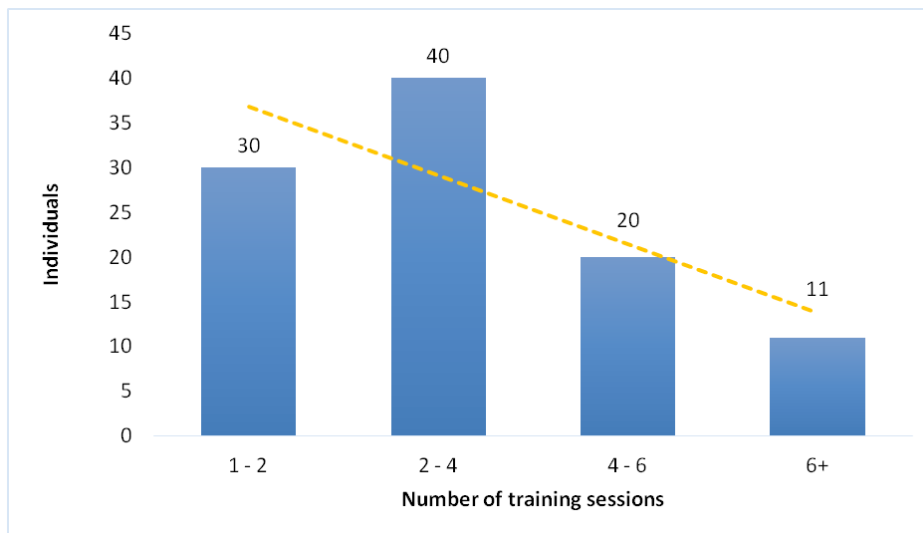
**INTRODUCTION**

Combat sports develop strength and speed, and are based on mixed exertion of varying intensity. Athletes undergo a thorough training that is focused on: aerobic fitness, strength, endurance, balance, muscle flexibility, speed and agility. An important element of the above-mentioned training is also work on the explosive force. Combat sports are nowadays gaining more and more popularity among all age groups. Competition and direct confrontation with the competitor are probably some of many reasons for the popularity of martial arts [1]. Unfortunately, beginners often do not have sufficient theoretical knowledge and baseline physical fitness to acquire the skills they are provided with in a comprehensive and safe manner. Therefore, numerous competitors with short training experience are injured relatively quickly. Such injuries, improperly treated or not treated, turn into a persistent, chronic condition.

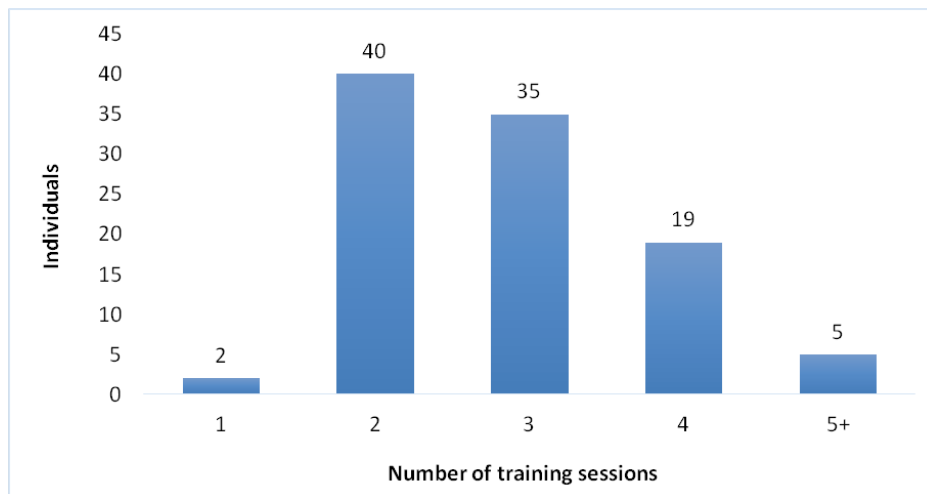
An injury (physical trauma) is an action of any mechanical, thermal or other factor on human body, which results in bodily injury at the cellular, tissue and organ level. Damage caused by injury is divided by type, location, or degree of lesions. Division by type of injury in martial arts practitioners reveals the following most common injuries: sprains, bruises, muscle or tendon damage, fractures, dislocations. Injuries can also be divided by their cause. Here we can distinguish between intentional ones, namely caused by aggressive or self-defence force, and unintentional ones, i.e.

