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Eswt Shockwave Therapy: An Efficient Noninvasive Physiotherapy Treatment

Neethi M. [1] * , **Dr. Ravi Shankar Ravi** [2]

1. PhD Scholar, CMJ University, Jorabat, Ri-Bhoi, Meghalaya , India
drmneethi@gmail.com ,
2. Dean of Allied Health Science, Capital University, Koderma, Jhumri Telaiya, Jharkhand, India

Abstract: ESWT has been shown to be an efficient noninvasive physiotherapy treatment that may be used for the treatment of a wide range of diseases to treat a number of conditions. Nonunion of long bone fractures, plantar fasciitis, calcific Plantar fasciitis of the shoulder, and lateral epicondylitis of the elbow are some of the disorders that fall under this category. The two most common varieties of ESWT that are used are referred to as R-SWT, which stands for radial shockwave treatment, and F-SWT, which refers for focused shockwave therapy. There was a lack of sufficient scientific data that supported the use of R-SWT, which is the reason why the aforementioned guideline did not suggest its utilisation. At the time of the most recent follow-up, the author of a randomised controlled trial (RCT) that was recently published and investigated the efficacy of R-SWT in patients suffering from ALBP came to the conclusion that both groups significantly indicated improvement in all patient-reported outcome measures. This was the conclusion reached by the author of the R-SWT study. This is especially beneficial for patients who have had ESWT. In the realm of alternative treatments, the ability of ESWT to provide pain relief and functional improvement without the need of significant intervention makes it an appealing option to consider.

Keywords: ESWT, Shockwave, Therapy, Noninvasive, Physiotherapy, Treatment

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INTRODUCTION

Permanent pain and illnesses that persist for an extended length of time may have major psychological effects, which often manifest as emotions of emotional distress, concern, and hopelessness. It is conceivable for persons who suffer from conditions such as arthritis, fibromyalgia, or chronic back pain to feel as if they have no control over their body. This has the potential to result in sentiments of frustration and despair. The persistent struggle with pain may have a detrimental effect on a person's motivation, their ability to make decisions, and even force them to withdraw from social settings. Continuous pain may, over time, lead sleep habits to become interrupted, which further exacerbates stress and mental instability. This can be a significant barrier to recovery. Many patients have higher levels of irritation and cognitive degradation as a consequence of prolonged suffering, which has an impact on their general mental well-being. They also experience a decline in their ability to think clearly.

Effect of delaying physical exercise and medical treatments on regular routine

Individuals who suffer from physical diseases and chronic ailments that limit their mobility and prohibit them from taking part in social activities are more likely to experience feelings of isolation than those who do not have these problems. Individuals who are going through substantial pain can avoid going to social gatherings, hobbies, or activities that take place outdoors because they are afraid of suffering anguish or feeling ashamed of themselves. It is conceivable for this lack of contact to result in feelings of isolation and

detachment from one's family, friends, and peers in society. This is something that might possibly happen. Whenever the caretakers and loved ones of the patient have difficulty understanding or coping with the patient's condition, it may also have a detrimental influence on the relationships between them. This may occasionally lead to encounters that are uncomfortable and emotional distance between the persons engaged in the situation. The feeling of being a burden on other people is made even more difficult by the fact that one is unable to participate equally in the activities that take place inside the household or in the commitments that are made to the community.

The quality of life is significantly diminished when one is forced to endure chronic pain or a medical condition that persists for an extended length of time. This is due to the fact that it becomes more challenging to do activities that are often seen as being routine. Even activities that seem to be relatively unimportant, such as walking, cooking, or maintaining personal cleanliness, might become more difficult to do. When individuals are unable to engage in physical activities, it is not uncommon for them to suffer a reduction in their overall health, as well as an increase in weight and a loss of muscle mass. Medical conditions that are currently present may become much more complicated as a result of this. Over time, a lack of physical exercise and freedom may ultimately lead to emotional weariness and a lower sense of self-worth. This is because of the cumulative effect of delaying physical exercise and independence. Furthermore, due to the fact that many chronic conditions may need adjustments in lifestyle, such as limitations on food or medical treatments, an individual's regular routine and the amount of comfort they enjoy are further disrupted.

