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Original article

## THE ROLE OF PREVENTIVE PRACTICE IN REDUCING THE NUMBER OF INJURIES OF HANDBALL PLAYERS

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### Abstract\*

*Aim.* The purpose of this study was to prevent the number of injuries in handball players by focusing on physical fitness practice and create a well-planned and sustained sports training programme.

To be able to make a training plan and program, it is necessary to do the diagnosis beforehand, including medical, functional, motor and anthropological diagnosis and choose the right exercises and their correct performing technique. This is particularly related to the work at the gym and plyometric training. We implemented the principles of adaptation, gradualism, progressivity, individual aspects, continuity, flexibility, specific focus of sports training, and many others. (Dick, 1997; Bompa, 2000).

The correct methodology of preparing exercises, methods and resistance is one of the most important preventive measures in sports. The task of preventive practice improved the muscle and connective tissue, the locomotor apparatus of athletes, and motor reactions in unpredictable and dangerous situations health wise.

*Conclusion.* Preventive training should become an integral part of daily exercise with the ultimate aim of extending the athlete's career in the broader sense, and continuous high performance level during the season, which is reflected in the higher level of sports results.

*Keywords:* handball, practice, injury prevention

### Introduction

By its structure, handball is a very complicated and complex game. The complexity of its activities is reflected in the acyclical and cyclical movement structures. Modern handball is characterized by a high level of performance of technical and tactical elements in conditions of constant contact of the players during the game.

We have the emergence of a contact game not only during the match, but also during the daily practice, which also presents a greater risk of injury of players. Physical fitness can in large part be aimed at preventing injuries. Preventive practice is increasingly present in the daily training process.

Consequently, the level of physical fitness should be optimal.

The level of physical fitness affects the number and severity of injuries in handball. All segments of physical fitness play a role in injury prevention.

To be able to make a training plan and program, it is necessary to do the diagnosis beforehand, including:

- Medical diagnosis, in which we get the information about the history of disease and injury, biochemical analysis of the body, the status of internal organs, and the status of the locomotor apparatus.
- Motor diagnosis, which tells us how to program a training session, harmonization

of the scope and intensity of the activity, and how not to put unattainable tasks before our players.

- Functional diagnosis, which tells us about the cardio-respiratory system, and about the energy capacity. Functional diagnostics should be carried out in the laboratories using modern technology.
- Anthropometric diagnosis, which gives us information about the structure of the body, deformities, and the critical zones of each player.

A well-planned and sustained sports training is a way to achieve high sports goals.

The realization of the set objectives in the field of optimal physical fitness for a longer period of time ensures a high sports performance and good health of the players.

In addition to the results obtained by the medical, functional, motor and anthropological diagnosis, it is very important to choose the right exercises and their correct performing technique. This is particularly related to the work at the gym and plyometric training.

Incorrect biomechanical performance of the movements leads to micro trauma, and later to severe injuries that separate the players from the field for a longer period.

The obvious example are the handball activities,

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passing and kicking, that are performed daily, while the irregular biomechanical performance of these elements leads to problems in the shoulder joint (labrum), which has been an increasingly common injury in handball players in recent years.

Respecting the principle is an important condition for the successful implementation of a sports training session. Common principles are adaptation, gradualism, progressivity, individual aspects, continuity, flexibility, specific focus of sports training, and many others. (Dick, 1997; Bompa, 2000).

Each of these principles contributes to the successful implementation of a training program and achievement of the intended results, with the aim of reducing the severity and the number of injuries.

### Method

In this research the task of preventive practice is to improve all segments of the locomotor system with the aim to alleviate and reduce injuries of handball players. A training session should be directed at the improvement of muscle tissue, connective tissue (tendons and ligaments) and proprioception.

For each of these segments we must choose the appropriate exercises, resistance, methods, and their timely inclusion in the structure of sports training.

#### Improvement of Muscle Tissue

Due to the strong pace of the competition, athletes spend more and more time at the gyms lifting tons and tons of weights. Working with weights is inevitable, but only to the extent that it does not endanger the health of the athletes. Well trained and physically strong athletes are at an advantage nowadays.

Particular attention should be paid to the harmonious development of motor abilities. We are often able to see athletes with developed lower and upper body, with the core muscles of the body poorly developed, which often leads to injuries of the lower back, adductors, abductors, flexor and super flexor.

Also, disproportionate development of the quadriceps compared to the hamstrings leads to the injury of the cruciate knee ligaments.

Structural improvement of muscle tissue refers to hypertrophy. If we plan it well and fit it into the system of sports training, it will certainly contribute to injury prevention.

One of the functions of muscle mass is to protect the joints from different movements and serious injury. Special attention should be paid to the period and the dynamics of increasing muscle mass (hypertrophy) because sudden changes can lead to a negative impact on the performance of technical elements of handball.

The Connective Tissue (ligaments and tendons, their improvement and development)

Ligaments, tendons, cartilage and muscle fascia are the critical points of the locomotor apparatus, and they are located between the bones and muscles.

In their research, Beagle and Earl, 2000, show that training can improve their quality.

The main objective of improving the tendons and ligaments is so that they can respond to mechanical forces produced during physical activity.