rapid and related to overload, or typical and accidental. The main causes of injuries are believed to be as follows: overtraining, excessive overload of bone and muscle system, insufficient preparation of an athlete for competitions in technical terms, ambition of a competitor and coach to take part in competition regardless of health, e.g. due to unresolved injury, material, technical or organisational deficiencies, doping agents, dissimulation, methodical deficiencies [2-17].

From the perspective of sports medicine, rapid diagnosis and rehabilitation constitute important elements of treatment of injuries sustained during combat sports. The following diagnostic imaging methods are used to diagnose musculoskeletal injuries: arthroscopy, arthrography, magnetic resonance imaging, computed tomography and ultrasound. Physical therapy is a part of medical rehabilitation. It may be divided into three elementary elements, such as: kinesiotherapy, physiotherapy and therapeutic massage. The rehabilitation process needs to be carefully planned in order to be efficient. A team of specialists is the basis of a proper and effective rehabilitation plan. It is composed of: an attending physician, physiotherapist, sometimes a sports psychologist (or other specialists needed) who work closely together. According to rehabilitation model employed in Poland, the process should be comprehensive and continuous, which is very important in case of athletes who often start training before they regain full physical fitness [18-25].



**Figure 1.** Training experience of respondents (n = 101) in years.



**Figure 2.** Number of training sessions undertaken by the respondents per week.

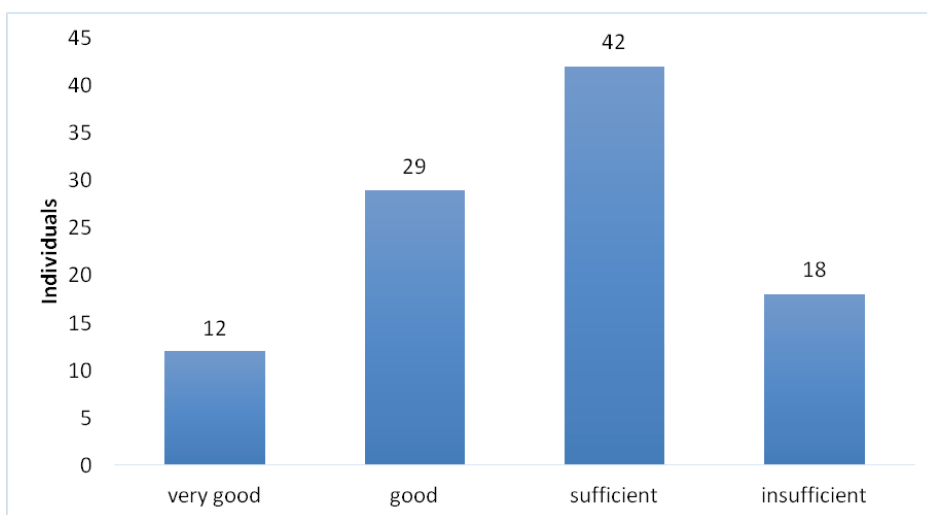
The goal of this study was the knowledge about on prevention and treatment methods for martial arts practitioners.

## MATERIAL AND METHODS

The study enrolled 101 participants; 51 of which were female and 50 of which were male. All participants (aged 15-16) train various combat sports or martial arts: boxing n = 21; karate kyokushin n = 15; MMM (see glossary) n = 15; judo n = 12; karate shotokan n = 11; muay thai n = 10; kickboxing n = 8; Brazilian jiu-jitsu

n = 5; taekwondo ITF n = 3; wing tsun n = 1. Training experience from 2 to 4 years dominates among athletes (39.6%) and only 10.89% have practiced martial arts for more than 6 years (Figure 1).

