

## TRAUMATISME MUSCULO-SCHELETALE LA SPORTIVII DE PERFORMANȚĂ (GAMBĂ). METODE PE PREVENȚIE ȘI RECUPERARE

### MUSCULO-SKELETAL CALF TRAUMA OF COMPETITIVE SPORTSMEN. PREVENTION AND REHABILITATION METHODS

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**Key words:** sportsmen, musculo-skeletal traumas, calf, prevention, rehabilitation

The study starts from the premise that the high trauma incidence among competitive sportsmen is caused by factors that can be controlled at least partially through primary prevention methods. **Objective:** The objective of the study is to reduce the number of traumas in the studied sportsmen through the identification of risk factors and the introduction of prevention exercises and stretching techniques exercises in the training programme, both during warm-up and in post-effort rehabilitation, in order to prevent injuries and increase performance. **Material and methods:** The study was performed on a batch of 155 sportsmen, who practised athletics, basketball, handball, volleyball. The sportsmen were between 13 and 42 years old and have been practising sports for 4-20 years. The sportsmen were closely monitored during the study that covered three years of competitions: August 2006 – July 2009. The comparison of the trauma percentages affecting the segments, calf, between the two studied periods – August 2006 - July 2008 and August 2008 – July 2009, has revealed the following significant results: There are significantly less traumas calf, in the second period. Period 1- 30 sportsmen (19.35%) suffered 1 calf trauma in Aug. 2006 – July 2008. Period 2 - 15 sportsmen (9.68%) suffered 1 calf trauma in Aug. 2008 – July 2009. The number of sportsmen with calf traumas decreased to half (9.67%) in the second period.

**Cuvinte cheie:** sportivi, traumatisme musculo-scheletale, gambă, prevenție, recuperare.

Studiul pleacă de la premisa că, incidența crescută a traumatismelor în rândul sportivilor de performanță investigați, se datorează unor factori ce pot fi măcar în parte contracarați prin intermediul profilaxiei primare.

**Scop:** Reducerea numărului de traumatisme la sportivii cuprinși în studiu, prin identificarea factorilor de risc și introducerea în procesul de pregătire, a unor programe de exerciții profilactice și a tehnicilor de stretching, atât în încălzire cât și în refacerea postfort, în scopul prevenirii și a creșterii performanței sportive.

**Material și metode:** Studiul a cuprins un lot de 155 sportivi, componenți ai ramurilor sportive: atletism, baschet, handbal, fotbal, volei, cu vârste cuprinse între 13-42 de ani și o vechime în sport cuprinsă în intervalul 4-20 ani. Studiul s-a derulat pe o perioadă de 3 ani competiționali când s-a reușit urmărirea îndeaproape a sportivilor respectiv: august 2006 – iulie 2009. În urma comparării procentului de traumatisme pe segmentul gambă, între cele 2 perioade de timp, aug.2006-iulie2008 și aug.2008-iulie2009 au rezultat următoarele semnificații: Avem semnificativ mai puține traumatisme în perioada a II-a aug. 2008-iulie 2009. Perioada 1: -30 sportivi (19,35%) au prezentat 1 traumatism la nivelul gambei în perioada aug.2006-iulie 2008. **Perioada 2:** -15 sportivi (9,68%) au prezentat 1 traumatism la nivelul gambei în perioada aug.2008-iulie 2009. Numărul sportivilor traumatizați a scăzut la jumătate (9,67%) în perioada a doua pe segmentul gambă.

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## INTRODUCTION

The study starts from the premise that the high trauma incidence among competitive sportsmen is caused by factors that can be controlled at least partially through primary prevention methods. Injuries are a common fact in the competitive sportsman's life. They have known causes, such as too short warm-up periods, faulty training, improper equipment, specific trauma, aggression on the court.

This study deals with specific traumas in competitive sportsmen (athletics, basketball, handball, football and volleyball). *Compared with the data found in sports-related literature*, trauma incidence is very high in these sportsmen. For this reason, the author of the study has tried to identify trauma causes and to establish methods to prevent them.

