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ORIGINAL RESEARCH

REHABILITATION THROUGH WATER EXERCISES FOR SPORTSMEN'S INJURIES

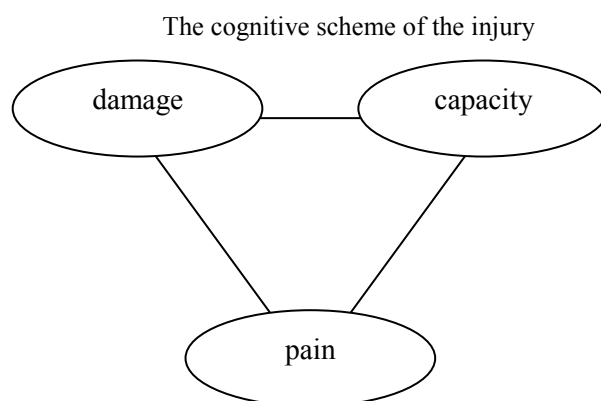
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As soon as the injury has been caused, it must be treated carefully. The athlete is taken over by the members of the multidiscipline team which take into consideration the interrelationships between the psychological and physiological factors (M. Cordun, 2006). Through this work team tries the quickest rehabilitation of the athlete (without great damage at the level of performance capacity) and also the return of him to his activity at the level he was before the injury was caused.

It is thought that that multidiscipline team must understand the cognitive scheme of the injury.



After Heil and Russel (1987, quoted by M. Cordun, 2006)

The components of this scheme are:

- ✓ damage – is given by the medical evaluation of the physical dysfunction level, performed by the prognoses and physical tests;
- ✓ capacity – is the ability which one has got at the damage level, during the time;
- ✓ pain – is a complex of subjective perception caused by the injury and felt by the athlete. Although it is linked with damage and helplessness, it can be diversified independently.

The first target of the medical treatment is to resolve the damage. In rehabilitation the target is to develop the capacity. Both of them propose to decrease the pain during the rehabilitation program although it can increase at certain moments.

In the choice of rehabilitation program, the multidiscipline team must take into consideration that the athlete is a different patient (in good health, based on an exceptional hereditary general biological potential, a well trained body) who wants to come back as quickly as possible his activity.

Desiring the quick rehabilitation of the athlete the multidiscipline team uses the best means which it has at its disposal so that rehabilitation begins quickly with the least damage for the athlete. One of the means which it has at its disposal is physical exercises which can be performed both on land and also in water and can profit by its beneficial effects (we mention the decrease of body weight because of the buoyancy, the decrease which is more used in hydrokinetotherapy; A.I. Murgu 2006).

The specific methods used in water rehabilitation developed in the second part of XX century, many them beginning from man's desire to travel in outer space (water movement can best be compared movement without gravity; A.I. Murgu, 2006). Gradually water exercises have become an important component of the rehabilitation process because of:

- physiological modification which appear when the body is submerged in water;
- decrease of the danger of another trauma appearing;
- persons' possibility for moving (decrease of weight) without pain;
- persons who cannot swim can perform in water programs because most of the exercises are performed standing. If there are conditions for swimming during the programs there are special and unspecific floating devices which ensure the persons' safety performing them.

Premises which on this research were based on:

- injuries have the greatest frequency at athletes which practice certain sports discipline;
- injuries oblige the athlete to inactivity for a period of time;
- quicker rehabilitation of the athlete and his return to sport activity are a priority;
- taken out of his activity changes the motivation of the athlete;
- return of the athlete to training depends on the quality of the rehabilitation.

Hypothesis

For the rehabilitation of the injuries the use of water environment can be more efficient regarding the time and firmness of the rehabilitation.

Depend on the etiology of the injuries the water environment allows the elaboration of the rehabilitation programs precise by and easily applicable. At the same time the athlete can participate active by in these programs.

Methods

The research methods used in our study were documentation method, observation method, experimental method and diagram method. At the same time, we used the evaluation methods of locomotor apparatus which permitted us to know our cases and finally to appreciate the progress after the application of the performing rehabilitation program. For these we used medical historic and local evaluation of locomotor apparatus (subjective and objective symptom): the measure of pain intensity (Visual Analogue Scales), inspection, palpation, anthropometric measures joint balance, muscular balance.

