Comparison of Effect of Extracorporeal Shock Wave Therapy on Different Sites on Plantar Fasciitis.

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Background : Extracorporeal shock wave therapy (ESWT) is an effective, non-invasive treatment for plantar fasciitis (PF). However, the most effective location for ESWT remain unanswered. On previous studies for PF, the effects of applying ESWT to calcaneal tendon insertion area and maximal tender point were compared. The research showed no difference in visual analogue scale (VAS) and functional improvements between two groups. However, clinically patients feel pain not only on tendon insertion area on calcaneal tuberosity, but also along the plantar aponeurosis. Degenerative and inflammatory changes along plantar fascia is one of the most important pathogenesis for PF. Thus, we tried to compare the effect of applying ESWT alone to the tendon insertion area on calcaneal tuberosity and applying it together to the tender point along aponeurosis including tendon insertion site.

Method : The present study enrolled patients who were diagnosed as PF through clinical features, physical examination, and ultrasound. Plantar fascia thickness over 4 mm in calcaneal insertion area was diagnosed as PF. Every patients have pain in tendon insertion area and at least one other tender point along plantar fascia. Patients were randomly divided into study group (calcaneal tendon insertion area plus tender point) and control group (calcaneal tendon insertion site only). Each group received ESWT for 3 weeks, 1 session per week. Each session was applied

for total 2,000 shots, frequency 10, and energy level of 0.025mJ/mm^2. In study group, ESWT was applied 1,000 shots for calcaneal tendon insertion area and 1,000 shots for tender points along plantar fascia near calcaneal tuberosity and in control group, ESWT was applied 2,000 shots for tendon insertion site only. Before and after the 3 sessions, VAS of pain at rest, pain at night, pain at pressure, pain at weight bearing, pain at first step at morning, and American Orthopedic Foot and Ankle society (AOFAS) scale were measured.

Result : Total 24 patients were recruited in the study. There were no significant differences in baseline characteristics between two groups (Table 1). After 3 sessions of ESWT, both group showed significant improvement in VAS of pain at night, pain at pressure, pain at first step at morning, and AOFAS scale. VAS of pain in weight bearing showed significant improvement only in study group. When compared the changes of measurement between the groups, VAS of pain in weight bearing and first step in the morning showed better outcome in study group.

Conclusion : In this study, ESWT was effective in relieving pain and promoting function in PF patients. Applying ESWT both on tender point and tendon insertion area on calcaneal tuberosity could be more useful for PF patients than applying ESWT on calcaneal tuberosity only.

Table 1. Baseline characteristics of two groups

	Study (n=12)	Control (n=12)	p-value
Age	52.00±7.40	51.33±5.39	0.937
Gender (Male/Female)	(4/8)	(4/8)	1.00
Affected foot (Right/Left)	(4/8)	(6/6)	0.699
VAS (Rest)	1.5±1.22	1.33±1.75	0.818
VAS (Night)	3.83±1.94	3.33±1.03	0.240
VAS (Pressure)	3.33±0.81	3.67±1.36	0.699
VAS (Weight_bearing)	3.00±0.89	4.00±1.67	0.310
VAS (First_step)	5.33±2.73	4.16±1.17	0.485
AOFAS Ankle-Hindfoot Rating System	57.3±12.07	54.16±20.46	0.818

Values are presented as numbers or mean±standard deviation.

VAS, Visual analogue scale; AOFAS, American orthopedic foot and ankle society.

*p<0.05.

Table 2. Changes of measurements after treatment.

	Study (n=12)			Control (n=12)		
	Pre	Post	p-value	Pre	Post	p-value
VAS (Rest)	1.5±1.22	0.17±0.40	0.066	1.33±1.75	0.67±1.21	0.102
VAS (Night)	3.83±1.94	1.67±1.37	0.039*	3.33±1.03	1.83±0.75	0.041*
VAS (Pressure)	3.33±0.81	1.83±0.75	0.024*	3.67±1.36	1.67±1.21	0.026*
VAS (Weight_bearing)	3.00±0.89	0.33±0.52	0.023*	4.00±1.67	3.17±1.33	0.059
VAS (First_step)	5.33±2.73	1.83±1.17	0.027*	4.16±1.17	2.67±0.82	0.024*
AOFAS Ankle-Hindfoot Rating System	57.3±12.07	72.17±9.85	0.026*	54.16±20.46	66.17±19.55	0.026*

Values are presented as mean±standard deviation.

*$p < 0.05$ by Wilcoxon signed rank test.

Table 3. Changes of Measurements between two groups.

	Study (n=12)	Control (n=12)	p-value
Δ VAS (Resting)	-1.5±1.52	-0.67±0.82	0.394

Δ VAS (Night)	-2.17±1.33	-1.67±1.03	0.485
Δ VAS (Pressure)	-1.5±0.55	-2.00±0.89	0.394
Δ VAS (Weight_bearing)	-2.67±0.52	-0.83±0.75	0.004*
Δ VAS (First_step)	-3.5±1.64	-1.5±0.84	0.041*
Δ AOFAS Ankle-Hindfoot Rating System	14.83±5.27	12±2.53	0.065

Values are presented as mean±standard deviation.

*p < 0.05 by Mann-Whitney test.