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Original Research Article

# Effectiveness of High Intensity Hilthera 4.0 Laser Treatment on Patients with Plantar Fasciitis

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## ABSTRACT

Plantar fasciitis is one of the most common causes of heel pain. Conservative lines of treatment include non-steroidal anti-inflammatory drugs, corticosteroid injections, Physiotherapy, stretching exercises and using heel pads or orthotics. The purpose of the study is to investigate the effects of high intensity Hilthera 4.0 laser treatment on pain and functional capacity in patients with acute plantar fasciitis. Total 30 participants were randomly recruited and were evaluated before the first treatment session and after 8 sessions of treatment with Hilthera 4.0 Laser. Treatment Parameters are frequency (Hz) 25, one shot emission (MJ) 500, and a total energy 3000W for 15 minutes each session. Outcome measures are VAS score for measuring Pain and Foot Function Index score for measuring Foot Function. IBM SPSS version 16.0 software was used for statistical analysis. Paired sample t-tests are used to measure the pre and post test results. Results shows that there is a significant difference in VAS Score and Foot Function Score pre and post treatment with 'p' value < 0.05 when Hilthera 4.0 laser is used for pain and Foot function in patients with Plantar Fasciitis. In conclusion Hilthera 4.0 Laser Therapy is effective in treating pain and Functional limitation in patients with Plantar Fasciitis.

**KEY WORDS:** Plantar Fasciitis, Hilthera 4.0 Laser Therapy, VAS Score, Foot Function Index Score.

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## INTRODUCTION

Plantar fasciitis is one of the most common causes of heel pain[1]. It involves inflammation of a thick band of tissue that runs across the bottom of your foot and connects your heel bone to your toes.

Plantar fasciitis (PF) is most common among patients aged 40 to 60 years[2] and the ratio of men to women is approximately 2:1 [2].

Patients with Plantar fasciitis usually experience plantar heel pain on ambulation, especially during the initial first few steps in the morning which improves with weight bearing [3]. Unaccustomed athletic activity, sudden weight gain, unsuitable footwear and even standing long hours may cause plantar fasciitis. Biomechanical abnormalities including reductions in the strength of calf muscles, tightness of the Achilles tendon (AT) and plantar fascia, isolated gastrocnemius tightness and abnormal foot alignment [4] can lead to abnormal loading on the plantar fasciia

resulting in its inflammation. Unfortunately, the time taken for resolution is often 6–18 months, which can lead to frustration for patients and physicians [5,6].

Conservative lines of treatment include non-steroidal anti-inflammatory drugs, corticosteroid injections, Physiotherapy, stretching exercises and using heel pads or orthotics [7].

Laser treatment is a regarded as a non-invasive and painless method that can be easily administered in therapy units for several musculoskeletal disorders, including muscle strains, epicondylitis, rheumatoid arthritis, osteoarthritis, and carpal tunnel syndrome [8].

Both Low-level laser therapy (LLLT) and high-intensity laser therapy (HILT) are being used in treating plantar fasciitis (PF) although both treatments improved the pain levels, function, and quality of life in patients with PF, HILT had a more significant effect than LLLT [9]. Ferit Akkurt in his study reported that High intensity Laser Therapy reduces inflammation and pain [10].

Several studies reported the effects of high intensity laser therapy on plantar fasciitis but studies on the effects of high intensity Laser (HILTHERA 4.0) on plantar fasciitis are very less. Hilthera 4.0 Laser using optical fiber with oscillation wavelength of 1064nm provides the optimal therapeutic option to treat acute and chronic pain by safely reaching deep tissues without causing thermal injury or damage to the patient. It delivers the most specific non-invasive therapeutic laser wave penetration for the treatment of painful joint pathologies, deep muscle injuries, tendon injuries and bone related ailments

The main characteristics of this laser is High Emission Power (up to 8000W), Highly Effective at Maximum Depths, Rapid Analgesic Effects, Pulsed Technology Ensures High Safety Profile, Controlled & Programmable Release of Energy, Observes Thermal Relaxation Periods of Tissues. Through its Photo-biostimulation, Photo biomodulation and Photo-thermal effects, Hilthera 4.0 Laser helps in speeding up metabolism by facilitating re-adjustment of physiological concentrations of Na + and K + at the cellular level, supplies thermal energy in tissue, promotes blood circulation in damaged tissue, increases nutrient supply, quickly reduces swelling.

The purpose of this study is to investigate the effects of high intensity Hilthera 4.0 laser treatment on pain and functional capacity in patients with acute plantar fasciitis.

**Purpose of the Study:** To investigate the effects of high intensity Hilthera 4.0 laser treatment on pain and functional capacity in patients with acute plantar fasciitis.

