

Different Effect of Donation Iontophoresis and Phonophoresis for Pain Reduction in Carpal Canal Syndrome

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Abstract:

The thenar pain and paresthesias experienced by people with CTS greatly interfere with their daily activities. Long-lasting repetitive strain injuries, thickening of the yellow ligament and pregnancy are suspected to be the cause. Objective: To determine the difference in effect of iontophoresis and phonophoresis in reducing pain in CTS cases. The research subjects were CTS patients who visited the physiotherapy center at UNS Hospital in Surakarta. Method: experimental research with two pre and post test design groups. 21 subjects aged 26 to 61 were randomly assigned to 2 groups, 10 were assigned to the iontophoresis group and 11 to the phonophoresis group. The cream used contains methyl salicylate. Pain assessment was performed before and after the intervention in both groups. Analysis: Test of normality of the VAS pain data before treatment of the two groups with the Shapiro Wilk test obtained $p > 0.05$. Pre-test VAS homogeneity test in the two groups with the results of the Mann Whitney test obtained $p > 0.05$. The pre and post difference test for each group used Wilcoxon's test with results for all groups showing $p \leq 0.05$. The difference test between the pre and post VAS differences using the Mann Whitney test was obtained $p > 0.05$. Results: The difference between the pre and post VAS tests between the two groups showed that the two interventions did not show a different effect, but the pre and post VAS tests for each group showed significant results. Conclusion: The two interventions have the same effect on pain reduction in CTS cases.

Keywords: iontophoresis, phonophoresis, pain, CTS

INTRODUCTION

Carpal tunnel syndrome (CTS) is a neuropathy of the median nerve resulting from compression (Burton et al., 2014). Patients will enjoy court cases of paresthesia withinside the palms and ache that frequently happens at night. The maximum not unusualplace symptom is a tingling sensation withinside the thenar muscle as much as the first finger and 1/2 of of the 4th finger at the radial side. If it lasts for an extended time, it's going to motive ache and cause atrophy of the thenar muscles. These signs and symptoms significantly intervene with the patient's sleep best and could have an effect on exertions outcomes in the event that they arise in the course of the day. The occurrence of CTS isn't but clear, however repetitive pressure harm is suspected to be the motive of CTS. Cases of CTS may be related to situations of hypothyroidism, diabetes, rheumatoid arthritis, and pregnancy (Burton et al., 2014) or even 55-65% arise bilaterally (Bland & Rudolfer, 2003) .

Andrade et al.,(2011) said that iontophoresis and phonophoresis are non-invasive strategies of regulating molecules via the skin, facilitating their penetration via hair follicles or sweat ducts. Iontophoresis makes use of low-depth power to move the drug throughout the ensuing gradient. Phonophprespis makes use of ultrasound to boom the percutaneous absorption of the drug.

Iontophoresis is a healing method that entails introducing ions into frame tissue via the pores and skin of the patient. The primary precept is to region ions below the electrodes with the equal charge. Thus, bad ions are located below the cathode and

superb ions are located below the anode. An electric powered contemporary is used to propel ions via the tissues of the frame. The electrode in which the ions are located is referred to as the “energetic electrode”. A regular direct contemporary (galvanic contemporary) is used to push ions into the patient's tissues. Smaller currents are extra green at directing ions across the frame. The depth can variety from five to twelve mA. The remedy time is about 15-20 minutes. The iontophoresis protocol makes use of a galvanic micro-contemporary with an depth of 0.four to 0.five A for 15 minutes (Andrade et al., 2011). Iontophoresis has numerous healing benefits along with a painless, sterile and non-invasive approach to introduce particular ions into frame tissues (Thakur et al., 2017). The range of ions transferred to tissue via way of means of iontophoresis is decided via way of means of the depth of the contemporary density or contemporary on the energetic electrode, the length of the contemporary flow, and the ion attention on the energetic electrode (Singh, 2012)

Phono manner sound and phoresis manner the migration of ions via a membrane via way of means of the movement of an electric powered current. Phonophoresis is described because the motion of the drug via the pores and skin to the subcutaneous tissue below the have an effect on of ultrasound. The precept of phonophoresis is primarily based totally on tissue disturbances which purpose the debris to transport quicker and as a result sell drug absorption (Baixauli et al., 1990). The impact of phonophoresis is that thermal ultrasound will increase the permeability of the tissues and the sound strain will push the drug into the tissues. So medication follows the route of light. Once the drug has handed via the epidermis, it's far in all likelihood to flow into to some extent which relies upon at the vascularity of the tissue concerned, and drug molecules can effortlessly input blood vessels (Smidt et al., 2003).

