



EFFICACY OF THERAPEUTIC ULTRASOUND IN HYPERTROPHIC SCARS.

KEYWORDS

Hypertrophic scars, Vancouver Scar Scale, Silicone sheet, Deep friction massage, Kneading, Therapeutic ultrasound.

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ABSTRACT

Objective: To find out the efficacy of therapeutic ultrasound in hypertrophic scars. **Methods:** Thirty subjects having hypertrophic scars were randomly allocated to control and experimental groups. They were evaluated for Vancouver Scar Scale Scores on 0- day (before the treatment started) and at the end of 4th week. Both groups were advised for scar massage and application of silicone sheet in common. However therapeutic ultrasound was received by the experimental group in addition. **Results:** Statistical analysis showed non- significant gain in Vancouver Scar Scale Scores at 0 day – 4 week period. **Conclusion:** Therapeutic ultrasound is not effective in hypertrophic scars.

INTRODUCTION:

Wounds often heal with red and marked scar tissue which later on becomes flat and pale. When healing wound is exposed widely to tension it becomes thick, known as hypertrophic scars (HS). HS are raised, erythematous dermal fibro-proliferative disorders unique to humans that occur following trauma, inflammation, surgery, burns and sometimes spontaneously and don't spread beyond the wound margin.⁽¹⁾ These are characterized by excess deposition of matrix proteins in dermis and subcutaneous tissues which is either due to excessive synthesis of collagens, fibronectin and proteoglycans by fibroblasts or deficient matrix degradation and remodeling.^(2,3) In HS, epidermis is thicker than that of normal skin and islands composed of aggregates of fibroblasts, small blood vessels and collagen fibers are seen throughout the dermis. Collagen and other major extracellular matrix component which are essential for fibril formation and alignment of collagen fibrils are in excess and differential deposition which indicates high amounts of collagen and its cross linking in these abnormal scars.⁽¹⁾ In developed world every year around 100 million people get scars following surgeries, either elective or traumatic. Approximately 15% of them develop unaesthetic or excessive scars.⁽⁴⁾ Overall prevalence of HS following burns was found to be 67% with >75% in non white races and >60% in whites.⁽⁵⁾ HS lead to adverse physical, psychological and social problems. Physical problems include itching, stiffness, scar contractures, tenderness and pain.^(6,7) while psychosocial include decreased self-esteem, stigmatization, disruption of daily activities, anxiety and depression.^(7,8,9) HS are like puzzles, treatment generally begins with educating patients. Most of time nonsurgical treatment is considered to be the best option. Combination therapy has proven to be more effective than monotherapy. At present silicone gel or sheet remains the most accepted modality but in many cases different approaches like pressure garments, combination of corticosteroid injections and onion extract gel are indicated⁽¹⁰⁾ while other treatment includes scar massage, desensitization, stretching, mobilization exercises and splinting.

Positive effects of therapeutic ultrasound on scar tissues are well known^(11,12,13,14,15,16). In remodeling stage therapeutic ultrasound is considered to improve the extensibility of mature collagen which is found in scar tissue (Lehmann and deLateur, 1982). This is believed to occur by promoting the reorientation of the fibers which leads to greater elasticity without loss of strength.

Regarding the effects of therapeutic ultrasound on HS is scarce. So, keeping the effects of therapeutic ultrasound on scar tissue in mind, a hypothesis of having positive effects also on HS was made.

METHODOLOGY

For this prospective interventional study ethical clearance was obtained from the Ethical Committee of S.D.M. College of Medical Sciences and Hospital, Dharwad. Subjects of either gender with HS were referred to Physiotherapy OPD from Plastic surgery and General surgery departments of the Hospital. Subjects having keloid, breeched skin over the scar, infected scar, and general or local contraindications for ultrasound were excluded from the study.

Subjects were explained about the study and written consent was taken. They were evaluated for VSS (Vancouver Scar Scale) score on 0 day (before the treatment started) and at the end of 4th week. Thirty subjects participated in study. They were randomly allocated by lottery system into group 'A': Control group: N=15 ranging from 03 to 39 years, M: F=5:10, with mean age 23.7 (SD 8.80) years and group 'B': Experimental group: N=15 ranging from 09 to 61 years, M: F= 7:8, with mean age 26.4 (SD 14.9) years. In both groups they were advised for scar massage {in the form of Deep friction massage and Kneading using two fingers along the whole length of the scar in a slow, firm manner for 5 to 10 minutes, 3 to 6 times daily⁽¹⁷⁾} and application of silicone sheet {Where they were advised to clean scar area before silicone application, apply it 24 hours a day (except during bathing), not to expose it to sunlight and regular wash with soapy water}. Subjects in group B received an additional intervention in the form of therapeutic ultrasound (frequency 3MHz, intensity 1.0 - 1.5 W/cm², duration 10 minutes continuous mode, thrice a week for 04 weeks). At the end of 4th week they were reassessed for VSS score.

RESULTS:

Table: 1 Comparison of groups A & B for VSS Scores at 0 day – 4nd week.

GROUP	0 - DAY (MEAN)	SD	4nd WEEK (MEAN)	SD	MEAN DIFF.	PAIRE D t-VALUE	p - VALU E	SIGN I.
A (Control) {Y}	9.93	1.10	8.33	0.900	1.60	12.2	0.000	S
B (Experimental) {E}	10.7	1.22	8.60	1.06	2.13	8.34	0.000	S

Table: 2 Comparison of groups A & B for VSS gain Scores at 0 day – 4th week.

Group A		Group B		t-value	p-value	Signi. Mean
Mean	S D	Mean	S D			
1.60	0.507	2.13	0.990	-1.86	0.074	NS

DISCUSSION:

Results were analyzed using parametric tests. Table 1{¥, €} shows significant decrease on VSS scores in both groups A & B at 0 day – 4th week which can be attributed to application of silicone sheet and scar massage. The exact mechanism of action of silicone sheet is not yet clear but occlusion and hydration of the stratum corneum, suppression of over- activity of scar-related cells is likely to involve.⁽¹⁸⁾

¹⁹⁾ Also it prevents bacteria- induced excessive collagen production and modulates the expression of growth factors, fibroblast growth factor β and tumor growth factor β thereby balances fibrogenesis and fibrolysis.⁽²⁰⁾ However massage would have loosened scar tissue by mobilizing cutaneous tissue from underlying tissue and broken the adhesions.

Table 2 shows non- significant gain in VSS scores between groups A and B at 0 day – 4th week proving that therapeutic ultrasound has no effect in the management of hypertrophic scars.

Though pain and pruritis were also assessed but it was not present in all subjects hence data was not analyzed. In groups A & B, 12 and 05 subjects had pain which scored 0.3 and 3.2 on VAS {Visual Analog Scale is a straight horizontal line of fixed length, usually 100 mm. The ends are defined as the extreme limits of the parameter to be measured (symptom, pain, health) (21)} on 0 day and decreased to 1.33 and 0.4 respectively, while 10 and 06 subjects had pruritis on VAS which scored 4.8 and 3.83 and decreased to 2.1 and 1.0 respectively at the end of 4 week. After observing this data here it can be stated that ultrasound might be effective in decreasing pain and pruritis in hypertrophic scars which can be further scope of the study.

CONCLUSION:

The selected dose of therapeutic ultrasound in this study was not effective in treatment of hypertrophic scars.

ACKNOWLEDGMENT: I acknowledge all the subjects who participated in this study.

FINANCIAL SUPPORT: Self

CONFLICT OF INTEREST: Nil

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