ESWT shockwave therapy an efficient noninvasive physiotherapy treatment

ESWT has been shown to be an efficient noninvasive physiotherapy treatment that may be used for the treatment of a wide range of diseases to treat a number of conditions. Nonunion of long bone fractures, plantar fasciitis, calcific Plantar fasciitis of the shoulder, and lateral epicondylitis of the elbow are some of the disorders that fall under this category. The two most common varieties of ESWT that are used are referred to as R-SWT, which stands for radial shockwave treatment, and F-SWT, which refers for focused shockwave therapy. The F-SWT technique first generates a pressure that is spread out across a large range, and this pressure gradually converges at a certain depth inside the body of the patient. Among the F-SWT commercial devices that provide therapeutic advantages, the three most important ones are piezoelectric stimulation, electrohydraulic stimulation, and electromagnetic stimulation.

R-SWT, on the other hand, is capable of producing maximum pressure waves that are directed at the applicator in an outward direction. As these waves go further within the structures, they are relieved of their pressure. It is advised that "radial pressure wave therapy" be referred to by a term that is considered to be an alternate designation. It is likely that the pressure waves that are produced by R-SWT may not elicit a genuine shockwave because they reach lower peak pressures and lower speeds than other types of pressure waves.

ESWT in Acute Back Pain

Acute low back pain (ALBP) is one of the most prevalent types of pain that is associated with the musculoskeletal system. It has a lifetime prevalence of around 85 percent among people who are between

the ages of 18 and 74 and who have this ailment. In order to determine whether or not non-pharmaceutical therapy is beneficial in the management of acute nonspecific low back pain, the "German National Care Guidelines" conduct a study of the evidence that pertains to the efficacy of such treatment. There was a lack of sufficient scientific data that supported the use of R-SWT, which is the reason why the aforementioned guideline did not suggest its utilisation. At the time of the most recent follow-up, the author of a randomised controlled trial (RCT) that was recently published and investigated the efficacy of R-SWT in patients suffering from ALBP came to the conclusion that both groups significantly indicated improvement in all patient-reported outcome measures. This was the conclusion reached by the author of the R-SWT study. The visual analogue scale (VAS) for low back pain (LBP) had a drop of 60.7% ($P < 0.001$) in the intervention group, while the sham group experienced a decrease of 86.4% ($P < 0.001$) in pain. After a period of four and twelve weeks, the intervention group had a much lower amount of pain relief than the control group experienced. With regard to the EuroQol 5 Dimension (EQ-5D) submodality pain, it was seen that the sham group exhibited considerably superior results ($P < 0.014$) in comparison to the intervention group over the course of eight weeks. When it comes to the treatment of adults with low back pain (ALBP), the combination of traditional guideline therapy and supplementary R-SWT does not have a significant impact on the patient's physical function, the degree of pain they experience, or their quality of life.

Typical surgical or invasive therapies for Treatment of Plantar fasciitis, tendinitis, and calcific shoulder tendinopathy

Extracorporeal shock wave therapy (ESWT) has attracted a lot of attention as an alternative treatment because to the fact that it is non-invasive, it has the ability to speed up the natural healing process, and there is a growing body of research that supports its value. Plantar fasciitis, tendinitis, and calcific shoulder tendinopathy are some of the chronic musculoskeletal conditions that may be treated with ESWT, which is a non-surgical therapy option for individuals who are suffering from these conditions. When it comes to the treatment of various ailments, this stands in contrast to surgical methods. Some of the risks that are associated with surgical procedures include the possibility of infections, extended durations of recuperation, and complications related to the administration of anaesthesia. This makes it particularly helpful for those who are interested in avoiding the hazards that are being discussed. Furthermore, ESWT requires little downtime, which allows patients to return to their daily activities more quickly than they would be able to do so following typical surgical or invasive therapies. This is especially beneficial for patients who have had ESWT. In the realm of alternative treatments, the ability of ESWT to provide pain relief and functional improvement without the need of significant intervention makes it an appealing option to consider.

OBJECTIVES OF THE STUDY

1. To study on ESWT shockwave therapy an efficient noninvasive physiotherapy treatment

2. To study on Typical surgical or invasive therapies for Treatment of Plantar fasciitis, tendinitis, and calcific shoulder tendinopathy

RESEARCH METHOD

This study will employ a quantitative research technique that is based on a randomised controlled trial (RCT) in order to investigate the efficacy of extracorporeal shockwave therapy (ESWT) and corticosteroid injections in the treatment of pain that is linked with calcaneal spurs. Assessment before therapy, intervention, and evaluation after treatment will be the three key components that will make up the study of this nature.

Population

Adults between the ages of 18 and 65 who have been diagnosed with calcaneal spurs using a combination of a clinical history, a physical examination, and imaging (either X-ray or MRI) will be eligible to participate in the study. With the intention of recruiting patients, we will be reaching out to clinics that specialise in pain management and orthopaedics.