Martial arts practitioners were asked to take part in the survey. A questionnaire was developed for this purpose. It consists of 22 questions, both single and multiple choice. Analysis of data collected makes it possible to verify the state of knowledge about prevention and treatment of injuries sustained by martial arts practitioners.



**Figure 3.** Structure of respondents' answers to the question: *How do you assess your current knowledge about injuries that could occur during training?*

educating contemporary man in aggression.

**Article 2:** Likewise, symbols (a sword pointed downwards surrounded by five rings) and motto ("Friendship through Sport") of Conseil International du Sport Militaire (CISM) did not stop soldiers from killing each other and murdering people after 1948 (the year of establishing CISM, the second largest multi-sport discipline organization after the IOC, and also the year of the Universal Declaration of Human Rights).

**Article 3:** Although there are five identical combat sports in the Olympic Games and the Military World Games, their potential is still not used to meet the second of the Fundamental Principles of Olympism: "(...) to place sport at the service of the harmonious development of humankind, with a view to promoting a peaceful society concerned with the preservation of human dignity" (Olympic Charter, p. 13).

**Article 4:** Boxing and wrestling cultivate the traditions of ancient Olympism. Judo and taekwondo have given martial arts humanistic and health attractiveness. Fencing combines this tradition with modernity in the spirit of chivalry. Aiming dynamic offensive and defensive actions directly at the opponent's body (irrespective of the protectors used) in such a way as not to hurt is a measure of respecting those knightly rules. This rule harmonizes with the principle of respect for the opponent's as well as one's own corporeality and dignity over the vain victory at all costs.

**Article 5:** For the civilized individual and the society for whom human health and dignity are the common good, participation, in any role, in brutal shows of people massacring each other cannot be a standard of the quality of life. Neo gladiatorship camouflaged under the banner of martial arts or combat sports is a slight to the Fundamental Principles of Olympism, but also to the Universal Declaration of Human Rights. Therefore, this Resolution should inspire as many actors of Knowledge Society as possible jointly to oppose any deformations of the mission of Olympism and sport. The expansion of the pathology of unauthorized naming neo gladiators as combat sports athletes will soon turn the Fundamental Principles of Olympism into their own caricature – objective indicators are a testament to the devastation of all dimensions of health by the practice of legal bloody pageants [34].

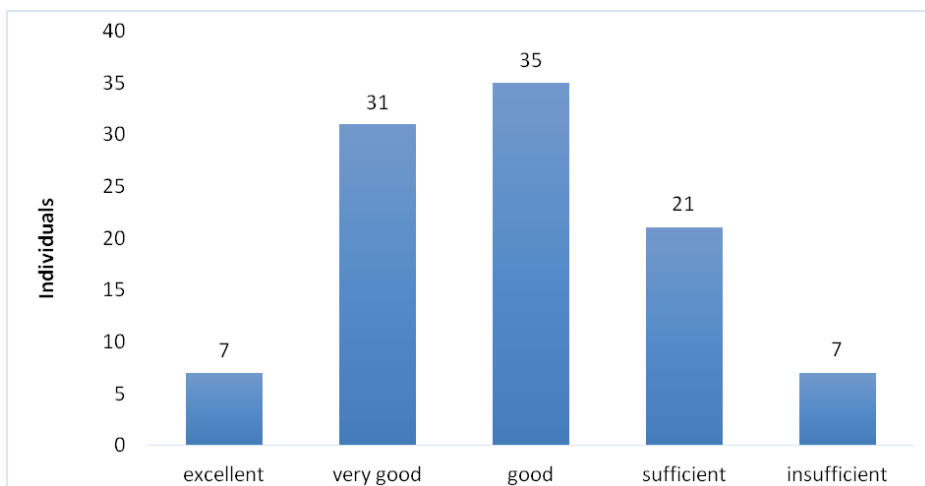
## RESULTS

Two largest groups (74% athletes) consisted of individuals who trained 2-3 times per week (Figure 2). The majority of respondents (n = 65, it means 64.36%) failed to interest for information about prevention and treatment of injuries that could occur in given discipline before the first training session. In most cases (n = 64, it means 63.37%), respondents were instructed by their coach about possible injuries and how to protect themselves against them

