BALNEO RESEARCH JOURNAL
English Edition
eISSN 2069-7619 pISSN 2069-7597
ROMANIAN ASSOCIATION OF BALNEOLOGY

THE EFFECTS OF PHYSIOTHERAPY PROGRAMS IN THE RECOVERY OF CALCANEAL SPURS

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Balneo Research Journal DOI: http://dx.doi.org/10.12680/balneo.2020.338 Vol.11, No.2, May 2020 p: 187–190

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Abstract

The calcaneal spurs are a specific condition of middle and old age. It manifests through plantar osteophytosis on plantar fascia insertion, and is largely associated with plantar fasciitis. Calcaneal spurs are asymptomatic until they are mechanically irritated and inflamed, they respond through a local intense pain. The proposed treatment is conservative, and uses physiotherapy applied locally such as TENS current, ultrasound and passiv/active stretches. The study was performed on a group of 10 patients, treated daily with the physiotherapy complex program. Patients are evaluated according to the VAS pain assessment scale at the beginning of the treatment and at the end. The evaluated parameters were: pain at rest, pain in standing position, and pain in walking. The results showed a favorable evolution in pain reduction, in all patients treated within 10 days. All the data obtained from the evaluations were processed statistically based on specialized software.

Key words: *heel pain, calcaneal spur, physiotherapy, plantar fasciitis,*

Introduction

Heel pain is a very common reason why patients go to the orthopedics, rheumatology and physiotherapy medical offices. The calcaneal spur is a bony protrusion that appears at the level of the Achille’s tendon insertion and / or at the level of the planar fascia (1). The differential diagnosis is essential in the optimal treatment of calcaneal osteophysosis; it is making the difference between plantar fasciitis, ahilian tendinopathy, Haglund's disease, calcaneus fractures and, rarely, calcaneous bone tumors (2).

Heel spurts most commonly occur at the plantar fascia insertion on the heel. Spurs may also appear anywhere along the calcaneal tuberosity. The calcaneal spurs are usually asymptomatic, and their inflammation is manifested by intense local pain. The pain is caused by the irritation and inflammation of the fibers from the insertion of the plantar fascia at the level of the medial tuberosity of the heel. It can be said that painful calcaneal spurs are associated with plantar fasciitis and more rarely with inflammatory systemic diseases such as: Gout, rheumatoid arthritis, Reiter syndrome, etc.. Some patients develop heel spurs due to high impact exercises on the heels, and in others, has a strictly mechanical cause, determined by the abnormal gait and the way in which the heel attack is performed in the gait cycle (3).

The causes of the emergence of plantar calcaneal spur are multiple and here we mention abnormal mechanical forces of the muscles: soleus, extensor hallucis brevis, flexor digitorum brevis, extensor digitorum brevis, quadratus plantae gastrocnemius, plantaris, abductor digiti minimi and abductor hallucis (4). Another cause is the accumulation of repetitive traumas at the level of the heel, traumas that will generate tears and cracks in the plantar fascia in the attachment area. Individual occupation, obesity, age, diabetes, osteoarthritis and biomechanical disorders of the foot are other predisposing factors for the appearance of the spleen. Chronic local inflammation is the result of attempts to repair the lesions of the fascia, entering a negative loop in which the production and maintenance of symptoms is a consequence of the constant irritation and tension of the fascia [5].

It is considered calcaneal spurs from 2 mm upwards, and all changes under this dimension are considered irregularities of the cortical bone. The vast majority of the calcaneal spurs are asymptomatic, accidentally finding themselves on the profile incidents of the calcaneal radiographs. Several meta-analyzes have demonstrated the relationship between heel pain and calcaneal spurs. The pain is directly proportional to the size of the spur, with the level of compression of the inferior calcaneal nerve, with the inflammation of the spur, with the thinning and deformation of the fat layer surrounding the heel, and the plantar fasciitis [6].

Material and method

The study profile was created and conducted on a pilot group of ten patients diagnosed and treated in the Micromedica Medical Clinic from Piatra Neamt, six female and four male. All patients were diagnosed by the orthopedic specialist doctor, they were between 39-67 years old. Two age groups were identified 39-50 years and 50-67 years old. All diagnosed patients, were evaluated and confirmed radiologically by specialist doctor, by performing a standard X-Ray foot profile image. Radiologically, the calcaneal spur presents itself as a bony exostosis on the sagittal image projecting inferomedially from the calcaneus (7).

