Journal of Orthopedics Research and Rehabilitation

Original Article

DOI: 10.51271/JORR-0032

Investigation of the effectiveness of dry needle therapy in pressure ulcers

Mehmet Ergün Kayıran[1], Ali Cımbız[2], Uğur Sözlü[3], Özlem Altındağ[4]

[1]Department of Physiotherapy and Rehabilitation, Therapiekonzept Wellness Center, Gaziantep, Turkiye
[2]Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Rumeli University, İstanbul, Turkiye
[3]Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Gaziosmanpaşa University, Tokat, Turkiye
[4]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Gaziantep University, Gaziantep, Turkiye

Received: 26/04/2024 • Accepted: 14/06/2024 • Published: 09/07/2024

Corresponding Author: Mehmet Ergün Kayıran, mergunkayiran@hotmail.com

ABSTRACT

Aims: This study aims to show whether dry needle therapy is effective in the treatment of pressure ulcers in patients who have developed ulcers anywhere on their body for any reason.

Methods: Thirty individuals (16 females, 14 males) with pressure ulcer were included in the study and a total of 6 sessions of dry needle therapy were applied to each individual with a one-day break. Before and after the application, circumference-diameter measurements of the wounds and staging according to the National Pressure Ulcer Advisory Panel scale were made and recorded with photographs.

Results: While the average wound diameter before the application was 3.97±2.11, it was determined as 3.21±1.77 after the dry needle treatment (p<0.001). While the wound stage [med (IQR)] before application was 2 (1.75-3), it was determined as 2 (1-3) after application (p: 0.003).

Conclusion: Dry needling treatment applied in pressure ulcers was effective in healing the wound and that studies should be conducted on wounds other than pressure sores.

Keywords: Pressure, ulcer, dry needle

INTRODUCTION

Pressure ulcers, bed ulcers and decubitus ulcers are terms used to describe ischemic tissue loss due to pressure, especially on bony prominences.[1] It has been reported that 1.5-3 million people in the United States develop pressure ulcers every year for different reasons.[2] 63% of pressure ulcers develop in hospitalized patients,[3] the prevalence among hospitalized patients was found to vary between 10-20%.[2] It was observed that 10% of ambulatory patients, 37% of wheelchair-bound patients and 53% of bedridden patients developed pressure ulcers.[3] The economic burden of pressure sore treatment and care fees is considerable.[4] The amount of money spent on treating patients with pressure injuries in the UK is estimated to be between £1.4 and £2.1 billion.[5]

Pressure, the most important etiologic factor in the formation of pressure ulcers, was first described by Sir James Paget in 1873.[3] In cases where movement cannot be achieved, excessive pressure occurs in a part of the body. If this pressure is less than 45 mmHg, only capillary circulation is disrupted and erythema occurs in the tissue. However, when exposed to pressure higher than 45 mmHg, arterioles close, causing ischemia and tissue damage occurs.[6]

Pressure ulcers occur in patients requiring long-term care as a result of the contribution of two types of facilitating risk factors: intrinsic (cerebrovascular events, multiple sclerosis, spinal cord injuries, prolonged surgery, trauma, advanced musculoskeletal) and extrinsic (pressure, shear, friction and moisture).[7] It is most common in the sacrum, coccyx and heels in the supine position, in the hips and ankles in those who always lie on one side, and in the hips in the sitting position.[8]

Dry needling treatment (DNT) is the use of monoflament thick needles, known as acupuncture needles, on muscles, ligaments, tendons, subcutaneous fascia, scar tissue, peripheral nerves or tense neurovascular networks without the administration of any medication.[9] DNT creates an intense stimulation, activating muscle spindles and golgi tendon organs with the movement of the needle, creating long-lasting stimulation due to the minor injury it creates, unlike other physical stimuli. This stimulation reaches deep muscles, autonomic dysfunction responds to needle stimulation, resulting in smooth muscle relaxation, vasospasm and lymphoconstriction.[10]

Cite this article: Kayıran ME, Cımbız A, Sözlü U, Altındağ Ö. Investigation of the effectiveness of dry needle therapy in pressure ulcers. *J Orthop Res Rehabil.* 2024;2(3):45-48.

