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*Original article*

## THE IMPORTANCE OF KINETOTHERAPEUTIC PREVENTION PROCEDURES IN FLUCTUATIONS OF FITNESS LEVEL IN TRAIL RUNNING

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### Abstract

*Aim.* The practice of trail running, compared to most athletic disciplines such as middle-distance, long-distance and longest running races, are considered to carry some risks related to the corporal integrity of the athletes. It exists a sum of convergent factors, both external and internal, that expose the practican to different injuries that vary from the gravity point of view. Regardless of the physical conditions suffered, it yields negatively towards the stability of the athlete's fitness level, on one side due to the necessary recovery period of his biological integrity - given by the injury itself - and on the other hand due to the length of time necessary to his biological rehabilitation at the ante factum level of training.

This study, based on information taken from international bibliographic sources and on adopted methodologies in the national practice of sports training, specific to running disciplines in athletics, proposes to offer a theoretical and methodological synthesis towards the groups of injuries that an athlete who practices trail running could suffer, as well as the relevance and irrelevance of prevention or/ and recovery measures that are found in the specific training, led by Romanian coaches.

*Conclusions.* The frequency and gravity of injuries that are reported by executing trail running, requires the adoption of special measures, through which to intervene in a correct way and timely manner towards maintaining optimal physical integrity of athletes, throughout the year of training. In this context, there are a variety of kinetotherapeutic procedures that can be used preventively, case in which, through the lack of injuries, the training process is not disrupted and in methodological conditions properly planned and implemented, can act in the direction of stabilising the fitness level, in accordance to the level of competences each athlete obtained at a certain moment.

*Keywords:* trail running, body injuries, prevention, kinetotherapeutic procedures, fitness level

### Introduction

Prevention in sports became a necessity, due to sports performance evolution. Nowadays, this is seen as a job and athletes in most of the cases, because of the increase in the level of effort specific parameters, start to train at top intensity and volume, that in the meantime could favorize body usage and the fitness level decrease. So, specialists from the sport field and sport medicine bring frequently into discussion, not only in direct practice, but also in the speciality literature, the problems caused by homeostasis, prevention and recovery of athletes that are supposed to go through different stages of effort stimulus.

In order to increase the quality of sport performances, more and more coaches prefer to set up some interdisciplinary teams in order to optimise the process of training. In such a team, the kinetotherapist has an essential role through the multitude of specific issues that occur or have to be prevented, individualised and according to the imposed necessities.

Sports medicine represents a

multidisciplinary consideration from its athletes. Through this it is supposed to promote the state of health and especially preventing any eventual injuries. (France, 2011, p. 27)

Trail running represent a motric activity that recently appeared in competition calendars, that become more and more popular. It involves alternating ascending and descending with a large variety of specific surfaces to forests and mountain areas. Descending running has specific features, given by the increased impact at the contact between leg and land in the breaking phase on the heel as well as on the pushing impulse with the top of the foot. It represents a permanent change of the gravity/ mass center and arms play a major role in balancing the changes of the running trajectory. This type of motric action realises an excentric phase at the muscular level in such a way that the usage and muscular pain level is high. In the phase of ascending running, a static force is requested over the trunk muscles, while the inferior limbs muscles realise isotonic contractions, short and fast. The mentioned actionings, bring a higher fatigue

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level (Horvaisa & Giandoliniab, 2013, p. 26).

Biomechanics in running comprises the contact phasis, rolling phasis, propulsion or impulsion phasis and pendulation phasis. In case of running on varied surfaces, it modifies the structure and the level of neuro-mio-artrokinetic requests direct proportional to the inclination level. In the acceleration and impulsion phases, muscles are contracted and in the breaking phasis, tendons and muscles combine contraction with elasticity properties.

([http://en.wikipedia.org/wiki/Level\\_and\\_incline\\_running](http://en.wikipedia.org/wiki/Level_and_incline_running)).

Another important factor in practicing sport at professional level is the relationship between running and the running surface, any issue creating easily injuries to the athletes. Natural running surfaces are through their composition demanding for special attention of the balance between the risk factors which makes it highly important in selecting the adequate equipment. (Bartlett, 1999, p. 53-68)

Rules of trail running have been recently adopted, so there are things that can be improved. Race distances differ, depending on a series of factors such as: the difficulty of the route (addressed to both amator and performance athlets), age category, sex etc. In case of performance athlets from Romania, it is being running between 4 km and 12 km, with a height level difference between 600 m and 1100 m, and in case of amators, races can go up to marathons and montan supermarathons, with significant differences in levels, routes being marked or unmarked, having different running surfaces. ([http://en.wikipedia.org/wiki/Trail\\_running](http://en.wikipedia.org/wiki/Trail_running) and <http://www.fra.ro/fisiere/1424341060.pdf> pag.33). Trail running has common boundaries with sports orientation, alpinism, skirunning and in the largest amount with athletics. ([http://www.wmra.ch/index.php?option=com\\_content&task=view&id=543&Itemid=8&nav=special](http://www.wmra.ch/index.php?option=com_content&task=view&id=543&Itemid=8&nav=special)).