The development of connective tissue takes place somewhat slower than in the muscles, but it is sufficient to contribute to the harmonious development of all segments of the locomotive apparatus, which is a prerequisite for the prevention of sports injuries.

Training Incentives for Improving the Connective Tissue

- exercise in water
- exercise in the sand
- static (isometrical) exercises that last up to a few minutes
- dynamic (isokinetic) one-joint exercises with resistance, partner, elastic bands, sandbags
- low intensity plyometric exercises
- stretching exercises (stretching methods)

#### Proprioceptive Practice

Proprioceptors are special receptors located in the joints, muscles and tendons (Harris and Dudley, 2000). Receptors are sensitive to the change in pressure and tension, and they send all the information to the nervous system.

Proprioception is the ability or the muscle ability to respond to unforeseen and specific situations in which they find themselves.

The essence and task of proprioceptive training is to put the body in a large number of situations that will provoke the activation of proprioceptors.

Their activation through training will create a presumption that they can react optimally in unforeseen situations.

The overall effects of proprioceptive training are aimed at the strengthening of tendons and ligaments, and increasing the range of motion in the joints. This type of exercise can be conducted in the following way: movement over rough terrain, soft mats, jumping on the trampoline, distort and maintenance of starts and stops while walking or running, work on balance boards, work with Pilates balls, use of the BOSU ball, and various combinations of the above.

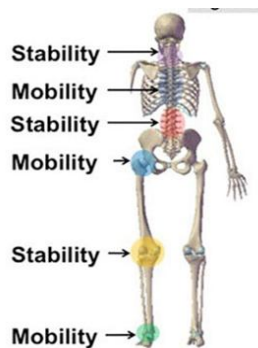
Looking at the shape of an athlete, we must pay attention to the joints in a specific order, joint by joint.

Every joint or series of joints have specific functions, and therefore each joint has specific training needs.

We will line up the joints of the body in order, from bottom to the top, and describe their primary function:

- ANKLE JOINT - mobility
- KNEE JOINT - stability
- HIP JOINT - mobility
- LOWER BACK - stability
- CHEST (thoracic part) - mobility
- SCAPULA (shoulder blade) - stability
- SHOULDER JOINT (articulatio humeri) - mobility

What is visible in the said chain system is that the corresponding characteristics STABILITY - MOBILITY rotate.



If one of the primary functions of any of the joints is undermined in the kinetic chain, one or both joints take on the role and compensate for the movement. This leads to dysfunction, and often to injury.

Many authors suggest that if you feel a problem in one of the joints, special attention should be paid to the neighboring joint, which is the source of the problem.

Mobility and stability are also basic prerequisites for uninterrupted function.

The Introductory and Preparatory Stage of Training

Training preparation consists of three stages:

Stage 1 (general preparation) involves movement exercises that are performed in an aerobic pace and aimed at increasing temperature and reducing tension in muscles and joints, but this effect is not sufficient, so, we move on to stage 2.

Stage 2 (exercise) is to increase mobility. Static and dynamic exercise prepares the locomotive apparatus to operate freely in all planes and angles required. It has been shown that the dynamic exercise is more effective and has a positive influence on sports results.

Stage 3 (specific) is the preparation which includes movements close to sports activities, activation of the CNS for speed and strong activities.

In order to implement the introductory and preparatory stage of training in a high-quality way, we should especially focus on individualization, which is reflected in the use of foam rollers, balls and sticks, professionally called the Self-Myofascial Release -SMFR.

What is their effect and task?

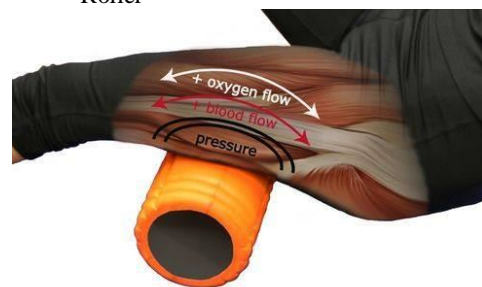
Many years of training, insufficient stretching, improper training, and poor treatment lead to the formation of fibrotic scarring, thickening, and nodules (trigger point). We can observe that the fascia sticks onto the muscle, resulting in pain, limitation of movement, reduced flexibility. The use of rollers leads to a reduction in tension, better blood circulation, relaxation and increased movement of the joints. It has been shown that the trigger point is best stimulated while the muscle is still cold. The situation is similar with balls and sticks. Regular stretching affects only the healthy muscle tissue, and it does not break the nodule.

Massage using rollers, balls and sticks usually takes about 60 seconds per region, but given that there is never enough time for that kind of warm-up, we should stick to the critical points.

The ideal massage sequence:

- a) Gastrocnemius, soleus
- b) Hamstring
- c) Gluteus maximus
- d) Gluteus medius
- e) Iliotibial tract
- f) Quadriceps
- g) Tensor fascia late
- h) Adductors
- i) Peroneus
- j) Latisimus dorsi
- k) Rhomboideus
- l) Tibialis

Overview of the exercises with rollers  
 Roller



Ankle Joint

The mobility of the ankle joint is important for take-off, landing, change of direction (tricks),

landing with resistance to the opponent, sudden stopping, and fast moving.