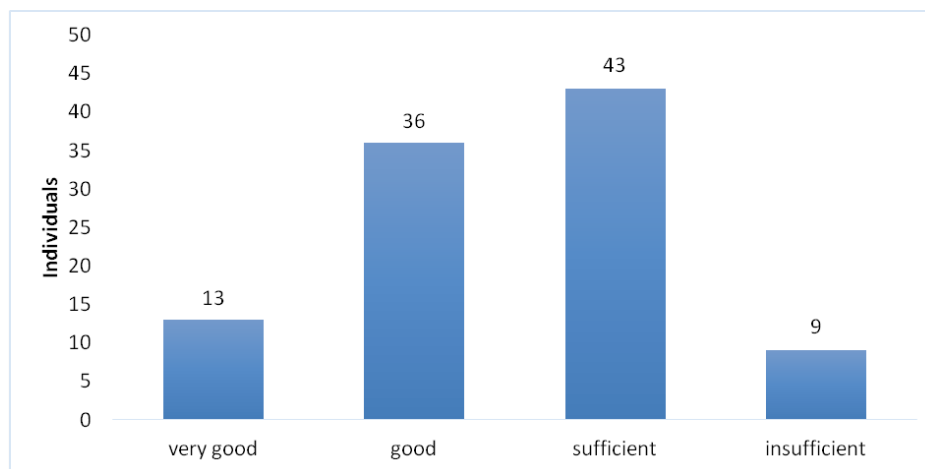
The majority of respondents assess their current state of knowledge in the field of injuries they are at risk of during training as satisfactory, and 18 (17.82%) as unsatisfactory (Figure 3). The

majority of respondents rated their health as very good or good before starting to train (Figure 4).

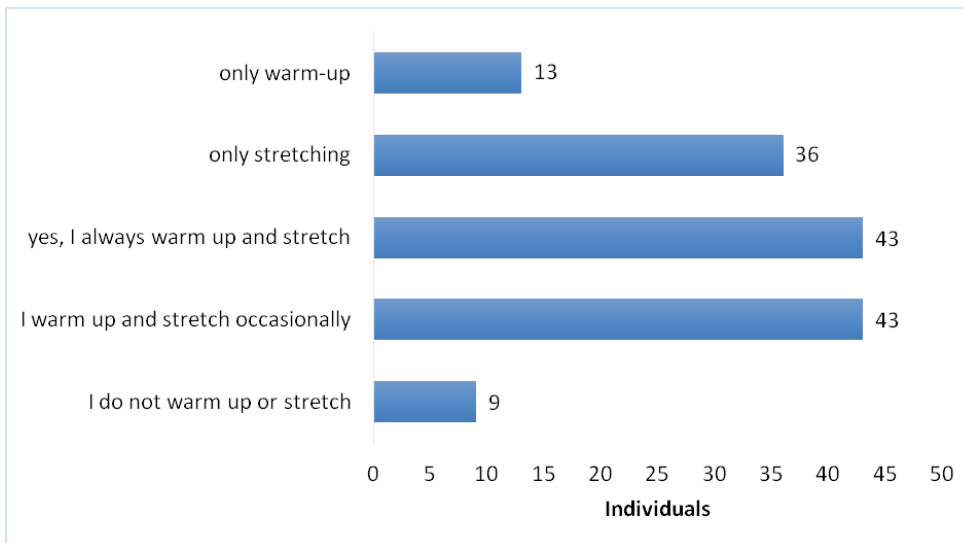
The most of respondents (43 sufficient, 36 good, 13 very good) assess their current state of knowledge about prevention (Figure 5). The largest group of individuals was composed of those that employ both warm-up and stretching in their training units (Figure 6). Many respondents sustained injuries during their career (n = 90 and 11 declared "no"), the most common: *soft tissue bruises* 39.8%; *joint sprain (ankle, elbow, etc.)* 26%; *joint sprain (ankle, elbow, etc.)* 10.4% and below ten percent: *complete or partial tear of ligaments and tendons* 8.2%; *bone fracture* 7.3%; *head injury* 5.2%; *spine injury* 3.1%.