Following the above, we highlight the variety and variation of specific effort stimulus in trail running. The athlete is continuously subject to adjustment of running techniques, of specific parameters given by the diversity of the variables from the trail running routes as well as climatic factors. These are many times becoming risk factors in the performed motric activity when the athlet doesn't succeed to permanently adapt to the specificity of running effort. Starting from these perturbatory factors, in the athlet's body and in the motric activity that he performers, it appears adaptation disequilibrium of the neuro-mio-atro-kinetic systems and functional, that lead to fluctuations in the fitness level, which imposes a convergent action of recovery, prevention and rehabilitation. Factors that are

permanent modifiable through the variation of surface and medium, impose to the athlet's body a permanent adaptability and the practican is subjected to a continue stress at the tissues level and at some varied risks of injury. (Gaurav et al., 2010, p. 16-18)

Theoretical-applicative arguments drawn from applied literature

A recent study, conducted during the Olympic Games in London, 2012, highlight the high frequency with which the sportsmen kinetherapist's services were requested and the situations that imposed those interventions (Grant et al., 2013).

Belfi et al. (2011), in a specialised article, highlight that, pain represent an alarming signal, being protective and useful. In this context, athlets should listen to their body, because the effort realised during pain produces rigidity. Another research paper regarding muscular fatigue, approaches aspects related to tissue oxygenation, in the absence of oxygen, inferior limbs become loaded and heavy, being affected by the modification of functional parameters, which is felt through an accentuated muscular pain (Christopher, et al., 2014; p. 207-211). Although in many studies, pain is the main alarm signal in the athlet's body, this is often rejected by the athlets. Their motto is "no pain, no gain!". This idea, which ocured in the sport's field of high performance, reinforces the mistaken belief that athlets should tolerate pain, although their belief are exclusively founded on the bases of personal experiences (Saragiotto et al., 2014).

Yeung et al. (2011), sustain that, among elite runners it frequently appear musculoskeletal injuries, caused by excesive usage after actioning the action of risk factors (of repetitive forces, maximal intensity efforts and increased volume), due to whom fatigue is accumulated, the more when the stafef of adaptability is not realised, going up to overtraining), and Gaurav et al. (2010), signal the neadaptation problematic of the body or of the decreased preparation level which creates the premises for the beginning or exacerbation of injuries.

Control and postural equilibrium represent an important factor in the athletic prevention. The poor development or affection of these factors favorises the perturbation of the athletes body. The postural control system involves a good organisation, integration and action of the somatic and sensorial equipment to deliver pieces of information related to the orientation of the postural control system. Equilibrium is a multidimensional ability which involves a series of factors such as visio- motory coordination creating



the kinesthetic answer. Movement and postural stability is affected whenever a deterioration occurs of the human's body systems. On the other hand, the abnormal position and the poor orientation of the body can lead to the deterioration of the general movement pattern contributing to a higher risk of injuries in athletics. (Slobounov, 2008, p. 45-69)

With the purpose of researching the accumulated usage after this type of effort, a preliminary descriptive study was realised in order to characterize muscular fatigue and specific damages caused by this type of test - route. There have been used two techniques in order to reduce the induced fatigue, on a standardised route. In the first procedure, compression clothes have been used as a method and strategy of optimizing performances. For the second procedure, it has been highlighted the warm up effect, regarding functional consequences of this. The research followed practically the fatigue level developed on the alternance uphill-downhill and strategies for reducing fatigue. The study highlights the positive effect of clothing articles - compression - towards performance and shows up the functional bond between muscular warm up and reducing the muscular damages induced by excentric training, in specific effort realised in downhill running. (Easthope Schmidt, 2013)

Bredeweg (2015) affirms that risk factors are divided in: extrinsic and intrinsic; of training; anatomics and biomechanics. Among the extrinsic risk factors variables, it can be identified: frequency, intensity, duration, stretching, footwear, running surface and technique, the level of warm up and recovery after effort; between risk intrinsic factors that bring into discussion: foot type, height of the ceiling planting, technique of movement for ankle, sex, body mass index, age.

In another speciality study (Saragiotto et al., 2014), realised on performance athletes and specialists in recovery and rehabilitation, there are highlighted the following aspects: inappropriate running surface excessively used, climatic changes, inadequate footwear, lack of muscular power, repetitive movements, temperature, lack of rest, physical preparation realised incorrectly, lack of flexibility, fatigue level, lack of athlete's experience, high number of competitors over the year, muscular disequilibrium etc., affect decisively the athlete's fitness level, reflected either through fluctuations of this or through athletic performance situated under real potential.