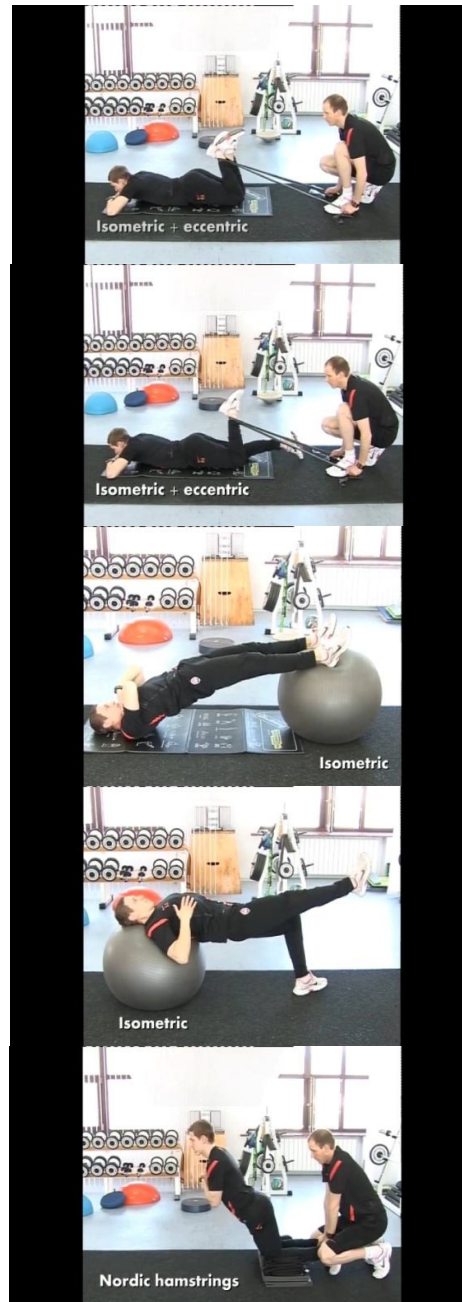


### Knee

One of the most common injuries on the sports field is a knee injury, or tearing of the ligaments. The injuries usually occurs during landing when playing one on one, or contact with an opponent. The cause of knee ligament breaking, according to many authors, is the imbalance between the quadriceps and hamstrings in situations when athletes are stopping, as stated already, given that the quadriceps is a much stronger muscle than the hamstring. The problem can be overcome by the steady strengthening of the quadriceps and hamstring muscles.



### Hamstring



### Hip Mobility

Poor mobility of the hip leads to problems in the knees and lower back.

Frequent problems that cause poor mobility in this joint are low elasticity of the hyper-flexors, and weak activity of the gluteus medius and gluteus maximus.

### Core Muscles of the Torso

Core muscles of the torso (the torso axle) are a very sensitive region, which includes not only

the lower back but also the adducts, abducts, flexors, superflexores, and the entire region to the chest.

The stability of the torso is the basic component for the transfer of energy from the lower to the upper part of the body. It should be developed in all directions, and put all the muscles that provide this stability to work.

The exercises are performed for 30 to 120 seconds. They can be performed with two, three or four support points.



### Thoracic Part - Mobility



### Shoulder

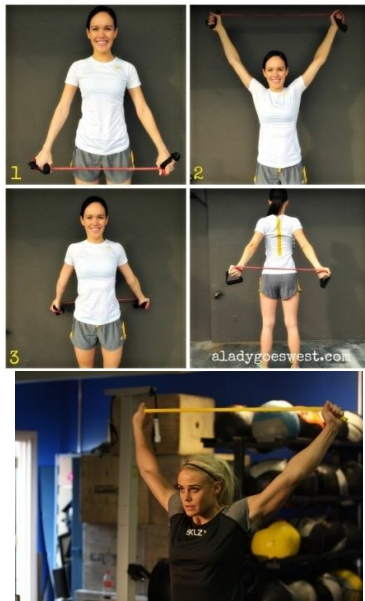
In handball, mobility in the shoulder joint is very important, and so is the ability to perform movements with the appropriate amplitude. They allow us to properly execute technical elements of tossing and passing the ball, and resistance to the strong contacts.



### Scapula

Due to manifesting high speed while tossing the ball, and large rotations in the shoulder joint, it is necessary to pay great attention to the stability of the scapula (shoulder blade).





### Conclusion

The lifestyle of elite athletes, which includes the field, competitions, travel, and media pressure requires a high level of fitness. The health of athletes is the foundation of their training. Preventive practice greatly contributes to the optimization of health of the athletes. Its primary goal is to reduce the number and severity of injuries.

The correct methodology of preparing exercises, methods and resistance is one of the most important preventive measures in sports. The task of preventive practice is to improve the muscle and connective tissue, the locomotor apparatus of athletes, and motor reactions in unpredictable and dangerous situations health wise.

Preventive training should become an integral part of daily exercise with the ultimate aim of extending the athlete's career in the broader sense, and continuous high performance level during the season, which is reflected in the higher level of sports results.

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