The patients were evaluated before and after treatment from the perspective of the pain severity, using the VAS scale (0 painless and 10 with unbearable pain) and goniometry to test ankle Range of Motion (RoM) (8). The VAS scale was used to assess pain in rest, pain in station and pain in walking. The dimensions of the plantar spurs were noted, ranging from 5 to 20 mm. Ankle RoM dorsal flexion (20-30 degrees normal) and planar flexion (40-50 degrees normal) were measured on before and after the physiotherapeutic treatment.
Calcaneal spur more than 10 mm is asociated with plantar fasciitis, determined by clinical examination in six out of ten patients.
Inclusion criteria for subject selection:
- Subject *approval* by signing *informal consent form*;
- Subject age: more than 18 years;
- Gender: male or female;
- The failure to include the subject in one of the exclusion criteria in the clinical investigation;
- The subject was diagnosed by calcaneal spurs over 5 mm by the specialist medical doctor;
- The subject was diagnosed with calcaneus spurs, sent on the basis of a medical letter to the physiotherapy department, by the specialist medical doctor.
Exclusion criteria for subject selection:
- The subject's refusal to sign the *informal consent form*;
- Subject that is part of the vulnerable populations;
- Subject age: less than 18 years.
All patients underwent a physiotherapy program for 10 consecutive days, in which electrical procedures TENS, ultrasound and passive and active stretches were applied on the sole. TENS currents were applied 30 minutes on a single channel in 6 patients and with two channels in 4 patients. Ultrasound therapy was performed in pulsed trains with 10% duty-cycle, with a probe power of 0.3 to 0.4 W / cm^2, for 4 to 6 minutes. The passive stretches were performed by the physiotherapist as well as at his request, the patient to perform the active stretching (9-10).
In order to statistically process and compare the data obtained from the patient evaluation, a specialized software was used IBM XI Statistics. The input and output data were recorded, inventoryed, processed and relevant information was obtained on the evolution of patients in a cycle of 10 sessions of physiotherapy.

Results

All the data was generated by the clinical evaluation and patient history, and they served as the primary source of information, binding the clinical aspects of the size and disposition of the calcaneal spurs, to gender of the patients, and the conditions that are closely related to the appearance of the spurs. Two age groups were identified: 39-50 years, and 50-67 years old.
In the table no. 1 we have described the particularities of the 10 patients with calcaneal spurs, of which 4 with bilateral placement and with important dimensions - 14 up to 20 mm. The plantar fasciitis was present in 6 of 10 cases, and 3 patinets also presented Haglund's disease, with spurs ranging from 10 to 20 mm.

Table no. 1. patients with calcaneal spur (disposition by sexes, size of spurs, interested area, ascoated diseases)

	age	sex	Spur size	Arrangement	Plantar fasciitis	observations
P1	39	female	10 mm	plantar	yes	
P2	41	female	14 mm	plantar	yes	
P3	64	female	20 mm	plantar and posterior	yes	Haglund
P4	45	female	8 mm	plantar	no	
P5	55	female	5 mm	plantar	no	
P6	43	female	9 mm	plantar	no	
P7	65	male	15 mm	plantar	yes	
P8	67	male	18 mm	plantar and posterior	yes	Haglund
P9	57	male	9 mm	plantar	no	
P10	59	male	16 mm	plantar and posterior	yes	Haglund

Legend: P.1 – patient 1, P.2 – patient 2, P.3 –patient 3, P.4 – patient 4, P.5 –patient 5, P.6 – patient 6, P.7 – patient 7, P.8 – patient 8, P.9 –patient 9, P.10 –patient 10

Table no. 2. Initial VAS pain assessment

	VAS in rest	VAS in bipedal stationary	VAS in walking
P1	3	4	5
P2	3	6	7
P3	4	6	6
P4	2	4	4
P5	2	3	3
P6	4	4	5
P7	4	6	7
P8	3	4	6
P9	3	3	4
P10	4	6	6

Legend: P.1 – patient 1, P.2 – patient 2, P.3 –patient 3, P.4 – patient 4, P.5 –patient 5, P.6 – patient 6, P.7 – patient 7, P.8 – patient 8, P.9 –patient 9, P.10 –patient 10

Table no. 3. final VAS pain assessment

	VAS in rest	VAS in bipedal stationary	VAS in walking
P1	1	2	3
P2	2	3	3
P3	2	3	3
P4	1	2	2
P5	1	2	2
P6	2	2	4
P7	2	2	3
P8	2	3	2
P9	1	1	2
P10	2	3	3

Legend: P.1 – patient 1, P.2 – patient 2, P.3 –patient 3, P.4 – patient 4, P.5 –patient 5, P.6 – patient 6, P.7 – patient 7, P.8 – patient 8, P.9 –patient 9, P.10 –patient 10

Three parameters of pain were followed using the VAS scale. In table no.2 the input data represent the start of the treatment evaluated in three diferent positions: pain in resting, pain in stationary position, and finally the pain during the normal gait. Following the execution of the 10 physiotherapy sessions, the same three output parameters were evaluated - the pain decreasing progressively in rest, in stationary and in walking (table no. 3).