Subjects

The subjects of our research are athletes between 15-22 years who suffered second degree sprains of the fingers (see table 1 and 2). For performing the comparison between the advantages of the water rehabilitation program and the land rehabilitation program, we chose the comparison of two athletes based on several criteria:

- sex;
- how much time had lapsed since the athlete was injured until he began the rehabilitation program;
- doctor's prescription for one program or another;
- material conditions met in the place where the program was taking place;
- time that the athlete had to perform the program because all of them were students or pupils.

Table 1

Athletes whose rehabilitation program was in water after spraining from finger joints

No	Name	Sex	Ages	Sport	Ages in sport practicing	Level of injure	Type of injure
1	FG	M	17	Volley	2,6 years	V fingers, LI joint, left hand	second level sprain
2	FC	F	16	Volley	3 years	II fingers, MCP joint, right hand	second level sprain
3	VC	F	15	Karate - traditional	9 years	I finger, MCP joint, right hand	second level sprain
4	CA	M	16	Rugby	1 year	I finger, MCP joint, left hand	second level sprain
5	DG	M	17	Volley	6 years	III fingers, MCP joint, right hand	second level sprain
6	MA	M	15	Volley	6 month	I finger, MCP joint, left hand	second level sprain
7	TR	M	17	Volley	4 years	III fingers, MCP joint, right hand	second level sprain
8	SA	F	22	Karate - shotokan	11 years	V fingers, MCP joint, right hand	second level sprain

LI – lateral inflexions

MCP – metacarpophalangeal

Table 2

Athletes whose rehabilitation program was on land after spraining from finger joints

No	Name	Sex	Ages	Sport	Ages in sport practicing	Level of injure	Type of injure
1	PI	M	20	Volley	7 years	V fingers, LI joint, left hand	second level sprain
2	NA	F	20	Ju - jitsu	8 years	II fingers, MCP joint, left hand	second level sprain
3	CL	F	19	Volley	8 years	I finger, MCP + IF joints, right hand	second level sprain
4	MA	M	17	Rugby	3 years	I finger, MCP joint, left hand	second level sprain
5	CS	M	15	Rugby	1 year	finger IV, LI joint, left hand left hand	second level sprain
6	PC	M	16	Rugby	4 years	I finger, MCP joint, left hand	second level sprain
7	GD	M	15	Rugby	3 months	IV finger, LI joint, left hand	second level sprain
8	GG	F	21	Ju - jitsu	16 years	V finger, MCP joint, right hand	second level sprain

LI – lateral inflexions

MCP – metacarpophalangeal

We made up the rehabilitation programs based on the athlete's diagnosis given by the sport medicine doctors. These contained exercises which solicit the athlete's joint on the all movement axis at that level. We tried to make that programs have the same exercises, but their application was different. We took into consideration the application order of the methods in the two environments. At the same time, we also took into consideration all the time that the athlete was a special person who reacted differently to the rehabilitation program.

In the assessment of doses of the exercises we took into account by the expert’s opinions recommending a smaller number of sets at the beginning with less repetitions (J.M. Koury, 1996, recommended 2-3 sets of 10-15 to be repeated). The repetitions increased gradually.

The rhythm of the execution was of one moment a second and coming back to initial position in one second.

The programs were (see table 3):

