

Effect of Cryotherapy in Plantar Fasciitis

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ABSTRACT

Background: Plantar fasciitis is one of the most common causes of heel pain in adults. It is very painful and disabling condition and most patients seek medical attention. Cryotherapy is the application of cold to the part of the body for reducing local temperature.

Methodology: 30 subjects diagnosed as plantar fasciitis and fulfilling inclusion and exclusion criteria were included in the study. Written informed consent was taken and study was undertaken. Subjects were randomly divided into two groups, Group A received cryotherapy along with conventional physiotherapy and Group B received only conventional physiotherapy. All the patients were treated once daily and for 6 days.

Results: Wilcoxon signed rank test applied for NPRS and FFI showed significant improvement within both the groups ($p < 0.05$). Mann Whitney U test applied for NPRS and FFI showed significant improvement in Group A (Study group) as compared to Group B (Control group) ($p < 0.05$).

Conclusion: Cryotherapy along with conventional physiotherapy is found to be effective in reducing pain and improving function and hence helps early rehabilitation in plantar fasciitis.

Keywords: Plantar fasciitis, Cryoflow IR, Foot function index

INTRODUCTION

Plantar fasciitis is one of the most common causes of heel pain in adults. It affects almost 10% of general population. It is very painful and disabling condition and most of the patients seek health care because of disabling pain which limits their activities of daily living. Cryotherapy is the application of cold to the part of the body for reducing local temperature and hence reduces inflammation. Routine physiotherapy treatment of plantar fasciitis includes ultrasound, calf muscle stretching and plantar fascia stretching.

NEED OF THE STUDY

Cryotherapy helps in decreasing pain by reducing nerve conduction velocity, reducing inflammation and increasing local blood supply. Hence, this study was meant to find the effect of cryotherapy in plantar fasciitis.

OBJECTIVES

- To study the effect of cryotherapy in plantar fasciitis.
- To study the effect of conventional physiotherapy treatment in plantar fasciitis.
- To compare the effect of cryotherapy and conventional physiotherapy in plantar fasciitis.

HYPOTHESIS

NULL HYPOTHESIS (H₀)-There is no significant reduction in pain and improvement in function with cryotherapy in plantar fasciitis.

HYPOTHESIS (H₁)- There is significant reduction in pain and improvement in function with cryotherapy in plantar fasciitis.

MATERIALS & METHODOLOGY

MATERIALS USED:

- Paper
- Pen
- Scale
- Cryoflow IR machine
- Ultrasound
- Gel
- Cotton
- Camera



Figure 1 shows materials used in the study

METHODOLOGY

- **STUDY DESIGN-** Interventional study
- **STUDY SETUP-** Physiotherapy department
- **SAMPLE SIZE-** 30 (15 in each group)
- **DURATION OF STUDY-** 6 Months
- **SAMPLING TECHNIQUE-** Simple random method

Inclusion criteria:

- Both males and females willing to participate were included in the study. Subjects of age 25-40 years, diagnosed with plantar fasciitis by medical practitioner and having symptoms for more than 3 months.

Exclusion criteria:

- Lower extremity related trauma/fracture, recent surgery of ankle or any other medical red flags were excluded from the study

OUTCOME MEASURES: NPRS, Foot function index (FFI)

PROCEDURE

Ethical approval for this interventional study was taken from the Institutional Ethical Committee. Subjects diagnosed as plantar fasciitis and referred to physiotherapy department were screened for inclusion and exclusion criteria. 30 subjects were recruited after screening and written informed consent was taken.

Subjects were randomly divided into two groups, Group A (n=15) and Group B (n=15). Group A was given cryotherapy and conventional physiotherapy treatment. Cryotherapy was given by means of Cryoflow IR. Infrared senses the skin temperature and Cryoflow helps to keep the skin temperature constant at the pre-set level and ensures constant temperature at the treated spot.

Group B was given Conventional physiotherapy treatment.

Conventional physiotherapy treatment was given in the form of

- 1) Ultrasound- 1MHz, 1.2 Watts/cm² for 5 mins⁽⁸⁾
- 2) Calf muscle stretching- 30 seconds hold, 3 repetitions
- 3) Plantar fascia stretching- 10 seconds hold, 10 repetitions⁽⁹⁾
- 4) Intrinsic muscle strengthening
- 5) Myofascial release

Each subject was treated once daily and for 6 days. NPRS and foot function index was measured before and after completion of treatment. Total duration of study was 6 months.

