

# Injury in sports aerobics

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**Abstract.** *The purpose of this article is to determine the main causes of injuries in sports aerobics for highly skilled athletes (Russian national team). Materials and methods. The questionnaire for coaches and highly skilled aerobics athletes was used, as well as analysis of video recordings of the Russian, European and World championships. The main errors in the technique and structure of exercises that increase the risk of injury are identified. Results. The study revealed patterns of injuries and their causes for highly skilled athletes in sports aerobics.*

**Keywords -** *sports aerobics, highly skilled athletes, skill, trauma, injuries, fitness, exercise technique.*

## I. INTRODUCTION

Sports aerobics is characterized by numerous complex elements combined with complex acrobatic and semi-acrobatic exercises [1]. Recently, sports aerobics has a tendency to more and more complex acrobatic training, resulting in an increase in the number of injuries at various stages of the training process. [2] A particularly large number of injuries are found in highly skilled athletes [3], whose competitive programs consist of complex acrobatic elements [4]. The causes of injuries in sports aerobics, as well as in any other sport, are the insufficient physical fitness for the performance of complex elements and the intensification of the training process, when athletes are forced to perform complex elements without sufficient recovery.

## II. MATERIALS AND METHODS

The study was conducted on the premises of the Lesgaft National State University of Physical Education, Sport and Health, St. Petersburg. To study the nature of injuries and their causes, highly skilled athletes were surveyed (n = 49) according to the developed questionnaire. The survey was also conducted among trainers in sports aerobics (7 trainers of the highest category, 2 honored trainers of the Russian Federation).

To identify technical errors, the video materials of the Russian (2017, 2018, 2019), European (2017, 2019) and World championships (2016, 2018) were analyzed. Based on the errors, a classification of injuries was built.

The pedagogical observations of the training process in highly skilled athletes made it possible to determine the volume and ratio of training means and the load/rest ratio, which allowed identifying the patterns of injury.

## III. RESULTS AND DISCUSSION

Using a survey of 47 highly skilled athletes (master of sports - 39 people, international master of sports - 7 people, 1 - honored master of sports), we identified the most common injuries in sports aerobics (Fig. 1).

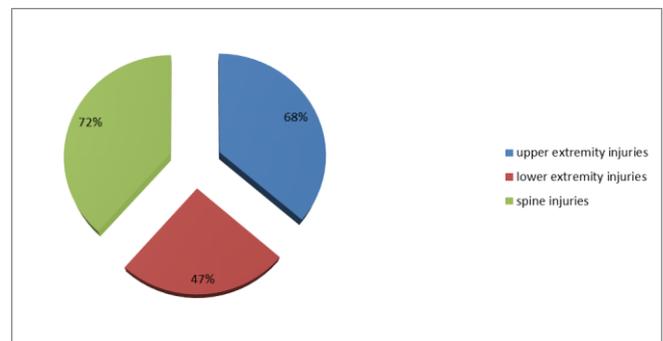


Figure 1 - The most common injuries of highly skilled athletes in sports aerobics

Moreover, a survey of leading highly skilled athletes of Russia (the national team of the Russian Federation) showed that most injuries occurred while performing elements of structural group C (jumps) (Fig. 2).

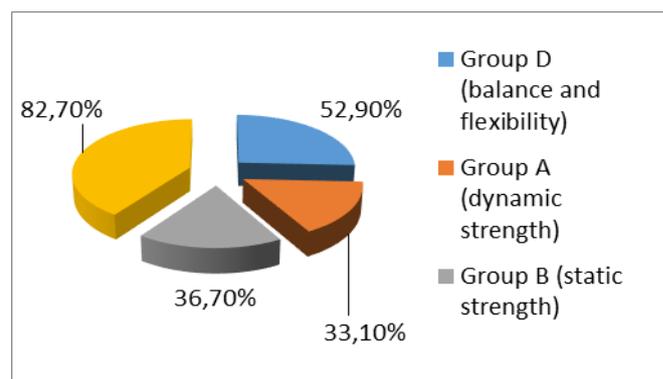


Figure 2 - Distribution of injuries in the elements of structural groups

Structural groups A (dynamic strength) and B (static strength) require the athlete to have strong muscles of the hands, shoulders and thighs. The performance of complex elements, such as leg circles and flare, often leads to injuries of the upper and lower extremities, including shoulder (72%) and thigh (68%) strain.

