

## BIOLOGICAL RENEWAL IN TEN-PIN BOWLING

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### Abstract

The ten-pin bowling as a game was known in antiquity but its progress and popularity were increased in the 19th century in the USA. Sportive ten-pin bowling is classified into different, male and female kinds of competitions, and the competitive systems are played individually and in teams on the special alleys. Training education in ten-pin bowling is based on the long-term process divided into the particular training periods: preparatory, starting and transitory period. Only the knowingly planned and carefully executed training process could lead to the significant national and international achievements.

The ten-pin bowling is characterized by the typical speed and weight effort. Multiple of repeated throwing during the training and competitions with the unilateral structure of movements evokes the occurrence of overloads localized in strictly defined places of the locomotor system. In this sport the most frequent injuries caused by overloads changes are observed in the joints of upper limbs, to a minor extend – in trunk or lower limbs.

Planning of the supporting restitution and the prophylactic of the overload injuries in bowlers should be connected with the qualification of potential competitor to this particular sport discipline, appliance of the right training loads, hygienic way of life as well as the widely meant biological renewal.

*Key words: ten-pin bowling, biological renewal, overload changes*

### Introduction

Ten-pin bowling (skittles) as a game was known in antique Egypt, Greece and Rome. In Europe this game was known also in the medieval centuries, but these times its popularity was limited by the gambling associations. The ten-pin bowling's progress and popularity were increased in the 19th century in the USA, where in 1875 the American Bowling Association was established. Ten years later the similar association was established in Europe (1).

Ten-pin bowling is classified into different, male and female kinds of competitions, and the competitive systems are played individually and in teams on the special alleys. The regulations of this game are strictly defined and their compliance is observed by referees commission. The main accessories are the skittle pins and balls.

Training education in ten-pin bowling is based on the long-term process divided into the particular training periods: preparatory, starting and transitory period. Only the knowingly planned and carefully executed training process could lead to the significant national and international achievements (1).

The ten-pin bowling is characterized by the typical speed and weight effort. Multiple of repeated throwing during the training and competitions with the unilateral structure of movements evokes the occurrence of overloads localized in strictly defined places of the locomotor system. Also the desire of immediate achievements is the frequent cause of overtraining states among the skittles competitors. This status may be heightened by the lack of proper restitution

as well as the directed prophylactic of overloads of the locomotor system (2,3).

### Localization of the overload changes

The most frequent localization of the overload changes in ten-pin bowling is observed in:

- Thumb of the bowlers competitor – repeated pressure on the thumb's basis by the hard edge of the ball's opening leads to the fibrosis of the ulnar nerve of competitor's thumb.
- Ulnar collateral ligament of the metacarpophalangeal joint of thumb – is responsible for the strength of the opposing grip of thumb to the index finger and middle finger. Significant weight of the ball (above 3000 g) as well as the intense take evokes the joint's destabilization and the decreased both force of take and precise of throwing.
- Wrist composed of the three different joints: radio-carpeal joint, intercarpeal joints and mediocarpeal joint. The exploitation of ligaments in this area conducts to the destabilization of the wrist, pressure neuropathy of the ulnar and median nerves and fractures.
- Elbow joint – even the minor destabilizations in this joint could produce the inflammatory states of the muscle implantation to the medial epicondylus.
- Shoulder – with its specific built glenohumeral joint with wide range of movement, frequently overloaded what leads to the often occurred „painful overloaded shoulder syndrome”.
- Spine – the specific biomechanics of the competitor's body during the throwing may evoke the painful syndromes of the particular parts of spine

- Pelvis and thigh – pains in these areas are often originated by entezopathies and the muscle breaking, nerve neuropathies, inflammation of joint's synovial sockets.
- Knee – the most frequent reported dysfunctions of this part of movement system are the chondromalacia, bone and cartilage sterile necrosis, the Hoffy fatty organon excess, entezopathies of tendon implantations, excess of the joint's synovial sockets.
- Feet – overload of the Achilles tendon, peroneal nerve and the lateral stabilizers of the talocruralis joint (shin joint) (1).

### Biological renewal in ten-pin bowling

Planning of the supporting restitution and the prophylactic of the overload injuries in ten-pin bowling should be connected with the following subjects:

1. Qualification of potential competitor to this specific sport discipline according to the family interview, orthopedic investigation and elimination of inborn defects.
2. Appliance of the right training loads for the biological age (individual training).
3. During the first stage of training the training procedures should be general.
4. The competitor should be acknowledged with the body biomechanics and the movement ergonomics as well as the proper patterns of move.
5. Hygienic way of life (proper amount of rest and sleep time).
6. Wide range of the biological renewal program in particular periods of training:
  - The general preparatory period – the training procedures are equally charged for all the body, the main stress of training is put on the general and strength endurance. In hours from 8 a.m. to 12 a.m., one to three times per week, the general restitution procedures should be applied as sauna, steam baths, warm and salty baths and immediately after the training - the showers (slope, curtain, whipped). The local restitution should include the water massages (whirl, underwater), local heating (Sollux, compresses) and the classic sport massage.
  - The special preparatory period – during the training the main stress is put on the improvement of the specific ball throwing. After the each training the local restitution procedures are recommended, especially for the upper limb –tissues cooling, massage of the throwing limb, curtain shower. One to two times per week the additional procedures should be applied for the rest improvement (sauna, baths and others). For the prophylactic of the overload injuries the following procedures are introduced: light procedures (Sollux, laser), electric current (4-chamber galvanization), magnetic fields, warm compresses and sport massage.

- The starting period – the high pressure induced by frequent starts are discomfort for the competitor's psychic. In this case the psychological procedures of the biological renewal are recommended: the relaxation, music therapy and others. About ten to twelve hours after the competition, the complex of the restitution procedures are recommended, for example:
  - *sauna (2 cycles), curtain shower, sport massage of the upper limb, wrist and forearms;*
  - *underwater massage, the Scotch whips, wrist and forearms massage;*
  - *steam baths, whirl massage of the upper throwing limb, relaxation massage, the Scotch whips, salty baths (4).*

The numerous procedures applied in the same time may be disadvantageous, because the effect reached by one procedure may be opposite to the other. The sufficient number is one general procedure with two local ones. Apart from the restitution and renewal procedures, in days between the starts the prophylactic by the physical factors should be applied on the upper and lower limbs as well as the spine. Especially the local criotherapy, laser biostimulation, local heating (Sollux, compresses), vibrating or centrifugal massage and the magnetic field with the low frequency are recommended.

- The transitional period - instead of the ten-pin bowling training, the general recreation should be introduced. The following renewal procedures are recommended: supporting body massage, sea baths, occasionally sauna or steam baths (5).

In introducing the supporting elements of the rest processes in ten-pin bowling, we should remember about the individual selection of the physical procedures for age, sex, health condition, training level and the competitor's individual reaction for the particular procedure. The specific selection of procedures should take into consideration the stage of preparation, training period, training loads extension and frequency of starts. The most important is the time of appliance of the particular renewal procedures. Some of them applied too early (for example the classic massage immediately after the strength training) could eliminate the expected, positive results of such training procedure, and too late applied renewal procedures may made the organism too weak for the next training processes (4,5).

Widely accessed bowling clubs and developed skittle sport in our country establish the new challenge for the biological renewal in aspect of the optimization of restitution processes and in aspect of the prophylactic of the overload injuries.

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**Author's contribution**

A – Study Design

B – Data Collection

C – Statistical Analysis

D – Data Interpretation

E – Manuscript Preparation

F – Literature Search

G – Funds Collection