Table 3

II – IV Fingers	
Means used in water environment	Means used on land environment
<ul style="list-style-type: none"> - keeping the fingers spread, palm downwards – flexion and extension of fingers - keeping the next fingers, palm towards down – adduction and abduction fingers - keeping the next fingers, palm towards down – adduction and abduction fingers, overcome a resistance opposite by first and second fingers from the other hand - helping the first finger in opposition to the other finger, with a stretching device around them – extension and coming back - keeping the palm downwards, the II-V fingers tight close – passive mobilization with the help the other hand - keeping the palm downwards – passive mobilization of the first phalanx with the help the other hand - keeping the palm downwards – passive mobilization of the second phalanx with the help the other hand - keeping the palm downwards – passive mobilization of the third phalanx with the help of the other hand 	<ul style="list-style-type: none"> - keeping the palm downwards, the II-V fingers tight close – passive mobilization with the help the other hand - keeping the palm downwards – passive mobilization of the first phalanx with the help the other hand - keeping the palm downwards – passive mobilization of the second phalanx with the help the other hand - keeping the palm downwards – passive mobilization of the third phalanx with the help of the other hand - keeping the fingers spread, palm downwards – flexion and extension of fingers - keeping the next fingers, palm towards down – adduction and abduction fingers - keeping the next fingers, palm towards down – adduction and abduction fingers, overcome a resistance opposite by first and second fingers from the other hand - helping the first finger in opposition to the other finger, with a stretching device around them – extension and coming back

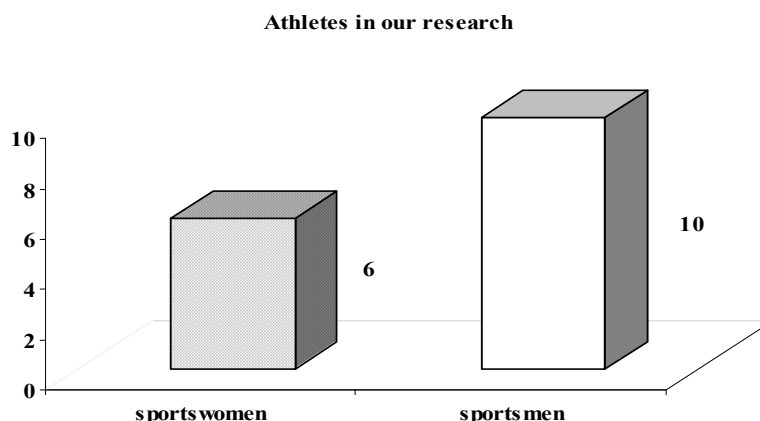
We must mention that the rehabilitation lessons, performed before the training began, had had a warm-up of 5-10 minutes.

Results and their interpretation

After studying the results we know:

- sportsmen in our research (see figure 1);

Figure 1

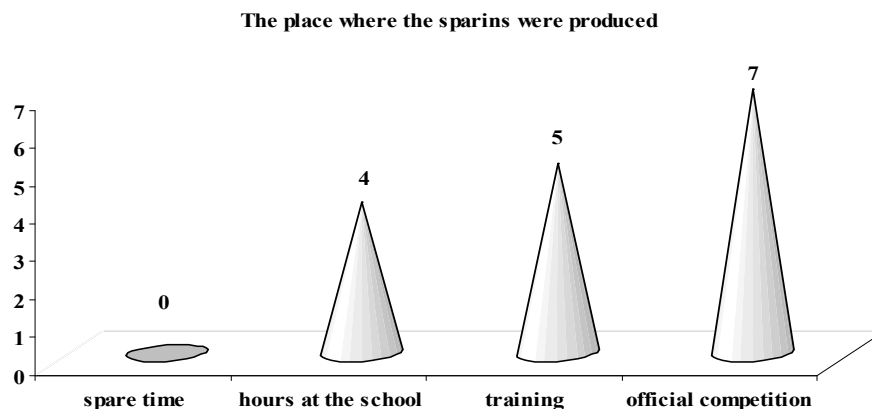


- average age that the injury happened: 18,8 years – sportswomen, 15,6 years sportsmen;

- regarding the time when the sprains was produced one observes that the most of them occurred in the official competitions that the athletes participated in National or Local Championships. Regarding the number of injuries occurring during the school schedule (the occupation of our subjects) we recorded that these appeared just after

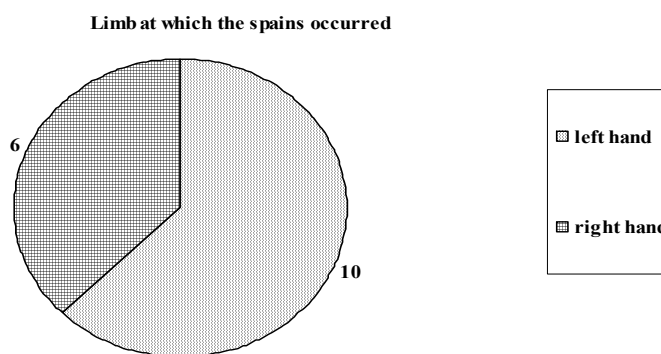
participating in the physical education at classes, at the same sport discipline which our athletes practiced in their spare time (see figure 2). In our opinion, in the case, the athletes weren't careful from they played and what they had to do. At the same time they weren't carefully supervised by their trainers who were not interested that their athletes would not be injured.