Sampling Method

After undergoing the identical process, each group utilised the Storz Medical Duolith SD1 machine, which was approved by the Food and Drug Administration in January 2016 for the treatment of recurrent plantar fasciitis. The machine was used to provide four weekly sessions of low intensity ESWT.

Work by Focus-SW "Shock" 2000, a Energy density: 0.2-0.3 mJ/mm2 Repeating frequency is four hertz Radial-SW Absolute values Shock: three thousand 15H variable frequency with a power range of 1.8-3 mJ/mm2.

Data Collection Methods

This research is an example of a clinical trial that is completely blinded. The project assistant in an effort to level the playing field repackaged Vaseline oil and clobetasol into identical new containers and branded them A and B, respectively. This was done in order to ensure that everyone was on an equal footing. There was a lack of awareness of the coding among all those involved in the project, including radiologists, analysts, patients, and residents of PM and R. However, decoding did not take place until after the data analysis was finished.

The descriptive analyses might be presented in the form of a percentage or a mean plus or minus the standard deviation respectively. Some of the baseline characteristics that will be summarised through the use of descriptive statistical analysis of the data include age, gender, and how much pain the individual is experiencing.

Statistical Analysis Techniques

A paired samples t-test was utilised in order to make a comparison between the PF thickness before and after the intervention. For the purpose of determining whether or not there were any significant differences in the thickness of the PF between the two groups, an independent t-test was utilised. It was determined that a significance level of $P < 0.05$ was considered statistically significant for all tests and analyses.

DATA ANALYSIS

The baseline characteristics of the patients are summarised in Table 4.1, which can be seen over here. In

the process of comparing the two groups, it was discovered that there was no statistically significant difference (P > 0.05). Using a random assignment method, eighty people were placed in either the intervention group or the control group.

Table 1: The baseline characteristics of the patients

Characteristic	Intervention (n=40)	Control (n=40)	p
Sex (%)			
Females	34 (85)	32 (80)	0.558
Age (year)	51.4±6.9	48.1±8.9	0.067
BMI (kg/m²)	28.5±3.4	29.7±3.3	0.113
PF thickness (mm)	5.17±0.73	5.24±0.5	0.618

The data is provided in the form of mean plus standard deviation or n (%). Standard deviation (SD), body mass index (BMI), and plantar fascia (PF) are abbreviations.

After three months, the thickness of the PF reduced (by more than seven millimetres) in 55% of the intervention group and 60% of the control group; nevertheless, the difference between the two groups was not statistically significant (P = 0.653).

Table 2: Comparison of the two groups' treatment outcomes in terms of plantar fascia thickness, modified Roles and Maudsley score, and visual analogue scale score

Treatment success	1 month after treatment (n=40)		P	3 months after treatment (n=40)		P
	Intervention, n (%)	Control, n (%)		Intervention, n (%)	Control, n (%)	
RMSa	26 (65)	16 (40)	0.026	28 (70)	24 (60)	0.351
VAS morningb	30 (75)	18 (45)	0.006	32 (80)	26 (65)	0.135
VAS dailyc	24 (60)	22 (55)	0.653	28 (70)	24 (60)	0.351

PF thicknessd				22 (55)	24 (60)	0.653

This data is displayed as n (percent). an In follow-up experiments, we will be changing the RMS to either 1 or 2. b,c If the score was equal to or less than four on the eleven-point visual analogue scale (VAS) or if the improvement was greater than fifty percent over the baseline in follow-up investigations. >0.7 mm decrease in the thickness of the PF. Visual analogue scale, Roles and Maudsley score, and Plantar fascia are the abbreviations for the following:.

Table 3: A comparison of the thickness of the plantar fascia between the two groups, both before and after the intervention in each group

PF thickness	Baseline	After 3 months	Pa
Intervention	5.17±0.73	4.51±0.98	0.001
Control	5.24±0.50	4.31±0.68	0.001
Pb	0.618	0.292	

The data represents the mean plus or minus the standard deviation. a P value is calculated for each group both before and after the intervention. b compare the P value of the two groups. Standard deviation is abbreviated as SD. Fascia plantar fascia (PF)

Table 4: The distribution of patients' altered roles and Maudsley scores at the conclusion of the research

