

Comparative Study between Effects of Kinesio Taping and Contractubex Phonophoresis on Post-Burn Hypertrophic Scar Characteristics

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ABSTRACT

Background: Post-burn hypertrophic scar (HTS) is common and leads to physical, cosmetic, and psychological problems. Kinesio taping (KT) and contractubex phonophoresis (CP) were proven effective but no studies were found to compare between their effects on improving scar characteristics in post-burn HTS.

Objective: The aim of the current work was to compare between effects of KT and CP on improving scar characteristics in HTS after burn injuries. **Patients and methods:** This study included 40 patients with HTS from burn injuries and aged 20 to 45 years who were selected from Om El Masryeen Hospital. They were randomly and equally allocated into group A (treated with KT) and Group B (received CP). Both groups received traditional physiotherapy. Treatment lasted for six weeks with three sessions weekly. They were assessed with Modified Vancouver burn Scar assessment Scale (MVSS) and A Schiotz tonometer device for scar characteristics.

Results: There was a significant improvement in HTS characteristics after both interventions (P- value ≤ 0.001). Significant difference was detected between groups in the improvement of HTS characteristics at post-treatment (P- value < 0.01), in favor of group A.

Conclusion: It could be concluded that KT is better than CP in improving HTS characteristics.

Keywords: Contractubex phonophoresis, Kinesio taping, Post-burn hypertrophic scar.

INTRODUCTION

Hypertrophic scar (HTS) is abnormal excessive healing response as a common consequence of burn injury¹. The patients with post-burn HTS had cosmetic, physical (pain, pruritus, contracture, and dysfunction), psychological and social consequences^{2,3}. The incidence rate of HTS is 91% following burn injuries⁴. So, the good treatment of HTS is crucial for patients. Kinesio taping is effective for improving HTS pliability and cosmetics and decreasing its thickness and need for surgery, via decreasing tensile forces of post-burn HTS and increasing laminin and collagen production^{4,5}.

Phonophoresis is a transdermal drug distribution with help of therapeutic ultrasound to overcome resistance of stratum corneum to the entry of medical drugs into skin. Contractubex gel is one of the topical drugs described for HTS treatment after burn. It can control inflammatory, bacteria and fibroblast proliferation during healing. It has a positive effect on painful HTS^{6,7}.

There are no studies that compared between the effect of kinesio taping and contractubex phonophoresis on post-burn HTS based on researchers knowledge.

So, this study was aimed to compare between the therapeutic effects of kinesio taping and contractubex phonophoresis on HTS after burn.

PATIENTS AND METHODS

This study included a total of 40 patients with HTS from burn injuries, attending at Om El Masryeen Hospital,

Giza, Egypt. This study was conducted between October 2022 and December 2022).

The included subjects were randomly divided into two groups; **Group A (KT)** consisted of 20 patients underwent KT, and **Group B (CP)** consisted of 20 patients underwent CP. Both groups underwent traditional physiotherapy. Treatment lasted for six weeks, three sessions weekly.

Inclusion criteria: Patients aged 20 to 45 years, post-burn HTS, and scar size ranged from 5 to 7 cm².

Exclusion criteria: Patients with open wound at treatment site, implanted electronic devices, any marked health problem that affects assessment or treatment, skin tumor, been un-cooperative patients, or deep venous thrombosis.

Instrumentations:

Measurement tools:

Modified Vancouver Scar Scale (MVSS): assesses 4 characteristics of HTS; vascularity (1=Pink, 2=Red, 3=Purple), pigmentation (1=Hypopigmentation, 2=Mixed, 3=Hyperpigmentation), pliability (1=Supple, 2=Yielding, 3=Firm, 4=Ropes, 5=Contracture) and height (1= < 2 mm, 2= 2 to 5 mm, 3= > 5 mm). The larger the total score, the worse the HTS. Normal skin (zero score)⁸.

A Schiotz tonometer device: This device (Riester, Germany, 0124) was used as an objective tool to assess the hypertrophic scar elasticity. It has a plunger with weights attached fits inside the barrel⁹.

Therapeutic tools:

Kinesio tape: Kinesio tape (Ares Uncut, Korea) was used to cover the whole scar tissue^{4,5}.

Contractubex gel: The contractubex gel (Merz Pharma, Frankfurt, Germany) was for phonophoresis. It includes onion extract, heparin sodium, and allantoin⁶.

Ultrasonic unit: Ultrasonic device (Chatanooga, USA) was used for all patients in both groups with the following parameters: 1 MHZ, 0.5 W/cm², 5 minutes, and Continuous mode¹⁰.

Procedures:

Measurement procedure:

The assessment was conducted directly pretreatment and after treatment.

Modified Vancouver procedure: The researcher chose the best score for each subscale based on patient status, and then the score were summed to a total score.

A schiotz tonometer device: It was held vertically over the scar, so the plunger moved inferiorly and indented the scar. The device showed the score from 0 to 20. This score was converted to mmHg using a conversion table, supplied with the Schiotz tonometer⁹.

Treatment procedure:

Kinesio taping: The patient was placed in a relaxed position, but allowed end stretch of scar. The treated site was uncovered, cleaned and dehydrated. The kinesio tape was cut appropriately for scar length and width. The tape was applied in the same direction of scar line, anchored tape then placed with 25 to 50% paper tension. Overlapped pieces of the tape were used to cover the full

scar area. The KT was worn throughout the day and reapplied three times per week¹¹.

Contractubex phonophoresis: patients were in a comfortable position. Ultrasound was performed by using contractubex gel using direct technique¹⁰.

Traditional physiotherapy: includes ultrasound therapy, deep friction massage, and stretching exercises^{5,12}.