Phonophoresis has been studied in vivo with numerous drugs, such as salicylates (Ciccone et al., 1991). Lenart & Ausländer (1980), in vitro research at the phonophoretic impact of ultrasound, stated that ultrasound allowed more delivery of complete molecules throughout artificial or natural semi-permeable membranes than become allowed via way of means of dummy ultrasound.

The utility of medication to push into the tissues is mixed right into a appropriate gel or cream which paperwork a couplant. Apply to the location to be treated. In general, gels are extra powerful marketers than creams, in particular for excessive frequency ultrasound (1.5 and 3 MHz). Contraindications need to be taken into consideration whilst administering phonophoresis in addition to whilst administering ultrasound (Singh, 2012). In this study, phonophoresis used 3MHz UST in non-stop mode with a frequency of 1MHz and an depth of 0.four W / cm² in five minutes (Andrade et al., 2011)

RESEARCH METHODS

This study is of the quasi-experimental type. The design of this study used a two-group pre and post design. This research was conducted from July to November 2021. Research data collection was carried out and conducted at the physiotherapy polyclinic of the UNS General Hospital, located at Jalan Ahmad Yani 200 Makamhaji, Kartasura district, Sukoharjo regency, Central Java. The subjects in this study were all patients with complaints of CTS who underwent therapy at the physiotherapy polyclinic of UNS. Hospital. The pain measuring instrument used is a visual analogue scale (VAS), with a VAS scale range of 1 to 10 cm. 1 for no pain and 10 for unbearable pain. The analysis carried out is a normality test using the Shapiro-wilk test. The different test using Wilcoxon and Mann Whitney analysis because the data distribution is not normal.

RESULTS AND DISCUSSION

Results

Univariate Analysis

Univariate analysis to describe the characteristics and descriptions of research subjects in the frequency, mean, maximum, minimum, standard deviation and percentage distribution of each variable studied. The number of subjects in this study was 21 people. The characteristics of the subjects in this study are as follows:

The ages of all subjects in this study ranged from 26 to 61 years. All of the subjects in this study were female with a total of 21 people.

Table 1. Frequency Distribution and Percentage of Research Subjects

Variable		Total	Percentage
Age (years)	26 – 61	21	100 %
Gender	Female	21	100 %

Bivariate Analysis

Bivariate analysis was performed using the Wilcoxon and Mann Whitney analysis and the normality test was performed first. Test the data for normality as a pre-test using Shapiro-wilk. The distribution of the data is said to be normally distributed if the significance is > 0.05 . The results of the data normality test showed group 1 $p = 0.009$, group 2 $p = 0.000$, group 3 $p = 0.001$ and group 4 $p = 0.000$. The full results of the normality test are listed in Table 2 below:

Table 2. Normality Test Results Data with Shapiro-Wilk Test

Group	Significance	Interpretation
1	0,009	Abnormal
2	0,000	Abnormal
3	0,001	Abnormal
4	0,000	Abnormal

The results of the above normality test become the basis for the various tests performed. The bivariate test is declared influential if the resulting significance is $p < 0.05$.

For the bivariate test, groups 1 and 2, namely the group before and after treatment by iontophoresis using the Wilcoxon test. The results obtained from this test are $p = 0.003$ which means that iontophoresis has an effect on reducing pain in case of carpal tunnel syndrome.

Different tests for groups 3 and 4, namely the group before and after phonophoresis using the Wilcoxon test. The results obtained from this test are $p = 0.004$, which means that the phonophoresis has an effect on reducing the pain in case of carpal tunnel syndrome.

