

# Injuries to motor organs among boxing and kick-boxing contestants in sports clubs in Subcarpathian Voivodeship in Poland

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**Key words:** martial arts, combat sports, injury prevention

## Summary

**Introduction.** The aim of the study was to describe causes, opportunities and frequency of injuries to motor organs in contestants who practice boxing and kick-boxing in sports clubs throughout Subcarpathian Voivodeship in Poland.

**Material and methods.** The studied group covered 41 contestants who practice boxing and 30 contestants who practice kick-boxing in the region of Subcarpathian Voivodeship in Poland. Analysis involved contestants from five boxing and three kick-boxing clubs. The respondents age ranged from 18 to 36 with an average of 26.8 (26.2 in the group of boxers and 27.4 in the group of kick-boxers). Research methodology based on a questionnaire. The questions concerns circumstances, types and reasons for injuries, duration of training break caused by the injury, recuperation time, frequency of repeated injuries of the body part, subjective assessment of physical fitness after the applied treatment.

**Results.** The data exhibited a large frequency of injury in the surveyed disciplines. The most typical reason for injury in the group of boxers was disrespect for protective measures. Considerable number of injuries, according to the respondents, was attributed to insufficient warm-up, improper technical conditions of the facilities and too high training intensity. In the case of contestants who practiced kick-boxing, the most frequent injuries included insufficient warm-up and too intensive training.

**Conclusions.** The results suggest a link between multi factor dependence of occurring contusions due to insufficient warm-up, too high training intensity and bad technical condition of sports facilities and the trainers' attention to adjusting the warm-up to the character of fighting.

## Introduction

Pursuit of success and fame in professional sport contributes to increased frequency of injuries to motor organs among the sportsmen. Training intensity and competition for records cause that professional sportsmen often cross beyond the borderline of natural human abilities, which impacts on occurrence of injuries and microinjuries which accelerate wear of passive and active motor organs.

Injuries typical of boxing and kick-boxing involve upper attack extremities, head and body trunk. Typical injuries in the area of limbs include fractures of metacarpal bones, fingers and carpal bones. In the area of head, the most injury-prone parts include superciliary arches, lips, auricles as well as nasal bones and mandible whereas punching the areas of liver, heart and solar plexus result in knock-out [1].

Vast majority of injuries in sport are caused by mechanical forces. The most frequent traumas include: injuries during direct fighting, injuries and overload caused by improper training, too fast return to physical activity after previous injury, defective sport equipment and improper conditions in sport facilities [2].

Importance of the problem of injury rate at global scale, comparable to an epidemic with large scope, contributing to huge financial costs and non-measurable social effects, was, among other things, the reason for calling 2000-2010 period a Bone and Joint Decade. Each year, 75 million people worldwide are subject to a variety of injuries [3].

In consideration of sport injuries, one should distinguish between injuries in professional and leisure-time recreational sports. Each of them have their own specificity, which should be taken into consideration during diagnostics and treatment of

injuries. Professional sportsmen are oriented towards achievement of the results (which brings them measurable financial benefits) and they are subject to environmental pressure from sports activists, trainers, public opinion, which causes that minor, in their opinion, injuries are hidden so that they "are not out". On the other hand, they are better prepared to practice sports as compared to ordinary people. According to world statistics, the percentage of highly professional contestants who suffer from serious dysfunctions of motor organs reaches even 70%. In recreational sports, preventive measures are of major importance, whereas what typically fails in professional sport is coordination of after-treatment procedures between doctors, trainers and sport activists. Pressure for results frequently ends with sportsman's disability.

## Aim of study

The aim of the study is to describe causes, opportunities and frequency of injuries to motor organs in contestants who practice boxing and kick-boxing in sports clubs throughout Subcarpathian Voivodeship in Poland.

## Material and methods

The studied group covered 41 contestants who practice boxing and 30 contestants who practice kick-boxing in the region of Subcarpathian Voivodeship in Poland. Analysis involved contestants from five boxing and three kick-boxing clubs. The respondents age ranged from 18 to 36 with an average of 26.8 (26.2 in the group of boxers and 27.4 in the group of kick-boxers). The study took place during the period from 1st March to 31st April 2009.

Research methodology based on a questionnaire. The questions concerns circumstances, types and reasons for injuries, duration of training break caused by the injury, recuperation time, frequency of repeated injuries of the body part, subjective assessment of physical fitness after the applied treatment. The analysis also concerned the selected medical aspects, such as paramedic first aid, surgical interventions and orthopaedic treatments as well as physiotherapeutic treatment. As independent variables kinds of different sport disciplines were pointed (boxing, kick-boxing) out and as dependent variable kinds of injuries were marked. For empirical data analysis statistical data Pearson's correlation coefficient and independence test  $\chi^2$  were used. For statistical analysis, Statistica 7.0. software was used.