RMS distribution	Refractorya (%)	Recurrenceb (%)	RMS 3d (%)	Improvementc (%)
Intervention (n=40)	4 (10)	4 (10)	4 (10)	28 (70)
Control (n=40)	6 (15)	2 (5)	8 (20)	24 (60)
P	0.501	0.398	0.213	0.351

This data is displayed as n (percent). One month following the intervention, participants who had RMS 4 or

those who were getting worse (refractors) were withdrawn from the research so that they may get a different treatment option. Based on the results of follow-up studies conducted after the original improvement in RMS, recurrence was defined as the regression of RMS to either 3 or 4. When doing follow-up research, c adjusting the RMS to either 1 or 2. d They did not meet our standards for improvement. RMS: The roles and the soundtrack for Maudsley

Table 5. Comparison of the Groups' FFI and VAS Scores Based on Evaluation Duration.

		ESWT (*n*=35)	ESWT+PEMFT (*n*=40)	*P*Value[a]
		Median (IQR)	Median (IQR)	
FFI pain	Pre-treatment	81 (13)	86 (13.25)	0.187
	Post-treatment	65 (32)	12 (12)	< 0.001
	Post-treatment third month	65 (36)	11.5 (5)	< 0.001
FFI disability	Pre-treatment	80 (15)	84 (17)	0.192
	Post-treatment	60 (50)	13.5 (14.5)	< 0.001
	Post-treatment third month	40 (50)	11 (8.5)	< 0.001
FFI activity limitation	Pre-treatment	45 (6)	45 (7.75)	0.322
	Post-treatment	40 (26)	6 (9.5)	< 0.001
	Post-treatment third month	40 (27)	5 (5.75)	< 0.001
VAS	Pre-treatment	9 (1)	9 (0.75)	0.096
	Post-treatment	7 (4)	1 (1)	< 0.001
	Post-treatment third month	7 (4)	1 (1)	< 0.001

A Mann-Whitney U test was conducted using the following abbreviations: FFI, VAS, ESWT, PEMFT, and

Pulse Electromagnetic Field Therapy.

The following abbreviations are used: FFI, VAS, ESWT, PEMFT, Pulse Electromagnetic Field Therapy, and a Mann-Whitney U test.

ESWT focus vs Sham:

The five types of pain outcomes that we report on are pain at rest, pain during activities, pain when first walking in the morning, pain that is not otherwise defined (NOS), and a composite measure of pain that is based on two or more pain scales. The pooled relative risk was 1.38 (95% confidence interval [CI], 1.15 to 1.66), which indicates that there is a substantial body of evidence. When compared to the baseline at the three-month follow-up, patients who got FESWT rather than a sham therapy reported a fifty percent reduction in the amount of pain they experienced when walking for the first time in the morning. In the intermediate and long term, there is less agreement on the effects of FESWT on the discomfort that is experienced when walking in the morning. One of the research concluded that FESWT was superior to a sham at the 6-month follow-up, but at the 12-month follow-up, two of the studies came to the conclusion that there was no difference (poor strength of evidence). The level of the evidence is HIGH, as indicated by the pooled relative risk of 1.55 (95% confidence interval, 1.29 to 1.85), which indicates that a greater number of patients were able to achieve a satisfactory pain composite outcome at three months across all four studies. In the short term, there were no significant changes between the groups in terms of pain during activities, pain at rest, and pain without symptoms, according to three investigations. No significant differences were found between the groups. These conclusions were supported by evidence that ranged from moderate to low in quality respectively.

A lesser number of times was function stated. One piece of research found that there was no discernible difference between the groups in the near term (the evidence strength was quite low). According to statistical and clinical analysis, another small trial revealed no indication that FESWT improved function more than sham at 6 and 12 month follow-ups. This was the conclusion reached by all of the researchers.

Discussion

The current meta-analysis indicated that high-intensity ESWT consistently decreased pain and treatment success rates the most among the therapies that were investigated for plantar fasciitis. This was followed by CSI therapy and low-intensity ESWT as the next most effective treatments.

Moreover, there is an increased risk of adverse events connected with the ESWT, and there is also an increased tendency for patients with CSI to increase the amount of analgesic that they require. On the other hand, the functional outcomes and recurrence rate of the ESWT and CSI are equivalent to one another.

The terminal value of the VAS score was utilised by a number of studies in order to compare the pain controls of the two groups during the process of pain alleviation analysis. Nevertheless, this measurement simply reveals the level of pain that was experienced after the intervention, and it does not take into account the impact that the intervention had on the healing process. By utilising VAS reduction, we were able to evaluate the effectiveness of CSI and ESWT in terms of alleviating pain both before and after therapy administration. The measuring of intensity is a significant factor in the evaluation of the results

obtained following ESWT. Previous studies have demonstrated that lesser doses of ESWT might not provide the same level of effectiveness as higher dosages.