## OBJECTIVE

The objective of the study is to reduce the number of traumas in the studied sportsmen through the identification of risk factors and the introduction of prevention exercises and stretching techniques exercises in the training programme, both during warm-up and in post-effort rehabilitation, in order to prevent injuries and increase performance

## MATERIAL AND METHODS

The study was performed on a batch of 155 sportsmen (52 (33.5%) female and 103 (66.5%) male who practised athletics, basketball, handball and volleyball in Leagues A1 and A2, in Timisoara and Lugoj. The sportsmen were between 13 and 42 years old and had been practising sports for 4-20 years. The incidence, frequency and location of specific traumas, the causes favouring traumas and the prevention and rehabilitation methods were determined.

The sportsmen were closely monitored during the study that covered three years of competitions: August 2006 – July 2009.

Beginning with **August 2008**, the sportsmen followed a complex and coherent programme of exercises focused on muscle groups and joints that are usually involved in the specific movements of sport games and athletics

- The statistical comparison of the results has revealed that in the second period (August 2008 – July 2009), when the exercise programme was followed in a systematic, organised and dynamic manner both during warm-up and post-effort rehabilitation, the incidence of locomotor traumas affecting whole batch of sportsmen decreased significantly (**with 25.18%**) as compared with the first period.
- In women (N= 52 sportswomen, 33.5%), the same significant decrease (**30.70%**), was registered in the second period.
- In men, (N = 103 sportsmen, 66.5%), the number of traumas also decreased (**22.60%**) in the first period.

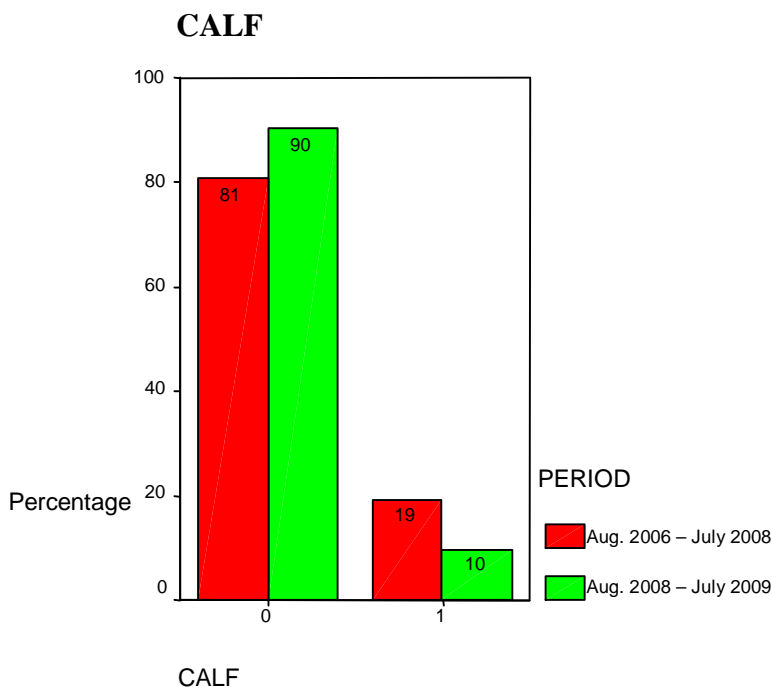
The comparison of the trauma percentages affecting the 11 body segments ((forearm, thigh, elbow, spine, face, calf, knee, ankle, hand (palm, fist), foot and shoulder) between the two studied periods – August 2006 - July 2008 and August 2008 – July 2009, revealed the following **significant results:**

- **There are significantly less traumas** (thigh, elbow, spine, calf, knee, ankle, hand and shoulder) **in the second period.**
- **A major decline of the forearm, face and foot traumas was also registered in the second period.**

In terms of the injured segment, the age groups (irrespective of sex or sport) with the highest number of traumas in both periods are:

- **13-18** and **19-22**, with elbow, spine, calf, ankle, foot and shoulder injuries
- **19-22** and **22-26** with forearm, thigh, knee, ankle, hand (palm, fist) and shoulder injuries.