## Results

The injuries occurring in the investigated groups mainly during training and fighting rather than during sparring or outside sports hall (Tab. 1).

The most typical reason for injury in the group of boxers was disrespect for protective measures. Considerable number of injuries, according to the respondents, here attributed to insufficient warm-up, improper technical conditions of the facilities and too high training intensity. In the case of contestants who practiced kick-boxing, the most frequent injuries included insufficient warm-up and too intensive training.

Period of break in training caused by the injury in boxers amounted mainly to 2-3 weeks. In many cases, according to the respondents, injury resulted in exclusion from sport for 4-6 weeks. Among the kick-boxing contestants, the period of discontinued training amounted typically from 1 to 3 weeks.

As results from the data, the most frequent injuries in both groups included bruises and joint dislocations as well as ligament/muscle strain; the least frequent injuries included ligament/muscle rupture and bone fractures. In the case of 29 contestants who practice boxing (83%) and 19 persons who practise kick-boxing (65%), the injury was of repeatable nature.

As results from the analysis of subjective assessment of physical fitness after return to practising of the described disciplines of sport, the injuries brought limitations to physical fitness in two boxers (4.9%) and 4 kick-boxers (13.3%).

Post-traumatic complications were reasons for premature end to sports career in two kick-boxers (6.7%). The injuries did not require necessity of discontinuation of training in boxer groups, however 6 contestants (14.7%) reported health problems as a consequence of the injuries. Among the group of kick-boxers, health problems were reported by 4 contestants (13.3%).

Over half of the studied kick-boxers received physiotherapeutic treatment during the period of recuperation (n=16, 53%). In the group of boxers, percentage of persons who underwent physiotherapy amounted to 29.3 % (n=12) (Tab. 2).

The injuries required surgical and orthopaedic interventions in 8 boxers (19.5%) and 9 kick-boxers (30%) (Tab. 2).

In the first studied group, paramedic first aid was given to barely 19 contestants who practice boxing (46.4%) and 19 kick-boxers (63.3%) (Tab. 2).

After analysis of circumstances and causes of injuries, half of boxing contestants (n=20) and 63.3% (n=19) of kick-boxers assess that the injuries could have been avoided. In

Table 1. Circumstances for injuries in the practised discipline of sport

Sports discipline	Circumstances of the injury or injuries			
	During training	During sparring	During sparring	Outside sports hall
Boxing (n = 41)	45	4	33	24
Kick-boxing	38	9	31	7
N = 30				

$\chi^2 = 9,707$  ,  $p = 0,0212$

Table 2. Kinds of injuries reported at research group

Kinds of Sports Disciplines	Kinds of injuries							
	Bruise	Twist	Dislocation	Sprain	Fracture	Rupture	Strain	No injury
Boxing	39	30	27	9	24	13	33	5
N = 41								
Kick boxing	37	33	35	15	12	5	13	2
N = 30								

$$\chi^2 = 18,031, p = 0,0118$$

order to compare differences between the groups, Chi-square test was carried out in order to compare the expected and the observed number and Pearson's correlation coefficient. The compared groups of the respondents differed statistically significantly with the number of persons who underwent physiotherapeutic treatment after trauma ( $p=0.4$ ). In the group of boxers, more persons were subject to physiotherapy. The studied groups of sportsmen did not differ in statistically significant way in terms of the number of persons who suffered from repeated injury ( $p=0.38$ ) and assessment of physical fitness after injury ( $p=0.2$ ). The compared groups of contestants also did not differ statistically significantly in terms of the number of persons who ended their sports career after the injury ( $p=0.09$ ) and the number of persons who reported the problems with health which occurred after the injuries ( $p=0.8$ ). Statistical analysis also did not reveal significant difference in terms of the number of persons who required surgical interventions ( $p=0.3$ ) and the threat of repeated injury ( $p=0.56$ ). Statistically higher percentage of boxers were not given paramedic first aid after injury ( $p=0.004$ ). The results of analysis did not reveal correlation between the appearance of health problems before injury and occurrence of repeated injuries in boxers. These factors do not show any relationship between each other whereas repeated injury was typical of the persons who had not reported any health problems before the injury ( $r=-0.06, p=0.68$ ). No statistically significant correlation was found for repeated injury and physiotherapeutic treatment after injuries in the group of boxers ( $r=-0.2, p=0.1$ ). The highest percentage was observed for persons who did not undergo physiotherapeutic treatment and suffered from repeated injury, however, relationship between these factors is weak and statistically insignificant. Statistically significant correlation in the group of boxers did not occur between repeated injury and such factors as: surgical intervention, paramedic first aid or threat of repeated injury. These factors do not show any relationship. Assessment of physical fitness level after injury and threat of repeated injury did not correlate with each other in statistically significant way in boxers, however, statistically significant relationship between these parameters was observed in the group of kick-boxers ( $r=0.4; p=0.02$ ). The respondents reporting deterioration in physical fitness after injury showed higher threat of repeated injury. No statistical correlation was revealed between subjective assessment of phys-