**Figure 4.** Structure of respondents' answers to the question: *How would you assess your general health status before the first training?*



**Figure 5.** Structure of respondents' answers to the question: *How do you assess your current knowledge about prevention in sport you are training?*



**Figure 6.** Structure of respondents' answers to the question: *Does your training unit consist of basic elements, such as warm-up and stretching exercises?*

The structure of prevention is declared as follows: *sauna* 23.8%; *physical therapy* 14.3%; *massages + sauna* 11.4%; *massages* 9.5%; *physical therapy + massages* 5.8%; *wellness* 4.8%; *physical therapy + massages + sauna* 1.9%; *physical therapy + massages + wellness* 1.9% and *I do not use any* 2.9%.

The question *Have you consulted your injury with general practitioner, neurologist, orthopaedist or physiotherapist?* 72 answered "yes", 20 "no" and 9 none; while to question *Did you start treating your injury after it was diagnosed?* the distribution of the answers is as follows: 76 answered "yes", 14 "no" and 11 none.

Among the declared therapeutic procedures dominates *physical therapy + kinesiotherapy* (14.3%), *physical therapy* (13.1%), *physical therapy + manual therapy* (12.1%) and *pharmacological therapy* (10.7%) (Figure 7).

The dominant period of treatment was 14 days (32 martial arts athletes declared), while 19 declared up to 7 days, 18- up to 21 days, 15- longer than 21 days and 11- longer than 6 months. Most martial arts athletes ( $n = 61$ ) adhered to doctor's orders after medical consultation.

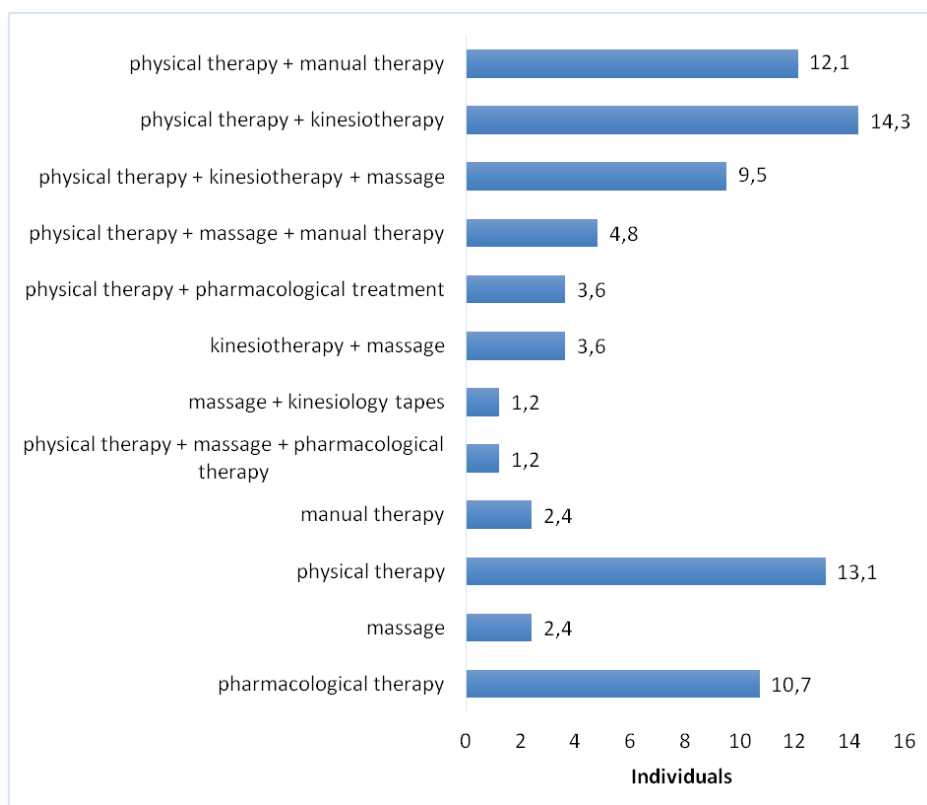
Structure of respondents' answers to the question *How long did your treatment last?* is as follows (ordinal variable from the most numerous declared responses): 21 up to 21 days and 21 longer than

21 days; 20 up to 14 days; 19 up to 7 days; 11 longer than 6 months. For 42 athletes, the injury had no effect on their mental state, while for 33 the impact was negative (demotivating) and for 19 motivating. To the question *Have you regained complete mental and physical fitness after treatment?* 85 athletes answered "yes" and 5 answered "no".