Figure 2



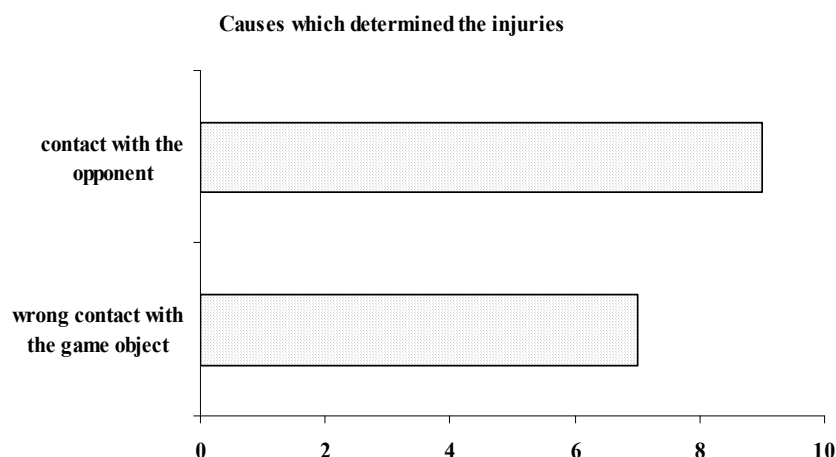
- the limb at which the sprains occurred (see figure 3). The greater number of injuries of the left hand. This can be explained that the greater number of sprains is at the unskilled limb (maybe it is based on coordination deficit, technical deficit and force deficit).

Figure 3



- the wrong contact with the game object or contact with the opponent represented the principle causes which determined the appearance of injuries at the hand levels (see figure 4);

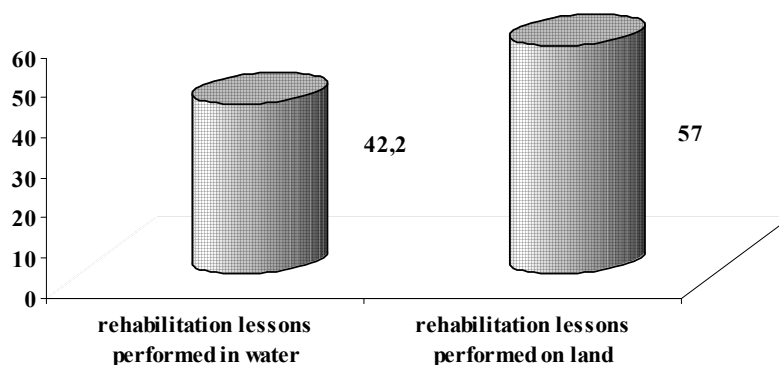
Figure 4



- the numbers of lessons that athletes have for performing in the rehabilitation program are different depending the environments in which it takes place. In our research the superiority of the water program is obvious (see figure 5). This affirmation is sustained by the less number of lessons required by the water program owing to the advantages which this environment provides;

Figure 5

Average rehabilitation lessons after the second degree sprain



- athlete

Table 4

without time / lack of interest	desire to rehabilitate	very great desire to rehabilitate
3	3	10

Conclusions

In our research we came to the following conclusions:

1. Knowing of the causes (can be of mechanical, physical, chemical and biological nature) which determine the injuries which are important because it offers the possibility of preventing them. To avoid these one can take sure measures, such as:

- ✓ the correct realisation of warming up;
- ✓ using correct equipment in connection with meteorology;
- ✓ strengthening / perfecting of the specific skill for their sport;
- ✓ systematic and graduated approach of physical and psychological training, respecting the effort curve;
- ✓ respect for hygienic, physiological and pedagogical principles for the organisation of the training programs and competitions;
- ✓ respect for sport rules and all hygienic rules for sport bases, material and equipment;
- ✓ athletes periodical medical control and respecting of received recommendations;
- ✓ knowing the athlete's personality, his hopes and his anxieties of his implication in the team;
- ✓ education of athletes for collaboration both during the training and during the competitions;

2. Athletes with the same injuries rehabilitate different by their response being as an individual particularity. It is obligatory for the athlete to be completely rehabilitated and in a short time for coming back to sport and competitive activities quickly as possible;

3. Lack of interest for light injury both of the athletes (a part of them because their ages and their short in practising sport they haven't knowledge about these) and the trainers (who have the necessary knowledge acquired during their studies should talk with the athletes and the parents too) who should advise the athletes to consult a doctor don't take notice of the injuries, saying that the athletes have no serious injury and in a few days all they will be rehabilitated;

4. In water exercises program the mobility rehabilitates quicker than on the land exercises program. This is explained that in to water environment the movement can performed with great amplitude quicker. As soon as the mobility is rehabilitated it allows going on with energetically force rehabilitation (it is recommended as that the strength exercises for force be performed on at all possible movement amplitude at that joint all the time), both of them determined the quicker return of the athlete to activity;

5. The water environment, because of its advantages offers by hydrostatic and hydrodynamic laws, allows for:

✓ beginning the rehabilitation program earlier which determines the decrease of the time necessary for rehabilitation:

✓ decrease of the weight of the limb – unloading joints – decrease the pain;

✓ decrease the edema;

✓ performed progress together with the decrease pain and the possibility of performing hard or impossible movements performed on land, advantage of the athlete to set up a positive image (influence on psychic sphere) regarding opposite the rehabilitation program and motivate him to go on with his activity;

6. Very important is the moment of the day when the athlete, who was injured, performs the rehabilitation program. We try, depending on the material conditions found at the athlete's training place, for the rehabilitation lessons to be at the same time as the schedule training of the team the athlete belongs to for that he / she doesn't feel isolated;

7. Finally, we can affirm that the water environment is more efficient regarding the time of the rehabilitation process and the efficiency of the program.

Bibliography

1. Becker, B.E., Cole, A.J. – Aquatic rehabilitation, În: Rehabilitation medicine: principles and practice, Ed. Lippincott-Raven Publishers, Philadelphia, 1998

2. Cordun, M. – Aspecte ale traumatismului și nevoia intervenției psihologice în recuperare, În: Asistență, consiliere și intervenții psihomedicale în sport și kinetoterapie, Ed. Fundației Humanitas, București, 2006

3. Koury, J.M. – Aquatic therapy programming, Guidelines for orthopedic rehabilitation, Ed. Human Kinetics Publishers, Champaign, Illinois, 1996

4. Marcu, V., Dan, M., și colab. – Kinetoterapie, Ed. Universității din Oradea, Oradea, 2006

5. Murgu, A.I. – Înotul – mijloc de recuperare al afecțiunilor aparatului locomotor, În: Înotul – mijloc terapeutic, Ed. Cartea Universitară, București, 2006

6. Piccininni, J.J. – Efective Athlete-Patient Education in Rehabilitation: A Primer, În: Athletic Therapy Today, The Journal for Sports Health Care Professionals, vol. 3, no. 6, November, 1998

7. Sbenghe, T. – Kinetoterapie profilactică, terapeutică și de recuperare, Ed. Medicală, București, 1987

8. Symons, S.L., Tabachnick, M.M. – Aquatic and hydrotherapy in rehabilitation, În: Therapeutic physical modalities, Ed. Hanley & Belfus, INC., Philadelphia, 2002

9. Warner, M.J., Amato, H.K. – The Mind, An Essential Healing Tool for Rehabilitation, În: Athletic Therapy Today, The Journal for Sports Health Care Professionals, vol. 2, no. 3, May, 1997

10. White, M. – Water exercise, Ed. Human Kinetics, Publishers, Champaign, Illinois, 1995