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**Mohammed Nihal**

Physiotherapy intern, Srinivas  
college of Physiotherapy,  
Rajiv Gandhi University of  
health science, City Campus,  
Pandeshwar, Karnataka,  
India.

**Carolyn Menezes**

assistant professor, Srinivas  
College of physiotherapy, City  
Campus, Pandeshwar,  
Mangalore, Karnataka, India.

**Correspondence:**

**Mohammed Nihal**

Physiotherapy intern, Srinivas  
college of Physiotherapy,  
Rajiv Gandhi University of  
health science, City Campus,  
Pandeshwar, Karnataka,  
India.

## Effect of Extracorporeal Shockwave Therapy in Patients with Burn Scar

Mohammed Nihal, Carolyn Menezes

### Abstract

**Background:** ESWT has been used to treat a number of painful musculoskeletal diseases as well as wounds. We examined the impact of ESWT for burn victims with painful scars following wound closure.

**Objective:** The manuscript's goal is to give a summary on findings of the efficiency of extracorporeal shockwave therapy on burn scar.

**Data sources:** All the articles published in English from 2015 till 2022 were included. Data about extracorporeal shockwave, burn scar, treatment methods and outcome measures were also considered.

**Study selection:** Only randomized controlled trial articles were selected if they discussed about extracorporeal shockwave therapy usefulness in burn scar.

**Result:** In this study 10 articles were reviewed. Out of these 8 articles, improvements in burn scar treatment were statistically significant. One study first found no significant intergroup differences, but eventually came to the conclusion that ESWT could be one of the techniques for enhancing the appearance of scars. Another study's failure to reveal statistically significant differences between the ESWT and control group at two weeks or five months following treatment.

**Conclusion:** Extracorporeal shockwave therapy in patients with burn scars can be helpful as a supplemental method of treating the burn scar. Even though the majority of trials produced encouraging findings, further study is necessary to fully assess the advantages of ESWT and its long-term impact on the treatment of burn scars.

**Keywords:** extracorporeal shockwave therapy, burns, scars.

### Introduction

#### Description of the condition

Burn trauma is a type of wound that can be caused by friction, heat, cold, electricity, chemicals, or radiation. Regarding the tissues they affect, their severity, and any potential side effects, burn injuries differ widely. Muscle, bone, vascular, dermal, and epidermal tissue can all be damaged by significant nerve injury, with discomfort as a result. Depending on the area burned and the severity of the burn, a burn sufferer may have a range of potentially fatal complications, such as shock, infection, electrolyte imbalances, and respiratory failure. In addition to the physical challenges brought on by prolonged hospitalisation, scarring, and deformity, burns can also result in severe psychological and emotional suffering.

Burn scarring is an inevitable result of an accident. The amount of a scar depends on the size and depth of the cut. An excessive response to healing results in abnormal scarring. Either hypertrophic or keloid scarring is the end outcome of this disproportionate response. The flexor surfaces of the extremities, the anterior neck, the shoulders, and the chest are the most frequent locations for severe scarring. This is believed to be brought on by an increase in scar tension, which spurs an increase in fibroblast activity. Scarring that is hypertrophic or keloid is distinguished by an increase in collagen tissue formation. This growth is brought on by increased synthesis and reduced degradation.

#### Description of the intervention

A sonic pulse with certain physical properties is what is referred to as a shock wave. Shock waves have a high peak pressure and a 10-ms-long life cycle. Additionally, it has a wide

frequency spectrum between 16 and 20 MHz Depending on how they are formed, the shock waves may be one of three types: electrohydraulic shock wave, electromagnetic shock wave, or seismic shock wave. Piezoelectric shock wave.

ESWT has been used to treat neuropathic and musculoskeletal pain. Even though there have been numerous clinical trials, the majority of investigations on ESWT in burn patients have looked at how it affects hypertrophic and contracture scars or wound re-epithelisation in the early stages of burn injury. Accordingly, based on the prior study, ESWT can be beneficial for patients with pain that remains or increases after the scar has fully

Collagen production from hypertrophic scarring's fibroblasts is increased. TGF- $\beta$ 1 is crucial for the development of fibroblasts during tissue fibrosis. ESWT on a skin wound speeds up epithelialization by encouraging angiogenesis and reducing inflammation. After ESWT, the levels of TGF- $\beta$ 1, collagen, and fibronectin decreased. Showed that disrupting the TGF- $\beta$ 1/Smad signalling pathway with shock wave therapy improved scar features. Numerous research using ESWT looked into how it might prevent fibrosis. Epithelized by promoting normal regeneration of wounded tissues beneath the burned skin.