Seventy athletes decided to expand their knowledge in the field of prophylaxis and motor preparation for training after suffering an injury, while 20 did not. However, 68 athletes declared, that added prevention elements to your training after sustain an injury (wellness, rehabilitation, etc.) but 33 claims that such modification did not affect the number of injuries. Seventy-eight athletes decided to add warm-up and stretching to your training unit after sustained an injury, while 12 did not. To question *What happened if you have introduced wellness between your training sessions after recovery?* 82 athletes answered "It had no impact on the number of subsequent injuries" and 19 "the number of subsequent injuries significantly reduced".

## DISCUSSION

Analysis of results revealed that individuals who plan to start regular training of martial arts are mostly unaware of the risk they will be exposed to. Combat sports are high-risk trauma disciplines. Beginners are not aware of the risk associated with regular overloads, which is why they approach



**Figure 7.** Therapeutic procedures.

the accompanying tasks too hastily. Although the study shows that prevention and recovery between training sessions do not have a significant impact on incidence of injuries, knowledge and awareness of one's own body and appropriate training plan, which includes warming up and stretching, significantly translates into reduced incidence of injuries in the future. Information on prevention and initial preparation before training also do not have a significant impact on reducing the risk of injury. It may be concluded that injuries and traumas are unavoidable.

Study results may be presented as follows: lack of preparation before training, lack of prevention, lack of recovery between training sessions results in a less intensive training, which may lead to injuries. However, prevention and recovery between training sessions make it possible to have a more intensive training and achieve better results during a sparring match, which may also to injuries. Thus, injuries and traumas are an integral part of sport. Knowledge of respondents acquired after they sustain injury makes them less susceptible to subsequent injuries because they employ appropriate warm-up and stretching exercises.

However, injuries are unavoidable [26-28]. On the other hand professional athletes often have knowledge about their body and are supported by a coach, physiotherapist, physician, etc. Individuals who practice martial arts non-professionally, despite lower training loads, in most cases do not have such support and that is why they sustain injuries as frequently.

The study shows that individuals describing their state of knowledge about prevention in practiced sport as good and very good pay more attention to include warm-up and stretching in their training. This is an example of how theoretical knowledge is directly translated into safety during the training process. Sauna is the most popular wellness treatment used to prevent overloads. Its popularity results from its availability and affordable price.

Soft tissue bruises are the most common injuries sustained by the participants. Most respondents show a clear tendency to downplay this type of injury, because only 3 out of 36 individuals who sustained such injury decided to consult a physician. Physical therapy treatments are commonly used during rehabilitation. This is due to the high

availability of these treatments and their price. Currently, treatments such as phonophoresis, magnetic therapy, interference currents or laser therapy are offered not only by rehabilitation centres but also by spas and wellness centres.

Thirty two of 90 respondents who sustained injuries admitted that their treatment lasted at least 14 days; it should be noted that 11 individuals sustained an injury because of which they had to stop training for over half a year. The survey shows that injuries, associated pain and treatment duration had a significant demotivating effect on the respondents.

The majority of athletes declare that they regained complete fitness after treatment. The rehabilitation process can take more than 6 months in treatment of severe injuries, such as fractures, back injuries or head injuries, but 95% of cases fully recover.

The study revealed that the injured ones paid more attention to issues related to prevention of overloads in the training process. They also more frequently incorporated elements such as stretching and warm-up in their training unit. The study demonstrated also that warm-up and stretching exercises incorporated by the respondents into their training after they sustained injury have a significant impact on the number of injuries in the future. Furthermore, wellness between training sessions does not have a significant impact on the number of subsequent injuries in the respondents who sustained an injury.