CONSORT FLOW DIAGRAM

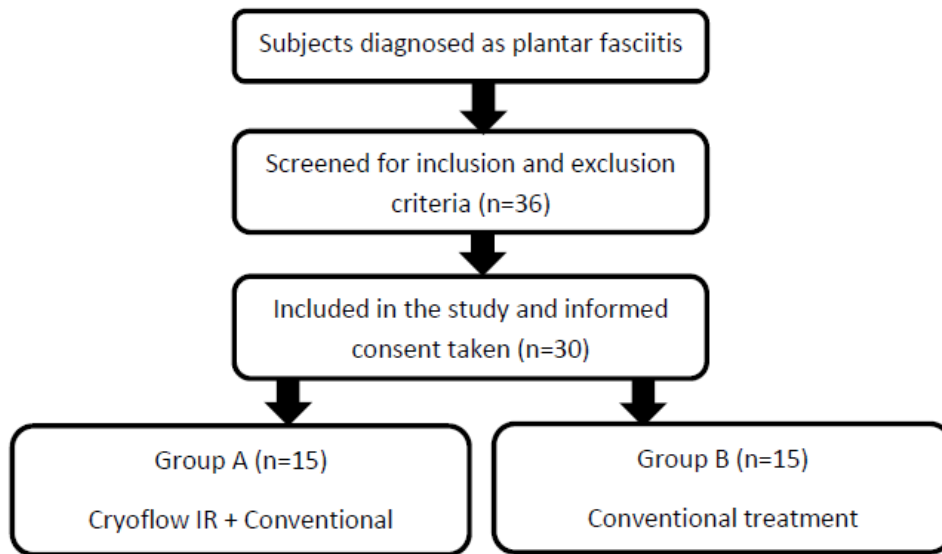


Figure 2



Figure 3



Figure 4

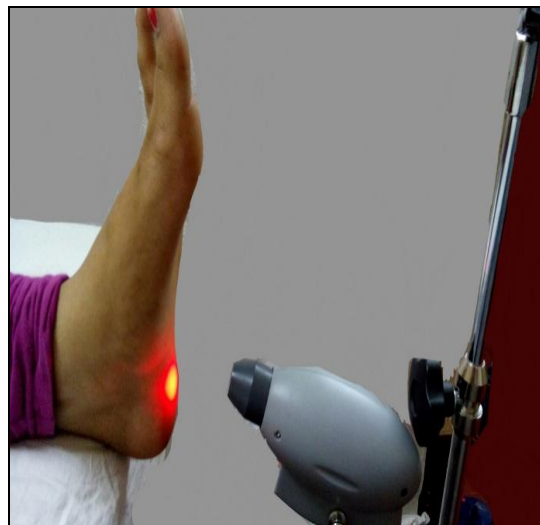


Figure 5

Figure 2,3,4 shows Cryoflow IR machine and Figure 5 shows treatment spot

STATISTICAL ANALYSIS

Data analysis was done by using the Statistical package for social sciences version 16. (SPSS16). Mean age of Group A was 35 ± 9.7 years and Group B was 40.4 ± 5.5 years

Wilcoxon signed rank test and Mann Whitney U test were applied to evaluate the data.

RESULTS

Wilcoxon signed rank test was applied for within group analysis. Results show significant difference in NPRS and FFI before and after treatment in both the groups ($p < 0.05$). Mann Whitney U test was applied to evaluate difference between both the groups. Both NPRS and FFI showed significant difference in Study group as compared to Control group ($p < 0.05$). Hence, there is statistically significant reduction in pain and improvement in function in Study group as compared to conventional group.

Table 1 shows Pre and Post score in both the groups

OUTCOME MEASURE	GROUPS	PRE (Mean \pm SD)	POST (Mean \pm SD)	DIFFERENCE	p- value
NPRS SCORE	GROUP A	6.56 \pm 1.65	1.58 \pm 0.52	4.98 \pm 1.75	0.002
	GROUP B	7.8 \pm 1.3	5.06 \pm 1.32	2.74 \pm 0.27	0.001
FFI SCORE	GROUP A	48.14 \pm 17.21	15.21 \pm 8.4	28.7 \pm 9.11	0.002
	GROUP B	33.48 \pm 15.72	16.16 \pm 1.38	15.72 \pm 8.13	0.001

Table 2 shows Difference of score in both the groups

OUTCOME MEASURE	STUDY	CONTROL
DIFFERENCE- VAS	4.98 \pm 0.75	2.74 \pm 0.27
DIFFERENCE- FFI	28.7 \pm 9.11	13.64 \pm 3.93

DISCUSSION

The results show significant improvement in pain and function with cryotherapy in plantar fasciitis. Plantar fascia is one of the most important static structures that support the medial longitudinal arch⁽³⁾. Plantar fasciitis occurs as a result of repetitive micro trauma at the origin of the medial calcaneal tuberosity. It eventually incites an inflammatory response.^{(5), (6)} Cryotherapy is the application of cold to the part of the body for reducing local temperature.