**Distribution of musculo-skeletal traumas by affected segment and maximum number of traumas (1-5 traumas/sportsmen/segment) against the whole batch (N = 155); a comparison of the two studied periods**



**Graphic 1.** CALF trauma distribution (%) (0 = 0 traumas, 1 = 1 trauma) on the two studied time periods

### Interpretation

#### Period 1

30 sportsmen (19.35%) suffered 1 calf trauma in Aug. 2006 – July 2008.

#### Period 2

15 sportsmen (9.68%) suffered 1 calf trauma in Aug. 2008 – July 2009.

The number of sportsmen with calf traumas decreased to half (9.67%) in the second period.

**Percentage distribution of musculo-skeletal traumas by affected segments  
and age groups against the whole batch, irrespective of sex or sport;  
a comparison of the two studied periods**

**Table 1. Percentage distribution of calf traumas**

	CALF			Total sportsmen
	Age group	Number of traumas	Trauma %	
Aug. 2006 - July 2008	<b>13-18 years</b>	<b>13</b>	<b>36.11</b>	<b>36</b>
	19-22 years	9	12.86	70
	23-26 years	5	14.71	34
	27-30 years	3	25.00	12
	> 30 years	0	0.00	3
		30	19.35	155
Aug. 2008 – July 2009	<b>13-18 years</b>	<b>8</b>	<b>22.22</b>	<b>36</b>
	19-22 years	3	4.29	70
	23-26 years	3	8.82	34
	27-30 years	1	8.33	12
	> 30 years	0	0.00	3
		<b>15</b>	9.68	<b>155</b>

As there are **significant** differences in calf lesions by age groups, it is necessary to compare the age groups to determine which group has the most important differences.

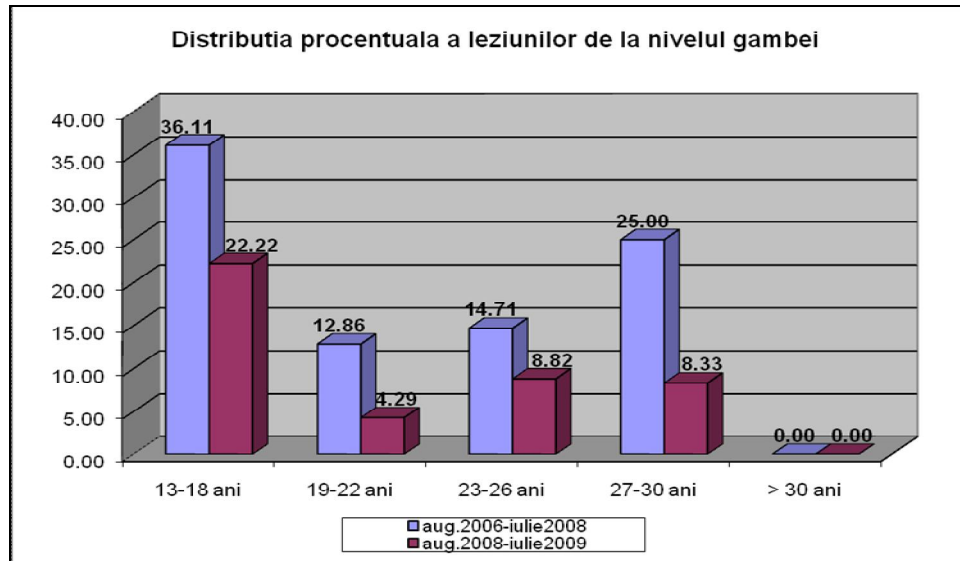
**In 2006 – 2008:** significantly more calf lesions in the **13-18** age group than in the **19-22** group ( $p = 0.011$ ,  $\alpha = 0.05$ )

**In 2008 – 2009:** significantly more calf lesions in the **13-18** age group than in the **19-22** group ( $p = 0.0113$ ,  $\alpha = 0.05$ )

No significant differences ( $p = 0.706$ ,  $\alpha = 0.05$ ) distributed by age groups were recorded between the two periods (August 2006 – July 2008 and August 2008 - July 2009).