Furthermore, 22% of amateurs who are injured do not report to a doctor or physiotherapist. Untreated injuries often result in irreversible, long-term complications, and consequently compensations [29-32]. The study demonstrates that a large number of chronic injuries makes it necessary to treat even minor, in opinion of an athlete, conditions, because they may frequently turn into dangerous complications.

## CONCLUSIONS

The majority of individuals who start training combat sports are not aware of the risk associated with them. Despite very good access to information about prevention and how to avoid injury, 90% of the respondents sustained an injury while training. This proves that preventive measures are insufficient.

Unfortunately, over 22% of the respondents did not consult a physician after an injury. Undiagnosed injury often results in improper treatment, which may make the symptoms chronic and lead to compensations preventing athletes from full recovery.

Although 8% of the respondents declared that their preparation before training was unsatisfactory and the remaining respondents stated it was good and very good, they sustained injuries to a comparable extent. This means that lack of motor preparation for a given discipline does not significantly affect the percentage of injuries in the initial training period.

## REFERENCES

1. Kalina RM. Teoria sportów walki. Warszawa: Centralny Ośrodek Sportu; 2000 [in Polish]
2. Sterkowicz S, Rukasz W. Typowe urazowe uszkodzenie ciała i ogólne wskazania w rehabilitacji ruchowej judoków. *Med Sport* 1996; 11-12: 12-17 [in Polish]
3. Saengsirisuwan V, Phadungkij S, Pholpramool C. Renal and liver functions and muscle injuries during training and after competition in Thai boxers. *Br J Sports Med* 1998; 32(4): 304-308
4. Gartland S, Malik MHA, Lovell ME. Injury and injury rates in Muay Thai kick boxing. *Br J Sports Med* 2001; 35(5): 308-313
5. Zazryn TR, Finch CF, McCrory P. A 16 year study of injuries to professional kickboxers in the state of Victoria, Australia. *Br J Sports Med* 2003; 37(5): 448-451
6. Bujak Z. Urazowość w sportach walki na przykładzie taekwondo. *IDŌ – Ruch dla Kultury* 2008; 8: 118-132 [in Polish]
7. Kuźma D, Pacek J, Sieroń D. Urazowe obrażenia w boksie amatorskim. *Med Sportiva Pract* 2010; 11(4): 64-69 [in Polish]
8. Kalina RM, Barczyński BJ et al. The method to evaluate the susceptibility to injuries during the fall – validation procedure of the specific motor test. *Arch Budo* 2011; 7(4): 201-215
9. Witkowski K, Maśliński J, Stefaniak T et al. Analiza porównawcza rodzajów i umiejscowienia uszkodzeń ciała u zawodników wyczynowo uprawiających judo i kickboxing. In: Kuder A, Perkowski K, Śledziwski D, editors. *Proces doskonalenia treningu i walki sportowej*. Warszawa: Polskie Towarzystwo Naukowe Kultury Fizycznej; 2011: 61-70 [in Polish]
10. Kamitani T, Nimura Y, Nagahiro S et al. Catastrophic head and neck injuries in judo players in Japan from 2003 to 2010. *Am J Sports Med* 2013; 41(8): 1915-1921
11. Pérez-Turpín JA, Penichet-Tomás A, Suárez-Llorca C et al. Injury incidence in judokas at the Spanish National University Championship. *Arch Budo* 2013; 3: 211-218
12. Pocco E, Ruedl G, Stankovic N et al. Injuries in judo: a systematic literature review including suggestions for prevention. *Br J Sports Med* 2013; 47(18): 1139-1143
13. Prill R, Coriolano HJA, Michel S et al. The Influence of the Special Throwing Technique on the Prevalence of Knee Joint Injuries in Judo. *Arch Budo* 2014; 10: 211-216