The pre-group 1 and 2 VAS data homogeneity test is the VAS data obtained before both groups were processed using the Mann Whitney test. The results of the analysis showed a significance of $p = 0.024$, which means that the data are not homogeneous because $p < 0.05$. So, to test the third hypothesis using a different test, the difference between the VAS before and after the VAS for each group.

The difference test for the pre-post VAS difference for groups 1 and 2 is the group before and after treatment of iontophoresis and phonophoresis using the Mann Whitney test. The results of the tests between these groups showed $p = 0.440$, which means that there was no difference in the effectiveness of iontophoresis therapy with phonophoresis

in reducing pain in carpal tunnel syndrome. This means that the two treatments are equally effective in reducing pain in carpal tunnel syndrome.

The full results of the bivariate analysis are shown in Table 3 below:

Table 3. Bivariate Analysis Results

Group	Significance (2-tailed)	Interpretation
1 and 2	0,003	Affect
3 and 4	0,004	Affect
Pre-post difference group 1&2	0,440	No effect

Discussion

Managing physiotherapy with suitable physiotherapy interventions may have a huge impact in lowering or maybe casting off affected person complaints. Various tries had been made for the achievement of remedy for one case. An attempt that may be essential is to position it into exercise right all the way down to the issue of the case, one in every of that is research. Through research, you may get effects that may be used as a benchmark in coping with diverse complaints.

Iontophoresis

Iontophoresis is one of the efforts to lessen court cases, in this example ache court cases with CTS. The incorporation of ions is the purpose of iontophoresis, the usage of galvanic direct contemporary. While the ion used for ache remedy is a cream that incorporates a terrible ion, particularly methyl salicylate. The quantity of incoming ions relies upon at the depth of the energetic electrode, the period and the ion attention, that is what underlies using direct contemporary iontophoresis. In addition, the dimensions of the electrode and the versions in contemporary additionally have an effect on the density. The small length of the electrode will boom the contemporary density so as to boom the ion switch. The large the dimensions of the electrode, the greater the contemporary depth decreases and the ion attention on the electrode additionally decreases. The depth of the contemporary can be greater powerful in directing ions across the body. The depth may be used among five and 12 mA and the period of remedy is 15 to twenty minutes (Singh, 2012). The iontophoresis dose relies upon on contemporary density and time. If the remedy time is prolonged to boom the contemporary density, the ion switch can be reduced. A snug contemporary density of 0.1-0.2 mA / cm² (Singh, 2012).

Phonophoresis

Phonoporesis is the motion of medication over the pores and skin withinside the subcutaneous layer below the have an impact on of ultrasound. In principle, phonophoresis will lessen court cases withinside the tissues because of the quicker motion of debris and sell absorption of the drug. The thermal impact of ultrasound will growth the permeability of the tissue, and its sound strain will push the drug into the tissue. In this study, use a low frequency to reap a sturdy penetrating impact (Singh, 2012). High penetration will result in excessive absorption of the drug in order that ache discount may be greater optimal.

This studies become performed at some point of the Covid-19 pandemic. This ended in a pointy drop in clinic visits via way of means of CTS patients, so the goal variety of topics become now no longer met. In addition, the evaluation device best makes use of the VAS and no evaluation is finished for the variety of movement of the joints and their useful abilities.

CONCLUSION

The conclusions of this study is both treatments, iontophoresis and phonophoresis with methyl salicylate were equally effective in reducing pain in patients with mild to moderate carpal tunnel syndrome. Both of these methods have a good effect in reducing pain. Coupled with the application of a gel containing methyl salicylate, it will increasingly provide a very good effect in reducing pain. It is hoped that the effect will last longer in pain reduction.

This study have two implications: 1) Theoretical implications, theoretically, the hypothesis is very favorable, the supporting variables are quite strong and in line with previous research. From this study, it can be seen that the administration of iontophoresis and phonophoresis play a role in pain reduction. This modality can therefore be given for similar cases with different locations. 2) Methodological implications, this study uses an experimental study with bivariate analysis to determine the results of comparisons between and between groups.

The results of this study should serve as a benchmark for future research. research variables and measuring instruments can be added so that it is more complete and the complaints felt by the patient are resolved in a full manner.

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