**Table 2. Percentage of calf traumas by age groups and the two studied periods**

Age groups	Aug 2006 – July 2008	Aug. 2008 – July 2009
13-18 years	36.11%	22.22%
19-22 years	12.86	4.29
23-26 years	14.71	8.82
27-30 years	25.00	8.33
> 30 years	0.00	0.00



Graphic 2. A comparison of the percentage distribution of calf traumas by age groups in the two periods

Percentage distribution of musculo-skeletal traumas by affected segment and years of practice groups, against the whole batch, irrespective of sex or sport; a comparison of the two studied periods

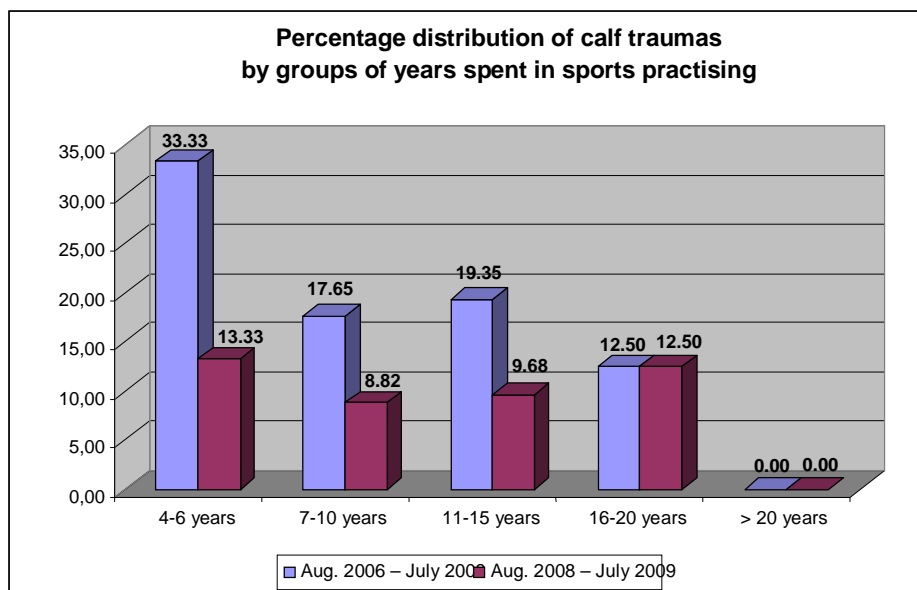
Table 3. Percentage distribution of calf traumas

	CALF			Total sportsmen
	Years of practice	Number of traumas	Trauma %	
Aug. 2006 – July 2008	4-6	5	33.33	15
	7-10	12	17.65	68
	11-15	12	19.35	62
	16-20	1	12.5	8
	> 20	0	0	2
	<b>Total</b>	<b>30</b>	<b>19.35</b>	<b>155</b>
Aug. 2008 – July 2009	4-6	2	13.33	15
	7-10	6	8.82	68
	11-15	6	9.68	62
	16-20	1	12.5	8
	> 20	0	0	2
	<b>Total</b>	<b>15</b>	<b>9.68</b>	<b>155</b>

For the first studied period, the calf trauma comparisons between the groups of years spent in sports practising were made with the  $\chi^2$  test; the results were  $p = 0.605$ , with a significance

threshold of  $\alpha = 0.05$ , which indicates that there were **no significant differences** between the number of traumas in these groups.

For the second period, the **calf** trauma comparisons between the groups of years spent in sports practising were made with the  $\chi^2$  test; the results were  $p = 0.966$ , with a significance threshold of  $\alpha = 0.05$ , suggesting that there were **no significant differences** between the number of traumas in these groups.