14. Witkowski K, Maśliński J, Stefaniak T et al. Causes of injuries in young female judoka. *Arch Budo* 2014; 10: 109-116
15. Mroczkowski A, Mosler D. Rotating training simulator as an assessment tool measuring susceptibility of the body injuries during the fall caused by an external force – validation procedure. In: Kalina RM, editor. *Proceedings of the 1st World Congress on Health and Martial Arts in Interdisciplinary Approach*; 2015 Sep 17-19; Czestochowa, Poland. Warsaw: Archives of Budo; 2015: 202
16. Bolach B, Witkowski K, Zerzut M et al. Injuries and overloads in thai boxing (muay thai). *Arch Budo* 2015; 11: 339-349
17. Bolach B, Witkowski K, Piepiora P et al. Injuries and overloads in combat sports exemplified by Thai boxing and judo. *J Combat Sports Martial Arts* 2016; 7(2): 89-96
18. Dziak A. Sport injuries and their management. *Acta Clin* 2002; 2(3): 217-234
19. Walentukiewicz A. Epidemiologia urazów sportowych. *Rocz Nauk AWFIS Gdańsk* 2002; 12: 19-35 [in Polish]
20. Weldon SM, Hill RH. The efficacy of stretching for prevention of exercise related injury: a systematic review of the literature. *Man Ther* 2003; 8(3): 141-150
21. Adamczyk G. Urazy w piłce nożnej. *Forum Trenera* 2005; 1: 171-175 [in Polish]
22. Garlicki J. Urazy sportowe u progu trzeciego tysiąclecia. *Med Sport* 2006; 165 (6): 54-65 [in Polish]
23. Widuchowski J, Widuchowski W. Urazy i obrażenia narządu ruchu w sporcie. *Med Sportiva* 2005; 9(4): 281-292 [in Polish]
24. Brożyna M, Medyka W, Godek Ł et al. Frequencies of injuries occurrence in movement organs in team games of players between 18 to 32 years old in football, handball and basketball on the region in Podkarpacie. *Prz Nauk Kul Fiz U Rzesz* 2008; (2): 112-120
25. Mońka M, Jagintowicz M, Chudzik W. Types and incidences of sport injuries in male volleyball and handball players. *Fizjoterapia* 2015; 23(2): 3-16
26. Kalina RM. The profile of Sense of Positive Health and Survival Abilities indices (subjective assessment) as a diagnostic tool used in health-related training. *Arch Budo* 2012; 8(3): 179-188
27. Croom AM. Embodying martial arts for mental health: cultivating psychological well-being with martial arts practice. *Arch Budo Sci Martial Art Extreme Sport* 2014; 10: 59-70
28. Kalina RM, Barczyński BJ. Long way to the Czestochowa Declarations 2015: HMA against MMA. In: Kalina RM, editor. *Proceedings of the 1st World Congress on Health and Martial Arts in Interdisciplinary Approach*; 2015 Sep 17-19; Czestochowa, Poland. Warsaw: Archives of Budo; 2015: 1-11
29. Jagiełło W, Sawczyn S, Jagiełło M et al. The subjective profile of positive health and survival abilities in female students differing as to physical activity. *Teoriã Praktyka Fizičeskoj Kultury* 2013; 5: 15-18
30. Bergier B. The diversity of the profiles involving the sense of positive health and survival abilities of Polish students of paramedical sciences. *Arch Budo* 2015; 11: 17-25
31. Kalina RM. Agonology as a deeply esoteric science – an introduction to martial arts therapy on a global scale. *Procedia Manuf* 2015; 3: 1195-1202
32. Piepiora P, Szmajke A, Migasiewicz J et al. The karate culture and aggressiveness in kumite competitors. *Ido Movement Cult J Martial Arts Anthropol* 2016; 16(2): 41-47
33. *Dictionary of Sport and Exercise Science. Over 5,000 Terms Clearly Defined.* London: A & B Black; 2006
34. Kalina RM, Krzemieniecki LA, Moska W. Gdansk 2nd HMA World Congress 2018 Resolution addressed to: United Nations, Norwegian Nobel Committee, World Health Organization, International Olympic Committee, Conseil International du Sport Militaire. 2nd HMA World Congress; 2018 Jun 14-17; Gdansk, Poland. Gdansk: University of Physical Education and Sports; 2018

**Cite this article as:** Witkowski K, Piepiora P, Gembalski K. Prevention and treatment of injuries sustained in combat sports by adolescents aged 15-16. *Arch Budo Sci Martial Art Extreme Sport* 2019; 15: 151-158