Padua (2014) considers that, injury prevention is realised through the control and efficient realisation of the movements; avoiding injury risks it practically actions towards the increase of performance capacity. Factors that

influence neuromuscular activity (flexibility, force, level of muscular activity) are modifiable through interventions with prescribed exercises, applied accordingly. Through correcting factors that are at the basis of the neuromuscular activities and deficitary running techniques, could diminish or eliminate chances of injury.

Saragiotto et al. (2014), in a research realised on performance athletes and specialists from an interdisciplinary team, proves that in order to prevent injuries physio-kinetotherapist strategies are used (stretching, criotherapy, compression and recovery apparatus, relaxation and rest techniques, massage, hidrotherapy, osteotherapy). These are applied after periodic evaluations towards the state of health of practicants, through specific tests, own psychological and behavioural techniques, nutrition and supplementation. The main objectives of the interdisciplinary team, after questioning its members, have been group on the following directions: muscular consolidation, orientation and informing the athletes regarding prevention of personal injury, nutritional counseling.

Between techniques and specific and nespecific recovery methods, Sabău, Niculescu, Gevat, (2013, p. 503) recommend: respiration techniques, sauna, hidrothermotherapy, cromotherapy, melotherapy, negative air ionization, acupuncture, stretching and massage (massage applied after training, reduces muscular pain, assures recovery, rehabilitates athlete's homeostasy for the next effort and assures positive effects at psychological level.

Stretching is usually performed before exercise in an attempt to enhance performance and reduce the risk of injury. Most stretching techniques (static, ballistic, and proprioceptive neuromuscular facilitation) are effective in increasing static flexibility as measured by joint range of motion, but the results for dynamic flexibility as measured by active and passive stiffness, are inconclusive. The mechanisms of various stretching techniques in terms of biomechanics and neurology, the effectiveness of the combination of stretching with other therapies such as heat and cold, and the effectiveness of stretching for performance and injury prevention are reviewed. (Weerapong et al., 2004, p.189-206)

According to Bonacci et al. (2009), isometric and plyometric procedures are used in kinetotherapy as well as in training. These types of specific contraction, refounded in the effort of trail running, improve the economy of neuromuscular functioning through combining muscular increase of power with elastic energy.

„The possible mechanisms responsible for the detrimental effects of stretching on performance and the minimal effects on injury prevention are

considered, with the emphasis on muscle dynamic flexibility. Further research is recommended to explore the mechanisms and effects of alternative stretching techniques on dynamic flexibility, muscle soreness, sport performance, and rate of injury." (Weerapong et al., 2004, p.189)

Recovery represents an important component in the formation of an athlete and through this it is followed the increase of biological potential at a high level not only in effort, but also after effort. The reestablishment of homeostasis became an essential condition in obtaining performances and diminishing fluctuations in fitness level. Some recovery procedures are known and frequently used, while others are new in the field. The application of these in sport training became a necessity in the acceleration of recovery at the level of systems that sustain effort (neurological and muscular, endocrine and metabolic, cardio-respiratory and psychological).

In order to evaluate recovery level, specific tests could be used such as medical autocontrol and control journal. (Sabău, Niculescu, Gevat, (2013, p. 498-500)

Scientific approach of specialised exercise has effects towards all areas that set up the activity field of every individual, participant or not of sport branch/event.

(<https://uncexss.wordpress.com/2014/02/>)

### Discussions

„Only 492 of 11 859 publications actually assessed the effectiveness of sports injury prevention interventions or their implementation. Research in the area of regulatory change is underrepresented and might represent one of the greatest opportunities to prevent injury.” (Klügl et al., 2010, p.407–412)

With a specific interest in rehabilitation another lack of research exists regarding the way in which interventions should be integrated effectively to the training process. (Slobounov, 2008, p.480)

### Conclusions

The diversity and specificity of trail running efforts favors the increase in the level of risk to suffer a multitude of injuries.

A large number of studies, highlight the complexity and frequency of risk factors, perturbatory in the optimal level of the fitness level.

The issue of implementation of kinetherapeutic measures in the field of trail running is approached by the specialists in the field in a very small measure.

The frequency of injuries is in a tight relationship with the integral methodology applied in specific training, with athletic performance,

influencing negatively or positively, after case, fluctuations of fitness level.

Interdisciplinary team that coordinate the athlete's instruction for practicing trail running, recommend the usage of ways, methods and techniques varied of prevention, recovery and biological rehabilitation; especially are recommended those measures that are according to the competences area of the kinetherapist.

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