This work is licensed under a Creative Commons Attribution 4.0 International License.

A study in healthy subjects showed that blood flow and oxygen saturation volumes after needle removal in dry needling increased at the treated site compared to before the intervention.[11] As a result of our literature review, we could not find any study examining the effectiveness of dry needling therapy in patients with pressure ulcers. We think that determining the effectiveness of dry needling on pressure ulcers will be beneficial against pain, hospitalization, high costs and many complications. The aim of our study in this direction is to examine the effectiveness of dry needle therapy in patients with pressure ulcers.

METHODS

Ethics

The study was approved by the Gaziantep University Şahinbey Hospital Clinical Researches Ethics Committee (Date: 22.09.2014, Decision No: 2014/299). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. All patients signed the free and informed consent form.

Design and Subjects

This study was conducted at Gaziantep University Şahinbey Hospital. At the beginning of the study, 52 patients with pressure ulcers were identified and followed up. The study was performed on 30 patients (14 males and 16 females) who met the inclusion and exclusion criteria (Figure 1).

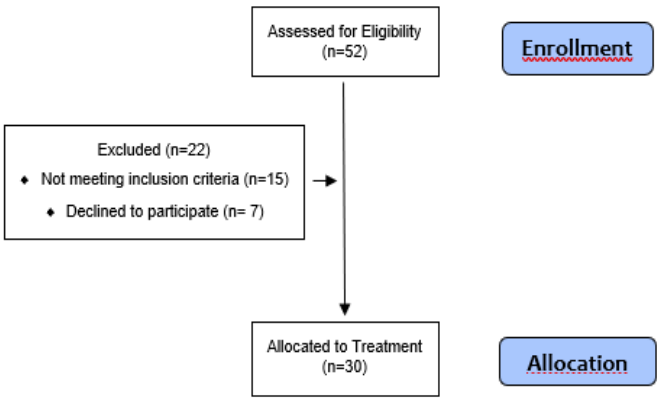

Figure 1. Flowchart of the study

Patients who received additional treatments such as debridement and grafting for pressure sores, patients with limb wounds and planned amputation, patients with a glasgow coma scale score of 3 points or less, patients who refused to participate in the study, and pregnant women were excluded from the study.

Procedures

Wound diameter and circumference: The circumference and diameter measurements of the wounds were measured with a ruler before and after dry needle treatment (Figure 2).

Pressure ulcer staging: Pre-and post-treatment pressure injury staging was carried out in accordance with the National Pressure Ulcer Advisory Panel's (NPUAP) 2016 unified standards. Pressure injuries were classified as stage one, two, three, four, probable deep tissue damage, or unstageable.[12]

Figure 2. Taking measurements from a pressure ulcer

Dry needle treatment: Needles 25 mm long and 0.20 mm thick were used to wrap around the wound. The number of needles used was increased or decreased in direct proportion to the wound size. Each patient underwent a total of 6 needling sessions with a one-day break and the needles were kept for 20 minutes (Figure 3).

Figure 3. Dry needling application

Statistical Analysis

Kolmogorov Smirnov test was used to check the conformity of continuous variables to normal distribution. In 2 dependent measure comparisons, paired t-test was used for normally distributed variables and Wilcoxon test was used for non-normally distributed variables. As descriptive statistics, mean±standart deviation, median (25%-75% values for numerical variables), number and % values for categorical variables are given. SPSS for Windows version 22.0 package program was used for statistical analysis and $p<0.05$ was considered statistically significant.

RESULTS

Demographic information, initial wound stages, wound diameters and the distribution of the wound sites of all individuals are shown in Table 1.

Table 1. Demographic characteristics of subjects and diameter, stage, and region of ulcers

	Subjects (n:30)
Age (years)	61.20±20.92
Gender (female/male) (n)	16/14
Ulcer stage	
Evre 1 (n)	7
Evre 2 (n)	9
Evre 3 (n)	8
Evre 4 (n)	6
Ulcer (cm)	3.97±2.11
Region	
Foot (n)	6
Knee (n)	2
Hip (n)	17
Back (n)	5

*Values are mean±SD, SD: Standart deviation

The average diameter measurement made on the ulcer before and after dry needle treatment (DNT) decreased from 3.97 cm to 3.21 cm, showing statistical significance (p: 001). When comparing the wound stage before and after treatment, the stage values of all cases decreased statistically (p: 003) (Table 2).