Marks et al. conducted a randomised controlled study (RCT) with a follow-up period of twenty-four months and found that placebo therapy had an impact that was equivalent to that of low intensity exercise for the treatment of painful heels in those who were suffering from the condition. As a consequence of this, we separated the individuals into groups according to the relative strength of the ESWT. High-intensity ESWT was shown to be more likely to be the most successful therapy after three months, but low-intensity ESWT was somewhat less effective than CSI in reducing VAS after the same period of time.

CONCLUSION

In addition to being convenient and simple to apply, topical corticosteroids do not call for any additional equipment or financial investment. Furthermore, it does not include the primary hazards that are linked with the injection of corticosteroids, such as the rupture of the patient's PF or the atrophy of the heel pad. It is required to do more comparative study in order to acquire a comprehensive understanding of the novel technique of combining ESWT with topical corticosteroid. The primary effectiveness endpoint of pain during the first few minutes of walking, which was measured by a VAS, was different across treatment groups from the beginning of the trial to the completion of the three-month period observed in this experiment. There was a significant difference between the treatments in terms of the number of patients whose VAS score improvements met the success criteria of the study at 6 weeks and 3 months after treatment, as well as the change from the baseline to the three months after treatment. It is likely that ESWT enhances the body's natural healing processes by boosting blood flow and cellular activity in the treated location. This is one of the probable explanations for the phenomenon. There is also the possibility that the shockwave will cause nerve overstimulation, which might lead to a reduction in the individual's tolerance for pain experienced.

References

1. Sulzbacher I. Osteoarthritis: histology and pathogenesis. Wien Med Wochenschr 2013;163:212-9.
2. Takahashi N, Wada Y, Ohtori S, Saisu T, Moriya H. Application of shock waves to rat skin decreases calcitonin gene-related peptide immunoreactivity in dorsal root ganglion neurons. Auton Neurosci 2003;107:81-4.
3. Tashjian RZ, Deloach J, Green A, Porucznik CA, Powell AP. Minimal clinically important differences in ASES and simple shoulder test scores after nonoperative treatment of rotator cuff disease. The Journal of Bone & Joint Surgery 2010;92:296-303.
4. Tashjian RZ, Deloach J, Porucznik CA, Powell AP. Minimal clinically important differences (MCID) and patient acceptable symptomatic state (PASS) for visual analog scales (VAS) measuring pain in patients treated for rotator cuff disease. Journal of Shoulder and Elbow Surgery 2009;18:927-32. /ki098
5. Taunton J, Taunton KM, Khan KM. Treatment of patellar tendinopathy with extracorporeal shock wave therapy. BCMJ 2003;45.

6. Theodore GH, Buch M, Amendola A, Bachmann C, Fleming LL, Zingas C. Extracorporeal shock wave therapy for the treatment of plantar fasciitis. Foot & ankle international 2004;25:290-7.

7. Thiel M, Nieswand M, Dorffel M. The use of shock waves in medicine--a tool of the modern OR: an overview of basic physical principles, history and research. Minimally invasive therapy & allied technologies : MITAT : official journal of the Society for Minimally Invasive Therapy 2000;9:247-53.

8. Urwin M, Symmons D, Allison T, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. Annals of the rheumatic diseases 1998;57:649-55.

9. Vahdatpour B, Taheri P, Zade AZ, Moradian S. Efficacy of extracorporeal shockwave therapy in frozen shoulder. International journal of preventive medicine2014:875-81.

10. Valchanou VD, Michailov P. High energy shock waves in the treatment of delayed and nonunion of fractures. International orthopaedics 1991;15:181-4.

11. Van der Worp H, van den Akker-Scheek I, van Schie H, Zwerver J. ESWT for tendinopathy: technology and clinical implications. Knee surgery, sports traumatology, arthroscopy : official journal of the ESSKA 2013;21:1451-8.

12. Wang CJ. Extracorporeal shockwave therapy in musculoskeletal disorders. Journal of orthopaedic surgery and research 2012;7:11.

13. Wang CJ, Huang HY, Pai CH. Shock wave-enhanced neovascularization at the tendon-bone junction: an experiment in dogs. The Journal of foot and ankle surgery : official publication of the American College of Foot and Ankle Surgeons 2002;41:16-22.