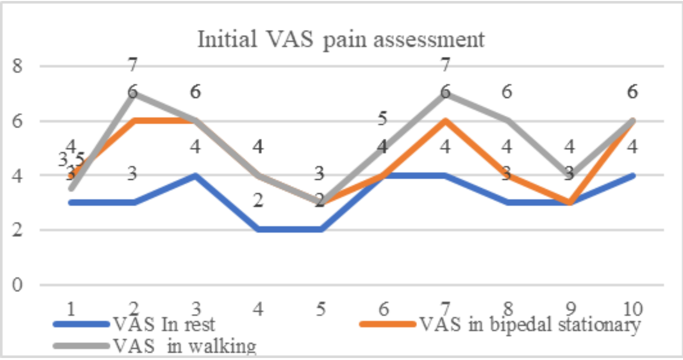

Figure no 1. Initial VAS pain assessment

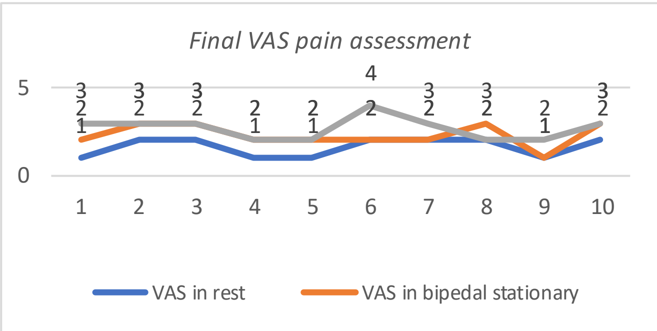

Figure no 2. Final VAS pain assessment

Table no. 3. VAS pain assessment correlations in three diferent positions between initial and final tests

VAS R-I	VAS BS-I	VAS W-I	VAS R-F	VAS BS-F	VAS W-F
3	1	4	2	5	3
3	2	6	3	7	3
4	2	6	3	6	3
2	1	4	2	4	2
2	1	3	2	3	2
4	2	4	2	5	4
4	2	6	2	7	3
3	2	4	3	6	2
3	1	3	1	4	2
4	2	6	3	6	3
0.763762616		0.676752968		0.480020451	

As can be seen from table no. 3 and table no. 4, there are values of the two variables from the initial and final tests of the three positions evaluated, values that represent strong but even weaker negative correlations.

It can be found in Figure 3 (correlations of all the three positions assessed) that strong negative correlations predominate, which leads us to conclude that the recovery programme of the 10 physiotherapy sessions has achieved its purpose, pain felt in the three evaluated positions.