Ethical Consideration:

This study was ethically approved by research ethics committee of faculty of physical therapy, Cairo University (P.T.REC/012/004103). Written informed consent of all the participants was obtained. The study protocol conformed to the Helsinki Declaration, the ethical norm of the World Medical Association for human testing.

Statistical analysis

Power analysis was done using G*Power with T test, alpha 5%, beta 20%, and effect size of 1^{5,10}. It revealed a sample of 40 patients (20 per group) considering 15% dropouts.

Independent t-test and Chi- squared test were used for analysis of age and sex distribution between groups, respectively. The data did not violate assumptions of parametric testing. So, independent and dependent t-tests were used to test differences between and within groups, respectively. Alpha was 0.05.

RESULTS

Subject characteristics:

Forty patients with post burn HTS were included. Baseline characteristics of all patients were shown in Table (1). Groups A & B showed no significant differences at baseline (p > 0.05).

Table (1): Baseline characteristics of patients of both groups.

	KT Group (20 patients)	CP Group (20 patients)	p-value
Age (years)^a	29.6 ± 5.66	31.05 ± 6.16	0.44
Sex			
Female^b	7 (35%)	6 (30%)	0.73
Male^b	13 (65%)	14 (70%)	

p, probability; ^a, mean ± standard deviation; ^b, count (percent); KT kinesio taping; CP, contractubex phonophoresis.

Within-group differences: Scar pliability and MVSS significantly improved after intervention in both groups (p < 0.001). The percent of change in MVSS and scar pliability in group A was 41.09% and 39.15% respectively, while that in group B was 21.57 and 27.75% respectively (**Table 2**).

Between-group differences:

Groups were homogenous at baseline in the studied outcomes (p > 0.05). Comparison between groups post treatment revealed a significant improvement in MVSS and scar pliability in favor of KT group (p < 0.01) (**Table 2**).

Table (2): Within and between-group differences in MVSS and scar pliability.

	KT Group A	CP Group	MD	t- value	p value
	Mean ± SD	Mean ± SD			
MVSS					
Pre treatment	10.1 ± 0.71	10.2 ± 0.61	-0.1	-0.47	0.63
Post treatment	5.95 ± 0.88	8 ± 0.45	-2.05	-9.18	0.001
MD	4.15	2.2			
% of change	41.09	21.57			
t- value	27.66	11			
	<i>p = 0.001</i>	<i>p = 0.001</i>			
Scar pliability					
Pre treatment	14.51 ± 6.7	15.89 ± 5.15	-1.38	-0.73	0.46
Post treatment	8.83 ± 3.54	11.48 ± 3.11	-2.65	-2.51	0.01
MD	5.68	4.41			
% of change	39.15	27.75			
t- value	7.2	5.73			
	<i>p = 0.001</i>	<i>p = 0.001</i>			

SD, standard deviation; MD, mean difference; p, probability; KT, kinesio taping; CP, contractubex phonophoresis.

DISCUSSION

This study was conducted to compare the therapeutic effects of kinesio taping and contractubex phonophoresis in treatment of HTS after burn. In this study, the Schiotz tonometer device and MVSS were used to assess HTS pliability and characteristics.

The study found a significant improvement after kinesio taping and contractubex phonophoresis in Schiotz tonometer and MVSS scores. However, the kinesio tape group had significantly higher improvement post-treatment, compared to contractubex phonophoresis group. As, The percent of change in MVSS and scar pliability in KT group A (KT) was 41.09 and 39.15% respectively, while CP group was 21.57 and 27.75% respectively.

Hypertrophic scars occur during healing after burn injuries. It can lead to significant physical, psychological and cosmetic problems to the patients³.

Regarding the effects of kinesio taping, results of the current study were agreed with the findings of several studies that reported the beneficial effects of kinesio taping in improving HTS cosmetics or scar characteristics^{11, 13-16}.

Moreover, finding of the present study regarding beneficial effects of kinesio taping supports the notion that KT, besides being easy applicable, durable, and cost-effective, it alters the mechanical forces on the skin and reduces tensile forces on HTS and hence improve HTS¹⁷.

Regarding to effects of contractubex phonophoresis; results of the present study were supported by four studies whose authors found that contractubex improved erythema, pruritus, healing, appearance and flexibility of HTSs, over topical drugs alone, may be because onion extract reduce inflammation and ultrasound help better gain these effects by improving dermal penetration¹⁸⁻²¹.

The present study agreed with **Lee and Zhou**⁷ who documented that phonophoresis increases absorption of medical drugs into the underlying subcutaneous tissue using ultrasound, therefore increasing their efficacy. In other words, in phonophoresis, US breaks down lipids of skin layer, increasing drug entry into skin, via cavitation and microstreaming²².

In contrary to the finding of the current study, **Zurada et al**² found no significant change in erythema and pruritus after onion extract gel application. This contradiction may be due to differences in treatment between the both studies. As in the present study, we used longer treatment time (6 weeks), while in the study of **Zurada et al**², they used shorter treatment time (4 weeks). In addition to that, the latter used only a topical contractubex gel, while in the present study, we used contractubex gel plus ultrasonic therapy (phonophoresis).

Results of this study agreed with assumption that kinesio taping is better than contractubex phonophoresis in improvement of scar characteristics and pliability.

However, both interventions were effective in treatment of HTS after burn injury.

To the best of our knowledge, this is the first study to compare between the effects of kinesio taping and contractubex phonophoresis.

The limitations of this study are small sample, short duration of follow up and small treated scar size, so it is recommended in future studies to have long term follow up for treatment of HTS, larger treated size of HTS and larger sample size.

CONCLUSION

It could be concluded that kinesio taping, when added to the traditional program, was more effective than contractubex phonophoresis, however, both interventions were effective in management of post burn hypertrophic scar.

Disclosure statement: Nil.

Conflict of interest: Nile

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