Table 2. Comparison of diameter and stage before and after dry needle treatment

	Before Treatment (n: 30)	After Treatment (n: 30)	p
Ulcer diameter	3.97±2.11	3.21±1.77	0.001*
Ulcer stage	2 (1.75-3)	2 (1-3)	0.003**

*: Paired sample t test, **: Wilcoxon test, values are mean±SD and median (inter quartile range), SD: Standart deviation

DISCUSSION

The data obtained from this study, which was carried out to examine the effect of dry needling technique on the healing of pressure ulcers, were discussed in the light of literature information.

When the pressure sore is approached as a soft tissue defect; Considering that DNT previously applied in moderate carpal tunnel syndrome gave satisfactory data,[13] a study on tendon healing reported that DNT contributed to healing by accelerating collagen proliferation,[14] DNT applied in wounds caused by burns produced high fibroblastic growth factor and increased wound healing rate[15] DNT's positive results in pressure ulcers would be in parallel with the literature information and was included in the study to be tested clinically.

Laser Doppler Flowmetry measurements performed after DNT, the blood flow in the region increases more than 2 times compared to before the application.[16] In the acute effects of DNT on osteoarthritis patients, it was found that microcirculation increased compared to the control group.[17] In this direction, it has been supported by other researchers that DNT increases blood flow by local vasodilation.[18]

Statistically favourable results were found on the basis of diameter and NPUAP stage scale in the pre- and post-DNT data evaluation. From this perspective, the application of DNT in pressure ulcers statistically reduced the diameter of these ulcers. The effects we obtained locally from dry needling are similar to the literature.[19,20] A study with a control group to evaluate the specific efficacy of DNT applied on pressure ulcers would eliminate the doubts about the efficacy of DNT. Our study, in which DNT application was used on pressure ulcers, is one of the first studies on this subject. We think that DNT will pioneer the studies on ulcer in this context.

Limitation

The patients included in the study were hospitalized both in the ward and intensive care unit. Since the care conditions in the ward and intensive care setting were not the same, it would have been more appropriate to select patients from the same type of intensive care unit or ward in order to eliminate other factors that may affect pressure sore healing. Since the care conditions in the ward and intensive care setting were not the same, it would have been more appropriate to select patients from the same type of intensive care unit or ward in order to eliminate other factors that may affect pressure sore healing. Some of the patients became mobile after prolonged hospitalization, while others were still immobile. A homogeneous study group, taking into account the mobilization status of the patients, would have been more effective in determining the efficacy of DNT in isolation. If a control group had been formed in addition to the DNT-treated patient group, the effect of DNT administration in isolation could have been better observed.

CONCLUSION

When the effectiveness of DNT in pressure ulcers is examined, the results obtained are positive and significant both clinically and statistically. Ulcers improved according to ulcer diameter and staging scale before and after DNT. It is thought that the general health status of the patient and the prevention of contamination in open ulcers may affect the rate of ulcer closure. In this context, a study that can be conducted with patients who have equal care conditions and whose general health status is close to each other will provide clearer results.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was approved by the Gaziantep University Şahinbey Hospital Clinical Researches Ethics Committee (Date: 22.09.2014, Decision No: 2014/299).

Informed Consent

All patients signed the free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

There was no external funding for the study.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version.