Structural group C (jumps) is characterized by the largest number of elements (47% of all elements of sports aerobics). A feature of sports aerobics is the possibility of landing to split, to standing position or to push up when performing complex elements. Elements with an emphasis on landing to push up are complex, spectacular, attractive and have the highest scores for their difficulty. At the same time, they are the most traumatic. Jumps with landing to push up, during which athletes make various kinds of errors, lead to injuries of the upper and lower extremities, including finger fractures (63%), shoulder strain (87%) and tear (42%), shoulder dislocation (71%), ankle strain (61%) and tear (39%) (Fig. 3).

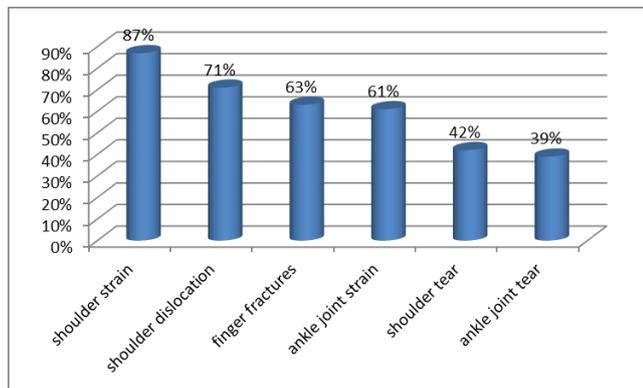


Figure 3 - The most common injuries when performing elements of structural group C (jumps)

Structural group D (flexibility and balance) is based on the elements with turns that are complex in nature and require the athlete to have excellent coordination and flexibility. When performing the elements of this structural group, such injuries occur as: lower extremities strain (91%) and hip and ankle joint dislocation (86%).

By the nature of injuries, following the generally accepted classification, we determined bruises, dislocations, sprains and strains, fractures. According to the scientific and methodological literature, athletes can be injured by many reasons, among which can be distinguished:

- the injuries due to the fault of the coach;
- the injuries due to the fault of the athlete.

In this work, we studied the causes of injuries due to the fault of both the coach and the athlete, because the training process is a combined work of both the coach and the athlete.

Most athletes are injured due to a feeling of fatigue (81%). Most highly skilled athletes are strong-willed individuals who spend quite a lot of time practicing sports. Based on this, athletes overestimate the role of a coach, and, as a rule, the latter considers himself responsible for solving the issues of the intensity and volume of training loads, as well as the performance of new and complex elements.

There is a threat of working at half-strength at the pre-competitive period, which also entails the risk of injury in sports aerobics. Timing of freefall jumps of structural group C (jumps) showed that the amount of time spent on the takeoff phase during training is less than during the competition in a state of mental readiness against the background of adrenaline production. As a result, the height of the jump increases, and the quality of the landing decreases, since in the training process the athlete achieved the technique of performing jumps with different kinematic characteristics.

Often, the transition of an athlete from one trainer to another, especially starting from the stage of performance enhancement, leads to the individualization of the exercise technique. That technique, which was formed by the "first" coach, and will be used for a long time by the athlete. A competent and correct approach to the development of exercise techniques at an early age will significantly reduce the risk of injuries in sports aerobics.

One of the important causes of injuries in sports aerobics is the failure to comply with generally accepted standards, material and technical equipment of the training and competition facilities. Quite often organizers do not provide warm-up and training zones at high-level international competitions. In this case, the athletes are forced to rehearse the competitive program in unsafe conditions.

#### IV. CONCLUSION

We have established the following reasons for injuries in highly qualified athletes from sports aerobics:

- 1) Exercise performance under severe fatigue (87% of injuries);
- 2) Failure to comply with the requirements of the coach (63% of injuries);
- 3) Changes in the exercise technique, the wrong technique (61% of injuries);
- 4) Athlete's unpreparedness to perform complex elements (37%);
- 5) Material and technical equipment which does not meet the standards (31%).

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