ASPECTS REGARDING MUSCULO-SKELETAL TRAUMAS IN COMPETITIVE ATHLETES AND FOOTBALL PLAYERS

MIRCIOAGĂ ELENA-DOINA
"Victor Babes" University of Medicine and Pharmacy Timisoara, ROMANIA
E-mail: doina_mircioaga@yahoo.com

Abstract
The overstress imposed by competitiveness and the imbalance between the mechanical overstress and the functional resistance of the tissues are the causes of the high incidence of joint traumas in sports. The study was performed on 27 football players and 12 athletes (sprint and hurdles) from Timisoara, aged between 13 and 27 and with 4-17 years time spent in training. The study extended over a three-year period of competitions, during which the sportsmen were examined closely: Period I August 2006-July 2008 and Period II August 2008-July 2009. The musculo-skeletal traumas occurred in 11 body segments: forearm, thigh, elbow, spine, face, calf, knee, ankle, hand (palm, fist), foot and shoulder. All injured segments (N = 11) were compared against the total number of traumas per sportsmen, age groups and time spent in training, in order to reveal the age groups and longevity groups with the highest trauma incidence and the most frequently affected segments in the two periods (before and after starting the prevention exercises programme).
Purpose: To reduce trauma incidence in the sportsmen studied in 2006-2009 through the identification of the risk factors and the introduction of prevention exercises and stretching methods in the training process, during both warm-up and post-effort rehabilitation, in order to prevent injuries and increase performance in competitive sportsmen. **Results:** The results of the comparison between the injuries occurring in each body segment separately in the two periods are significant (the Z-test was used and the significance threshold was $\alpha = 0.05$). **Track and field events:** the number of **knee** traumas **decreased considerably** in the 2008-2009 period compared with the 2006-2008 period. **Football:** the number of **thigh** and **knee** traumas **decreased significantly**, while the number of **foot injuries** was significantly higher **Conclusion:** The results of our study, validated in sports-related literature, indicate that trauma incidence is higher in athletes than in football players. Injuries occur frequently in athletes competing in technical track and field events such as hurdling.
Key words: musculo-skeletal traumas, competitive sportsmen, affected body segment.

Introduction

Traumas occur frequently in the competitive sportsman's life. The causes and the mechanisms of musculo-skeletal traumas vary with every sport.

This study deals with specific traumas in athletes and football players. *Compared with the data found in sports-related literature*, trauma incidence is very high in these sportsmen. For this reason, the authors of the study have tried to identify trauma causes and to establish methods meant to prevents injuries in sportsmen.

Athletes

The studied athletes compete in 100-200 m sprint races and 110 m hurdle races.

Track and field athletics is based on individual competition.

The short sprint (100 m and 200 m) and hurdle races (100 m and 110 m) are included among the events that require anaerobic alactacid efforts.

Sprint races are cyclic exercises. Like hurdle races, they require a short period of maximum effort. The hurdle race is primarily a technical event requiring cyclic movements of maximum intensity and short duration, and the mechanical efficiency is conditioned by stride length and frequency. (L. Mihailescu, 2005; G. Gavrilescu, M. Anton, O. Timnea, 2007; L.R. Joseph, 2000).

Football

In football, the physical factor is expressed in spontaneous alternation of maximal, submaximal and average efforts as movement abilities. Great efforts made in training and playing have cumulative effects on movements and morpho-functional abilities. Football requires a rigorous selection of somatotypes.

Of all sports, football calls for maximum aerobic effort because of the game duration and the area that the players have to cover. The musculo-skeletal system, especially the joints, is overstressed. Sudden stops and changes of direction overstress the knee and ankle joints. Consequently injuries are quite common; ankle and knee sprains often cause meniscus or muscle ruptures, elongations, partial or total ruptures (D.V. Poenaru, P.L. Matusz, 1994; P. Rochcongar, et al., 2000).

Hypothesis

Trauma incidence in sports varies with sex, age, time spent in training and affected body segments. The authors have assumed that following a comparative study on trauma incidence in training and competitions, specific means can be selected and applied as injury prevention methods and rehabilitation therapy.

Objectives

1. To determine trauma incidence and location in the studied sportsmen;

2. to determine the main musculo-skeletal traumas varying with every sport, age, time spent in training, height, weight, BMI, the maximum number of traumas per segment and the total number of traumas in the studied periods;

3. to develop and use preventive training protocols;

4. to evaluate and compare the results obtained within the same batch and between the two batches in the two periods.