REFERENCES

1. Haesler E, National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers: quick reference guide. [Internet], 2014.
2. Jacquot JM, Pelissier J, Finels H, Strubel D. Epidémiologie et coût des escarres en gériatrie [Epidemiology and cost of pressure sores in the aged]. *Presse Med.* 1999;28(33):1854-1860.
3. Petersen NC, Bittmann S. The epidemiology of pressure sores. *Scand J Plast Reconstr Surg.* 1971;5(1):62-66. doi: 10.3109/02844317109042939
4. Jackson D, Durrant L, Bishop E, et al. Health service provision and the use of pressure-redistributing devices: mixed methods study of community dwelling individuals with pressure injuries. *Contemp Nurse.* 2017;53(3):378-389. doi: 10.1080/10376178. 2017.1364973
5. Bennett G, Dealey C, Posnett J. The cost of pressure ulcers in the UK. *Age Ageing.* 2004;33(3):230-235. doi: 10.1093/ageing/afh086
6. Lyon NJP. Dermatology. *Skin Aging.* 1993.
7. Allman RM. Pressure ulcer prevalence, incidence, risk factors, and impact. *Clin Geriatr Med.* 1997;13(3):421-436.
8. Duthie EH, Katz PR. Practice of geriatrics. *WB Saunders Company.* 1998.
9. Casanueva B, Rivas P, Rodero B, Quintial C, Llorca J, González-Gay MA. Short-term improvement following dry needle stimulation of tender points in fibromyalgia. *Rheumatol Int.* 2014;34(6):861-8666. doi: 10.1007/s00296-013-2759-3
10. Alltree, J. The gunn approach to the treatment of pain: intramuscular stimulation for myofascial pain of radiculopathic origin. C. Chan Gunn. Churchill Livingstone (1996), Price:£ 25. 165pp., ISBN: 0443054223. 1998, Churchill Livingstone.
11. Cagnie B, Barbe T, De Ridder E, Van Oosterwijck J, Cools A, Danneels L. The influence of dry needling of the trapezius muscle on muscle blood flow and oxygenation. *J Manipulative Physiol Ther.* 2012;35(9):685-691. doi: 10.1016/j.jmpt.2012.10.005
12. Edsberg LE, Black JM, Goldberg M, McNichol L, Moore L, Sieggreen M. Revised National Pressure Ulcer Advisory Panel Pressure Injury Staging System: Revised Pressure Injury Staging System. *J Wound Ostomy Continence Nurs.* 2016;43(6):585-597. doi: 10.1097/WON.0000000000000281
13. Khosrawi S, Moghtaderi A, Haghighat S. Acupuncture in treatment of carpal tunnel syndrome: A randomized controlled trial study. *J Res Med Sci.* 2012;17(1):1-7
14. Langevin HM, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast response to acupuncture: dose-dependent effect of bidirectional needle rotation. *J Altern Complement Med.* 2007;13(3):355-360. doi: 10.1089/acm.2007.6351
15. Lee JA, Jeong HJ, Park HJ, Jeon S, Hong SU. Acupuncture accelerates wound healing in burn-injured mice. *Burns.* 2011;37(1):117-125. doi: 10.1016/j.burns.2010.07.005
16. Larsson R, Cai H, Zhang Q, Oberg PA, Larsson SE. Visualization of chronic neck-shoulder pain: impaired microcirculation in the upper trapezius muscle in chronic cervico-brachial pain. *Occup Med (Lond).* 1998;48(3):189-194. doi: 10.1093/occmed/48.3.189
17. Foster NE, Thomas E, Barlas P, Hill JC, Young J, Mason E, Hay EM. Acupuncture as an adjunct to exercise based physiotherapy for osteoarthritis of the knee: randomised controlled trial. *BMJ.* 2007; 1(335-7617):436. doi: 10.1136/bmj.39280.509803.BE
18. Kubo K, Yajima H, Takayama M, Ikebukuro T, Mizoguchi H, Takakura N. Effects of acupuncture and heating on blood volume and oxygen saturation of human Achilles tendon in vivo. *Eur J Appl Physiol.* 2010;109(3):545-550. doi: 10.1007/s00421-010-1368-z
19. Wang Y, Deng L, Bian C, et al. Efficacies of different diameters of fire needle therapy on stage II and III pressure ulcer: a comparative study. *Int J Clin Exp Med.* 2018;*11*(8):8460-8466.
20. Wang H, Gu Y, Huang L, et al. Effectiveness of fire needle combining with moist healing dressing to promote the growth of granulation tissue in chronic wounds: a case report. *Inter J Nurs Sci.* 2020;*7*(3):386-390.