ical fitness after injury and physiotherapeutic treatment in boxers, however, in the group of kick-boxers, no statistically significant dependence between these parameters was found ( $r=0.4; p=0.02$ ). Persons who were subject to physiotherapy showed no limitation to physical fitness after injury. However, statistically significant relationship was observed in both groups while comparing the assessment of fitness after injury and surgical intervention (in the group of boxers  $r=0.45; p=0.002$ , in the group of kick-boxers  $r=0.59; p=0.0004$ ). Persons who were not operated on, assessed their fitness better than in both groups. Statistically significant correlation also appeared in both groups between occurrence of threats of repeated injury and the frequency of health-related problems before injury (in the group of boxers:  $r=0.38; p=0.01$ , in the group of kick-boxers:  $r=0.4; p=0.02$ ). Persons in both groups who had not had health-related problems before the injury also did not show threat of repeated injury.

## Discussion

Due to their contact nature, combat sports, next to football and skiing, are included in first group of risk of injury. Most of contestants experience, at least once in their sport career, some injuries, which prove high level of danger involved in practicing of these disciplines of sport. According to the study presented by Zazryn et al. [4] injuries in the group of boxers mainly include the areas of head and neck. Porter et al. [5], on the basis of the results of a few-month prospective investigations prove that neurological injuries typically occur only during competition. Head, wrist and facial injuries also relate to competitions rather than to training, during which injuries occur to other body parts (usually knee joint and shoulder area) and are of chronic nature. Risk of injuries rises with age and number of previous matches.

Cynarski et al. [6] prove that in the case of boxing and kick-boxing, being most contact disciplines within martial arts, the most frequent types of injuries include fractures (nasal bones in particular). According to these authors, injuries typically occur during competitions, when contestants, maximally focused on fighting, forget about risk of injury [7].

In Polish literature the problem of accidents and injuries in combat sport – karate was dealt mainly by Sterkowicz [8]. The same author tackled also the multi-factorial analysis of acci-

dents in judo [9]. In this publications we can finds factors which exist in aspect of practicing box and kick boxing. A number of publications on epidemiology of injuries in sportsmen who practice boxing report on the types and frequency of occurrence of individual injuries. There is lack of references containing sufficient information connected with mechanisms and prevention of injuries, modification of the style of combat practise and training methodology, and most reliable studies from the domain of these problems, are based on analysis of the data obtained from long-term prospective investigations [10]. The authors of the most of references compare risk of injuries in the group of boxers to intensity of practice (competition vs. training). Currently, based on increasingly frequent prospective investigations (often more than ten-year long) with participation of very large number of studied subjects, tendencies go towards consideration of this problem in relation to time, determining injury rate on the basis of the number of injuries per 1000 hours of activity.

Rising interest in combat sports, along with commercialization of sport and perceptible need for watching spectacles on top level among the societies lead to appearance of increasingly higher load to human motor organs, which result in a number of injuries. In ethiology of injuries, one should take into consideration both internal and external factors. The former include: excessive fatigue conditions caused by too shorts periods of rest, too fast return to training after improperly treated injury, lack of proper warm-up or insufficient fitness level in contestants. External factors concern in particular erratic methodology of training, adverse meteorological conditions, poor state of the pitch or faulty interaction of oppo-

nents with disrespect to rules of the game [11]. Problems of the risk of injuries in the described disciplines, numbered among contact sports, require a multidirectional analysis.

## Conclusions

1. Injuries in boxers and kick-boxers typically occur during training and while fighting. Thus, preventative measures should on one the hand include the improvement in training methods, and on the other hand, modifications in fighting regulations – the necessity for referee's faster reaction in the fighting situations when injury is unavoidable.
2. The most frequent reasons for injuries include insufficient warm-up, too high training intensity and bad technical condition of sports facilities. Thus, the trainers should pay special attention to adjusting the warm-up to the character of fighting.
3. Contusions, joint dislocations and ligament/muscle strain are the most frequent injuries to motor organs among contestants who practice boxing and kick-boxing. Thus, the whole training cycle should consider the parts of body being exposed to injury.
4. Insignificant percentage of contestants who were subject to paramedic first aid point to insufficient knowledge of first aid and unprofessional preparation of medical facilities in sports clubs. Thus, it is highly recommended that the sports facilities where the sports are practised should be equipped according to the requirements.

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