PHYSIOLOGICAL EFFECTS OF CRYOTHERAPY

1) REDUCTION IN NERVE CONDUCTION VELOCITY

Studies show that there is 17% reduction in NCV at 15°C and hence there is increase in pain threshold and tolerance^{(11), (12)}

2) DECREASE TISSUE HYPOXIA

Reduction in temperature causes decrease in metabolic needs of the tissue and prevents secondary tissue damage⁽¹³⁾

3) VASOCONSTRICTION

Cryoflow causes vasoconstriction which leads to decreased exudation of fluid, decreased perifascial edema and reduce inflammation^{(13), (14), (15)}

4) INCREASE PAIN THRESHOLD AND PAIN TOLERANCE

Decrease sensitivity of nociceptors⁽¹⁶⁾

All these effects lead to reduction in pain and improvement in function in plantar fasciitis.

CONCLUSION

Cryotherapy along with conventional physiotherapy is found to be effective in reducing pain and improving function and hence helps early rehabilitation in plantar fasciitis.

CLINICAL IMPLICATIONS

Cryotherapy should be introduced in the protocol of plantar fasciitis along with the conventional physiotherapy as it helps early rehabilitation and improvised function.

DECLARATION

ETHICAL APPROVAL

Ethical approval for this study was taken from Institutional Ethical Committee.

FUNDING

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Conflict of Interest: None

REFERENCES

1. Pamela K. Levangie, Cynthia C. Norkin, Joint structure and function, 4th edition, JAYPEE, 466.
2. Singh D, Angel J, Bently G, Trevino SG. Fortnightly review. Plantar fasciitis. *BMJ* 1997; 315: 172-175.
3. Roxas M. Plantar fasciitis: Diagnosis and therapeutic considerations. *Alt Med Rev*, 2005; 10:83-93.
4. Jarde O, Diebold P, Havet E, Boulo G, Vernois J. Degenerative lesions of the plantar fascia: surgical treatment by fasciectomy and excision of the heel spur. A report on 38 cases. *Acta Orthop Belg* 2003; 69: 267-74.
5. Kaya, BK: Plantar fasciitis in athletes. *J Sports Rehabilitation*. 5:305-20, 1996.
6. Warren, BL: Plantar fasciitis in runners: treatment and prevention. *Sports Med*. 10:338-45, 1990.
7. Schepsis AA; Leach RE; Gorzyka J: Plantar fasciitis: Etiology, treatment, surgical results, and the review of the literature. *Clinical Orthopaedics*. 266:185-96, 1991.
8. D'Andréa, Greave JM, Grecco MV, Santos-Silva PR. Comparison of radical shock waves and conventional physiotherapy for treating plantar fasciitis. *Clinics*. 2009; 64:97-103.
9. Digiovanni BF, Nawoczinski DA, Malay DP, Graci PA, Baumhauer JF. Plantar fascia specific stretching exercise improves outcome in patients with chronic plantar fasciitis. A prospective clinical trial with two-year follow-up. *J Bone Joint Surg Am* 2006; 88:: 1775-1781.
10. Budiman-Mak E, Conrad KJ, Roach KE. The foot function index: a measure of foot pain and disability. *J Clin Epidemiol* 1991; 44(6):561-70
11. Clarke RS, Hellon RF, Lind AR. Vascular reactions of the human forearm in cold. *Clin Sci* 158; 17:165-16.
12. Algafy AA, George KP. The effect of cryotherapy on nerve conduction velocity, pain threshold and tolerance. *Br J Sports Med* 2007; 41:365-36
13. Knight K. The effects of hypothermia on inflammation and swelling. *Athletic training* 176; 11:7-10
14. Licht S. Physiologic responses to heat and cold. [In] Licht S, ed. *Therapeutic heat and cold*. 2nd ed. Baltimore, Williams and Wilkins, 1965, pp137-159.
15. Guyton AC. *Textbook of medical physiology*. 5th ed. Philadelphia, WB Saunders, 1976, 380-381, 675-77.
16. McMaster WC. A literary review of ice therapy in injuries. *Am J Sports Med* 177; 5: 124-26.

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