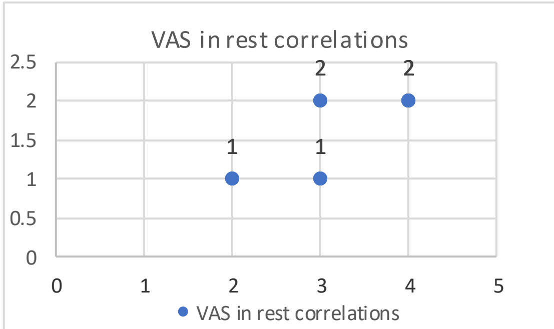

Figure no 3. VAS in rest correlations

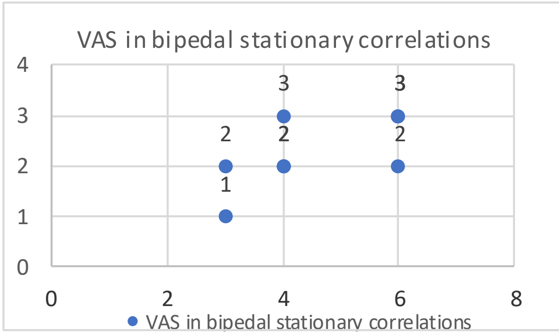

Figure no 4. VAS in bipedal stationary correlations

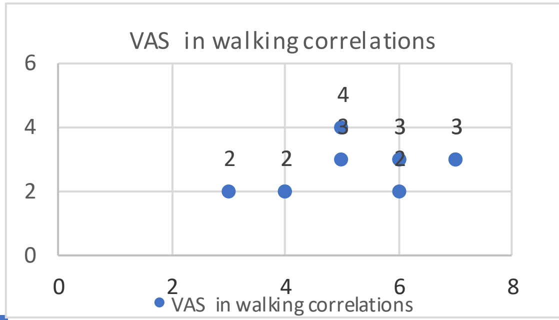

Figure no 5. VAS in walking correlations

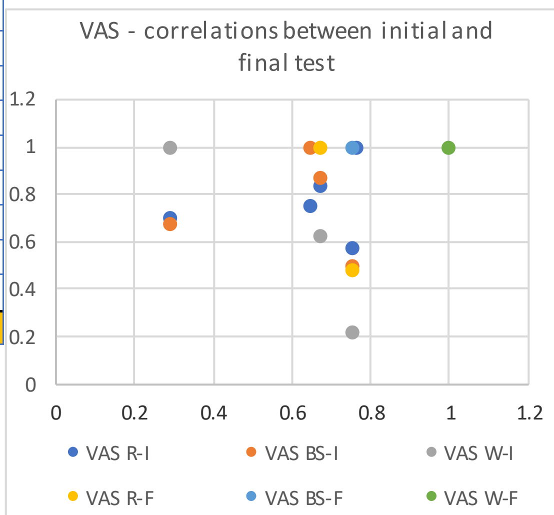

Figure no 6. VAS - correlations between initial and final test

Table no 4. VAS - Correlations between initial and final test

VAS	VAS R-I	VAS BS-I	VAS W-I	VAS R-F	VAS BS-F	VAS W-F
VAS R-I	1					
VAS BS-I	0.763762	1				
VAS W-I	0.645881	0.7484552	1			
VAS R-F	0.292174	0.7013343	0.6767529	1		
VAS BS-F	0.674020	0.8365362	0.8669214	0.627719	1	
VAS W-F	0.751305	0.5738190	0.4945502	0.219512	0.4800204	1

In table No. 4 we note that the values of the Pearson correlation coefficient has trends toward absolute value (-1<rxy< +1) which resultas the intensity of the linear relationship between the two variables (pair to pair) is higher. Also, figure No. 6 can again be distinguished that the relationship between the two variables is almost compact and tends in a clear direction.

Table no 5. Dorsal and Plantar Flexion - Initial and Final Test Correlations

FLEXION	Dorsal Flexion I	Dorsal Flexion F	Plantar Flexion I	Plantar Flexion F
P1	25	25	40	40
P2	20	20	42	42
P3	9	15	24	31
P4	20	20	37	39
P5	18	20	36	41
P6	22	22	41	42
P7	10	16	29	33
P8	11	14	27	36
P9	17	18	38	38
P10	11	16	29	35
CORREL	0.960690616		0.923747489	

Regarding the correlation between the initial and final tests of dorsal and plantar flexion we can say that the two values obtained represent each a very good correlation following the α significance test.

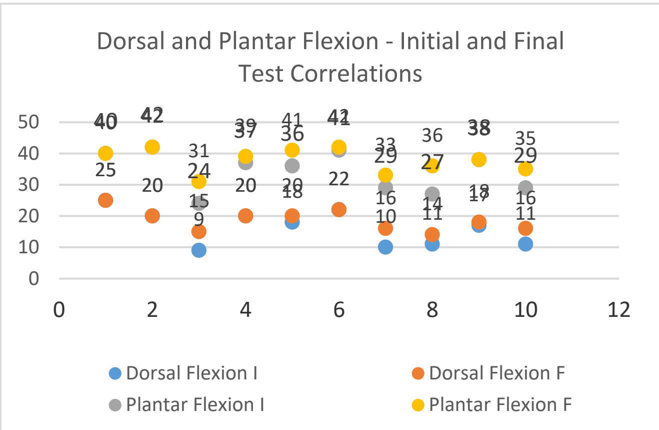

Figure no 7. Dorsal and Plantar Flexion - Initial and Final Test Correlations

At the same time, from table no. 7 we can conclude that those values, of the correlation coefficient in the case of dorsal flexion of 0.960690616, respectively the plantar flexion of 0.923747489 are high values (according to the Rules of Colton) which means a degree of very good association, so a strong correlation.
In this situation we can say that the recovery programme established during the 10 physiotherapy sessions described resulted in a slow but effective regression of the final values on the VAS scale, but also an increase in joint mobility in dorsal and plantar flexion.

Conclusions

In this situation we can say that the recovery programme established during the 10 physiotherapy sessions described resulted in a slow but effective regression of the final values on the VAS scale, but also an increase in joint mobility in dorsal and plantar flexion. All authors contributed equally to this manuscript.

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