## Methodology

### Protocol

The candidates were the research articles concerning to evaluate the safety and the efficacy of ESWT in healing of burn scar.

The outcome of interest included:

1. Using extracorporeal shock wave therapy will heal the burn scar without any complications.
2. Safe, effective and non-invasive treatment modality in scar recalcitrant to standard therapies.
3. The procedure is well tolerated, time-saving, lacking side effects, with potential to significantly decrease health care costs.

### Participants/ problems

Healing of burn scar is seen in patients who use extracorporeal shock wave therapy.

### Intervention

Extracorporeal shock wave therapy.

### Outcome

Decrease in healing time in patients with burn scar.

### Research question

Does healing time decrease in patients with burn scar by using extracorporeal shock wave therapy?

### Information source

An electronic analysis of literature using PubMed, Google Scholar search engines was completed for studies published during the period of 2015-2022.

### Study selection

To identify and get appropriate results for this review, key words were searched methodically using specific key words relevant to this topic. The main keywords in this literature search was 'extracorporeal shock wave therapy', 'burn scars', 'extracorporeal shockwave therapy in burn

scars' and 'effects of ESWT on burns'. The review and selection of articles was done in three phases:

1. Title review
2. Abstract review
3. Full text review

All articles were then selected on basis of inclusion and exclusion criteria of these studies.

### Inclusion criteria

- Articles for the study was taken from 2015 till now.
- the subjects taken for the study are patients with burn scar
- Apart from articles books are included

### Exclusion criteria

- Studies that were done before 2015.
- Studies done on extracorporeal shockwave therapy for different conditions.
- Studies done for burn scars with different treatment

### Results

In total, 10 articles were included from Google scholar, PubMed, Sci-Hub, Sabinet. Out of these 8 articles, improvements in burn scar therapy with regard to pain, pruritus, itching, and concerns related to body image and burns were statistically significant. One study first found no significant intergroup differences, but eventually came to the conclusion that ESWT might be one of the modalities for enhancing scar features. Another study's failure to demonstrate statistically significant differences between the ESWT and control group at two weeks or five months following treatment may be attributable to the absence of objective assessments and poor patient compliance.

### Discussion

In order to guide future research and aid in the creation of treatments for burn scars, the objectives of this literature review were to identify, critically evaluate, and compile relevant data from recent studies exploring the effects of extracorporeal shockwave therapy on burn scar.

The most important parameters for a complete treatment protocol description are the energy flux density (EFD), the number of pulses, the pulse frequency, and the number and interval of sessions. The most of the studies (7 studies) that used extracorporeal shockwave therapy on burn scars did so at a 100 impulse/cm<sup>2</sup> intensity. The remaining few studies used ESWT at 30-40 impulse/cm<sup>2</sup> and 360 impulse/cm<sup>2</sup> intensities. All of the studies used ESWT at frequencies between 4-6 Hz. In the majority of trials, an energy flux density (EDF) of 0.05 to 0.15mj/mm<sup>2</sup> and 0.05 to 0.20mj/mm<sup>2</sup> was used. In a different investigation, energy flux density ranged from 0.05 to 0.30mj/mm<sup>2</sup>. Majority of the trials gave treatment for 3-6 sessions that were held at 1 week interval and remaining few trials provided 1-2 sessions weekly for 4-10 weeks.

Studies conducted by So Young Joo, Ahmed Fathy Samhan, Peter Moortgat, Yoon Soo Cho, Mahmoud S Zaghloul, and Parisa Taher showed the importance of extracorporeal shockwave treatment for reducing burn scars and shown how effective and non-invasive it is. Seung Yeol Lee's randomised control research, in contrast, first found no significant intergroup differences, but later came to the conclusion that ESWT had quantifiable favourable

effects on the characteristics of burn-related scars. Furthermore, Jorge Aguilera- Sáez's revealed that neither two weeks nor five months following treatment, This demonstrates that more research is necessary to accurately determine the possible advantages of ESWT as an additional treatment for burn scars.

### Conclusion

Extracorporeal shockwave therapy may be helpful as a supplement to treat the burn scar in terms of decreased pruritus, lowered pain threshold, itching, and improved look. More study is necessary in order to fully assess the advantages of ESWT and its long-term consequences in controlling burn scars, even though the majority of trials produced excellent results.

### Funding

Self

### Conflict of Interest:

None

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