**Graphic 3**

In order to compare the percentage values for each group of years spent in sports practicing between the two periods, the Z test was applied and the following results were obtained:

**Table 4 Years spent in sports practicing**

<b>Years of sport practice</b>	<b>p value and significance</b>	<b><math>\alpha</math> significance threshold</b>
4-6 years	0.194 <sup>ns</sup>	0.05
7-10 years	0.103 <sup>ns</sup>	0.05
11-15 years	0.101 <sup>ns</sup>	0.05
16-20 years	0.225 <sup>ns</sup>	0.05
> 20 years	0.99 <sup>ns</sup>	0.05

**Interpretation:**

The decrease in the number of **calf** traumas is insignificant or stays the same in the second period against the first.

The order of sports by injured segment is the following:

Table 5. Calf

Period 1		Period 2	
<b>SPORTS</b>			
<b>1. Athletics</b>	<b>75%</b>	<b>1. Athletics</b>	<b>58.33%</b>
<b>2. Football</b>	<b>29.63%</b>	<b>2. Football</b>	<b>18.52%%</b>
<b>3. Handball</b>	<b>25.1%</b>	<b>3. Handball</b>	<b>3.57%</b>
<b>4. Volleyball</b>	<b>7.5 %</b>	<b>4. Volleyball</b>	<b>2.5%</b>
<b>5. Basketball</b>	<b>6.25%</b>	<b>5. Basketball</b>	<b>3.57%</b>

## DISCUSSION

Based on the careful biomechanic analysis of the movements required in team games and athletics and the location of overstressed muscle and ligament structures, the most successful therapies were selected for the rehabilitation of the injured segment and the prevention of relapses. When injuries (microtraumas, traumas and specific states generated by overtraining) are signaled by the coach, doctor and kinetic therapist without delay and when urgent measures are taken by the whole interdisciplinary team to treat them, then the time required for treatment and rehabilitation is shortened and better and lasting results are obtained.

- Extrinsic factors have a higher influence. Most lesions were caused by overstress (the number of training sessions per week, the volume, not the type of training), direct collision with the adversary, unjustified aggression on court and ball hits.
- The study indicates that impact forces and the moments when joints are stressed are major trauma-causing factors. Overstress traumas are influenced by factors such as: bad running tracks or court, improper training stages, insufficient warming-up.
- Many accidents in games are caused by repeated jumping (mainly in volleyball, where you cannot play without jumping).

### Volleyball

In the first period, August 2006 – July 2008, the number of **calf** traumas in female players was **significantly smaller** than the number of calf traumas in male players ( $p = 0.044$ ;  $\alpha = 0.05$ )

### Handball

- The number of calf trauma decreased significantly ( $p = 0.028$ ;  $\alpha = 0.05$ ).

### Basketball

- **Calf traumas** are **significantly fewer** in basketball players than in handball players.

### Football

- **Calf traumas** are **significantly fewer** in football players than in handball athletes.

## PREVENTION MEASURES:

- Good physical and psychical training
- Thorough warm-up before competitions
- Best conditions on training and competition areas
- Various methods of post-effort rehabilitation

- Avoiding excessive training
- Planned training sessions and competitions

## CONCLUSIONS

The prevention methods that have been included in the training programme and their simultaneous use during the other training stages have resulted in increased flexibility, force, muscular resistance and articular mobility; this, in turn, has prevented traumas and has reduced the number of accidents.

### **The conclusions of this study enable us to underline its practical value:**

- The utility, necessity and beneficial effects of the prevention exercises included in the training programme have been proved.
- The optimisation of the trauma-preventing strategy by including many prevention-type exercises and therapeutic massage techniques in the training session.
- The optimisation of post-traumatic rehabilitation strategies through:
  - early diagnosis
  - treatment started without delay
  - rehabilitation with the “RICI” formula.

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