Material and method

The study was performed in order to obtain information on 12 athletes from the Banatul Sports High School and 27 football players from Timisoara playing in League A1 and A2, all aged between 13 and 27 and with 4-17 years time spent in training. The study extended over three years: August 1, 2006-July 2008 and August 2, 2008-July 2009.

Starting with august 2008, the sportsmen followed a complex and coherent programme of exercises focused on muscle groups and joints that are usually overstressed while training or during competitions. The exercises were chosen so as to increase muscular balance and joint mobility and to improve muscle and ligament flexibility (major factors in trauma prevention) (E.D. Mircioagă, 2009).

The following research methods were used: scientific documentation, observation, experiments, conversations, questionnaires, MRI, CT, statistic and graphic methods (E.T. Rinderu, 2005; I. Kontonopoulou, A. Xidea-Kkemeni, 2004; D. Mircioaga, 2009).

The sportsmen were monitored both while training and during competitions through video recordings, questionnaires, and observation and conversation conducted by medical sportsmen and kinetic therapy experts.

The injured sportsmen were examined clinically and imagistically (radiology, ultrasound scan and in severe traumas also MRI).

The statistical processing included:

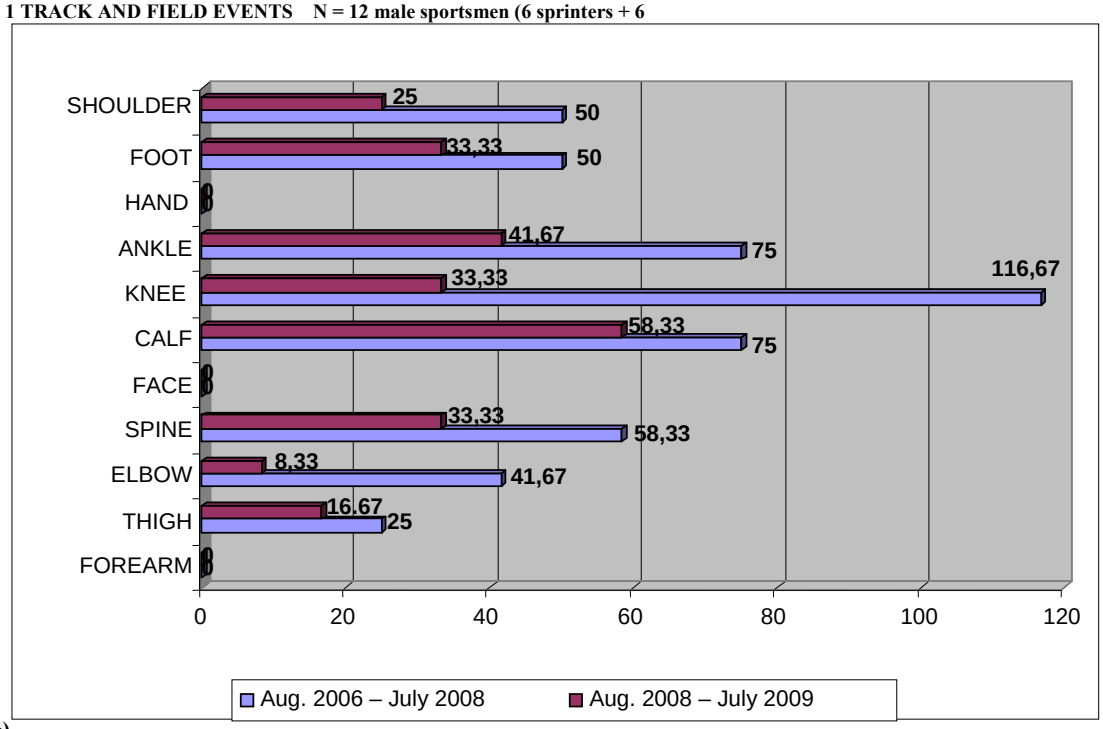
- the comparison of the average values: the "t" (Student's) test was used for pairs of independent batches and a significance (risk) level of 0.05 (5%); the "F" test was used to compare more than two batches (the ANOVA model) (A. Gagea, 1996; G.I. Mihalaş, D. Lungeanu, 1998; T. Baron, C. Anghelache, E. Titan, 1995);
- regression and statistic correlation: linear regression and the Pearson coefficient;
- the Z test.

Results

GRAPHIC PRESENTATION OF TRAUMAS ON SPORTS BRANCHES

Comparison of trauma distribution on body segments, sports branch and number of sportsmen in a branch in the two studied periods

Graphic 1 TRACK AND FIELD EVENTS N = 12 male sportsmen (6 sprinters + 6 hurdlers)



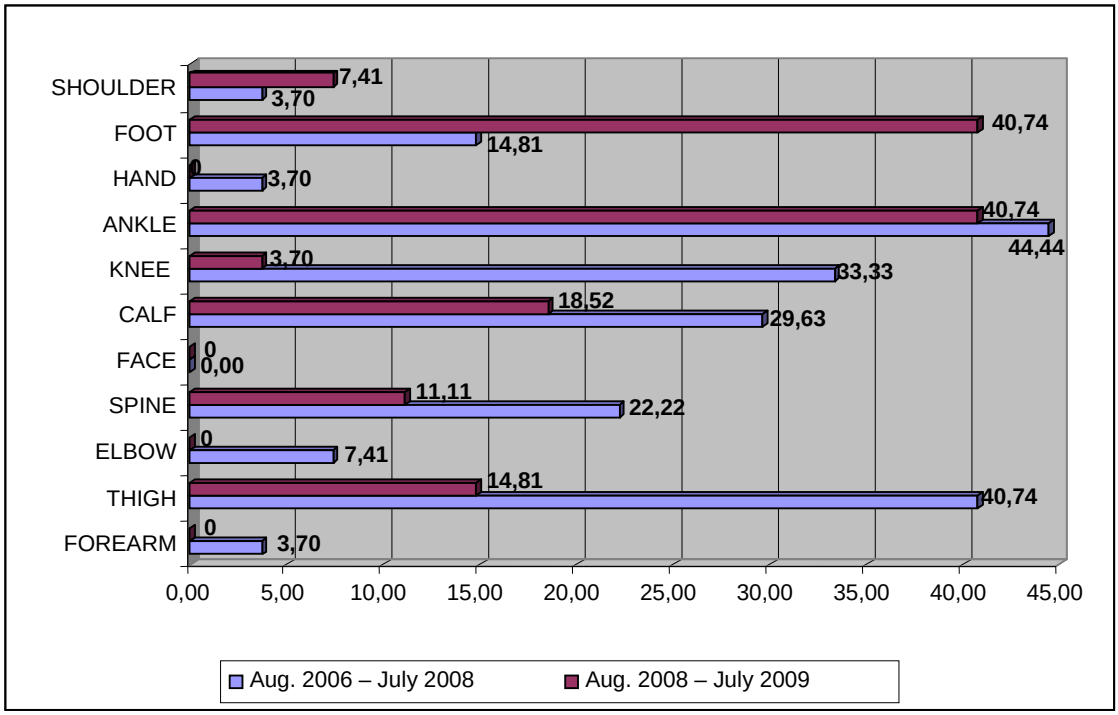
Track and field events: the number of **knee** traumas (p = 0.001; α = 0.01) **decreased considerably in 2008-2009 compared with 2006-2008.**

The comparison of the two periods revealed a decrease in the number of musculo-skeletal traumas in August 2008 – July 2009, during the systematic training programme that included stretching both as a warm-up and a post-effort exercise.

As a result of the training programme for accident prevention, the incidence of musculo-skeletal traumas in all **body segments** was lower in August 2008 – July 2009. The most common injuries affected the knee **(**93.34%), the ankle (34.33%), the elbow (33.34%), the shoulder and the spine (25%), the calf and foot (16.67%); the other segments were affected less than 10%.

It should be mentioned that the most affected body segments in the two periods were the knee, the calf, the spine and the ankle.

Graphic 2 FOOTBALL N = 27 male



player

% Total traumas

Football: the number of **thigh** ($p = 0.034$; $\alpha = 0.05$) and **knee** traumas ($p = 0.007$; $\alpha = 0.01$) **decreased significantly**, while the number of **foot injuries** was significantly higher **($p = 0.034$; $\alpha = 0.05$).**

The comparison of the two periods revealed a decline in the number of musculo-skeletal traumas in August 2008 – July 2009, during the systematic training programme that included warm-up and post-effort exercise.

A considerable reduction of 79.63% occurred in knee traumas as well as in thigh injuries – 25.93%. However, calf and spine injuries only decreased with 11.11%. **Foot trauma incidence increased with 25.93% among football players** (11 affected players in the second period as against 4 in the first one). It should be mentioned that out of the 11 body segments, only the foot suffered an increased number of injuries.

The most affected segment is the **ankle**: 40.74% in the first period and 44.44% in the second. Football-related literature also indicates 31% ankle injuries. The cause of this high incidence of ankle trauma is overstress, bad football ground and returning to training before complete rehabilitation after suffering an injury.

Table 1 is a comparison of trauma distribution on body segments and sports branch in the two studied periods (the Z test was used and the significance threshold was $\alpha = 0.05$)

Comparison of percentages in the periods: value

Table 1

BODY SEGMENTS	TRACK AND FIELD EVENTS	FOOTBALL
Forearm	0.99 ns	0.5 ns
Thigh	0.5 ns	**0.034 s**
Elbow	0.079 ns	0.235 ns
Spine	0.206 ns	0.233 ns
Face	0.99 ns	0.99 ns
Calf	0.332 ns	0.262 ns
Knee	**0.001 s**	**0.007 s**
Ankle	0.107 ns	0.49 ns
Hand(palm, fist)	0.99 ns	0.5 ns
Foot	0.34 ns	**0.034 s**
Shoulder	0.2 ns	0.49 ns

trauma two studied and significance

The red figures indicate significant differences, namely the number of traumas declined significantly in the second period, except for the increased foot injuries in football players **($p = 0.034$; $\alpha = 0.05$).**

Track and field events: significant reduction of knee traumas ($p = 0.001$; $\alpha = 0.01$).

Football: significant reduction of thigh ($p = 0.034$; $\alpha = 0.05$) and knee traumas ($p = 0.007$; $\alpha = 0.01$), but increased foot injuries **($p = 0.034$; $\alpha = 0.05$).**

Discussions

The overtraining imposed by competitiveness and the imbalance between the mechanic overstress and the functional resistance of the tissues are the causes of the high incidence of joint traumas in the studied batches

Track and fields events

Each track and field event is typical in nature and affected body segments.

Accident incidence is higher than in football, as shown in our study and confirmed in the athletics-related literature, according to which most lesions occur in athletes, especially in hurdlers (22, 25, 30).

In track and field events, the most common injuries are tendinitis and muscle and joint traumas.

Frequent traumas in sprinters and hurdlers:

Sprint:

- sprains, strains, tendon and muscle lesions: at ankle and knee joint caused by overstress
- muscle lesions: contraction, strains and partial or total ruptures that affect leg muscle groups, thigh and calf;
- tendon lesions: tendinitis, tenosynovitis, enthesitis, ruptures;
- lumbar pains: caused by overstress while training and faulty executions;
- enthesitis occurs in inferior limb insertions

Hurdles:

- wounds, contusions and haematomas after frequent falls caused by hitting the hurdle with the lead leg and the trailing leg;
- ankle and knee sprains caused by faulty jumps over the hurdle and faulty landing;
- fractures of the upper and lower limbs due to falling after hitting the hurdle with the lead or trail leg;
- overstress fractures of the pushing leg;
- shoulder, elbow: sprains and tendinitis; the risk of shoulder injuries is higher in hurdlers than in sprinters. This is caused by faulty hurdling technique (falling on the hand after jumping) and improper training;
- accidents caused by overtraining, insufficient rehabilitation, joint or tendon overstress;
- Most traumas affected the lower limbs: knee and ankle sprains, meniscus ruptures; shoulder separations
- Muscle injuries: contraction, strains and partial or total ruptures that affect leg muscle groups, thigh and calf
- Lumbar pains: caused by overstress while overtraining and faulty executions
- Enthesitis occurs in inferior limb insertions
- Achilles tendonitis is caused by overstress, overtraining, large number of games and poor grounds.
- TIBIO-TARSAL traumas (ANTERIOR SYNDROME OR FOOTBALLER'S ANKLE). According to the football-related literature, this is a rare syndrome (7% after Cabot, 18% after Commandre, quoted by Dan V. Poenaru et al. in *Traumatologie sportiva*, 3, 4, p. 42); the footballer experiences pain in the anterior ankle at the beginning of the warm-up, when he hits the ball or sprints.

The comparison of the two periods revealed reduced trauma incidence in both batches in August 2008-July 2009, during the systematic training programme that included warm-up and post-effort exercise.

Knee traumas occurred during contact with the adversary or in players with previous injuries and persistent instability (joint laxity) and insufficient rehabilitation measures.

Conclusions

Knowledge of trauma and the identification of its causes, prevention and rehabilitation are the key to future competitiveness.

Overstress accidents in the studied batches were reduced as a result of the trauma prevention programme that included joint exercises, massage, stretching, and exercises to increase muscle strength

Track and field events: the number of **knee** traumas ($p = 0.001$; $\alpha = 0.01$) **decreased considerably** in the second period (2008-2009).

Football: the number of **thigh** ($p = 0.034$; $\alpha = 0.05$) and **knee** traumas ($p = 0.007$; $\alpha = 0.01$) **decreased significantly**, while the number of **foot injuries** was significantly **higher ($p = 0.034$; $\alpha = 0.05$).**

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