**Objective of the Study:** To evaluate the effectiveness of Hilthera 4.0 laser in plantar fasciitis.

## MATERIALS AND METHODOLOGY

**Subject Recruitment:** All the participants of the study are collected from the out-patients attending Physiotherapy at Menara group of clinics, Physio at work – Menara Telekom, Physio at Work – Bukit jelutong, Malaysia and Rev-Med International.

**Selection Criteria:** A total number of 30 subjects were randomly selected and recruited for the study.

**Research Design:** Experimental design, Randomized control trial.

**Material:** Hilthera 4.0 laser, Patient's consent form and Pillows.

**Methodology:** Patients diagnosed with acute plantar fasciitis and referred for physiotherapy by a primary physician are carefully assessed and upon fulfilling the inclusion criteria are randomly recruited into the study.

**Inclusion Criteria:** Subjects diagnosed with Unilateral or bilateral Plantar Fasciitis, ii. Both Male and Female, iii. Age group from 20 – 70 years and iv. Having acute plantar Fasciitis.

**Exclusion Criteria:** Recent Ankle and Knee Injuries, ii. Any Foot Deformities, iii. Uncontrolled Diabetes Mellitus.

**Orientation of Subjects:** The purpose of the study has been explained to all the subjects before the commencement of the study and informed consent has been taken from all of them. Subjects were instructed to come to physiotherapy department regularly; Subjects

were clearly explained about the interventions before starting the treatment.

**Evaluation Procedure:** Evaluation was carried out for all the subjects; pain was measured using visual analogue scale and functional status of the patient was measured using Foot Function Index questionnaire. Two tools have been used for evaluation: i. Visual analogue scale ii. Foot Function Index questionnaire.

**Visual analogue scale:** Pain was quantitatively measured by visual analogue scale, here the subject was shown a 10 cm line where one end is marked "0" and the other end is marked "10". They were explained that "0" represents no pain and "10" represents maximum pain and they were instructed to mark their level of pain over that 10 cm line scale.

0——————————————————10

**Foot Function index (FFI)**: It is a self administered instrument that measures pain and disability associated with Foot. It gives information as to how your foot pain has affected your ability to manage in everyday life. It consists of 17 items divided into 2 subscales, pain (5 items) and disability (12 items). The questions are asked, patient mark the responses where 0 = No pain and 10 = worst pain imaginable for 5 pain items. For disability 0 = No difficulty and 10 = so difficult that he/she requires help. FFI is the result of total of two subscales (pain and disability subscales) divided by 170 and multiplied by 100 as its percentage.

**Treatment Protocol:** Hilthera 4.0 Laser therapy – one shot emission (MJ) 500, frequency (Hz) 25, Total energy 3000W for duration of 15 minutes per session.

**Procedure:** All the subjects were evaluated for their pain and Foot Function before initial treatment session. They received 8 sessions of Hilthera 4.0 Laser treatment. Each session is for 15 minutes and 2 sessions a week for 4 weeks, after 8 sessions of treatment the subjects were re-evaluated for pain and foot function.

## RESULTS AND DISCUSSION

IBM SPSS version 16.0 software was used for statistical analysis. Descriptive statistical results are shown as mean ± standard deviation, frequencies and percentages. Before and after treatment results were evaluated through paired sample t-tests. Statistical significance and confidence intervals were determined as $p<0.05$ and 95%, respectively.

A total of 30 subjects were selected randomly for the study but only 22 participants (n=22) successfully completed the study. 8 subjects were dropped in the middle due to various reasons.

As shown in **Table -1** the mean age and standard deviation of the participants is 45.4091± 12.8198. Male and female ration of 1; 1 (Male-11 and Female-11)

From **Table-2**, the Mean VAS score of participants (n=22) prior to treatment is 6.591, standard deviation is 1.436 and Mean VAS score of participants (n=22) after treatment is 3.000, and standard deviation is 0.976. The Mean FFI score of participants (n=22) prior to treatment is 46.176, standard deviation is 16.787 and mean VAS score of participants (n=22) after treatment is 26.674, and standard deviation is 7.734. The't' value of VAS score pre and post treatment is 15.339 and 'p' value <0.01. The't' value of FFI score pre and post treatment is 6.327 and 'p' value < 0.01 which is highly significant

**Graph 1** show the significant difference in VAS Score and FFI Score pre and post treatments. The results of the study shows that there is a significant difference in VAS Score (Pain) and FFI score pre and post treatment with 'p' value < 0.05 when Hilthera 4.0 laser is used for pain and Foot function in patients with Plantar Fasciitis.

Very few studies are done on the effects of Hilthera 4.0 Laser on Plantar Fasciitis. Present study evaluates the effectiveness of High intensity Hilthera 4.0 laser treatment on patients with plantar fasciitis.

This study was conducted on 30 plantar fasciitis patients, randomly recruited and evaluated before the first treatment session and after 8 sessions of treatment with Hilthera 4.0 Laser. Pain was assessed by Visual Analog Scale (VAS), pain and disability associated with foot was assessed by Foot Functional Index (FFI). The

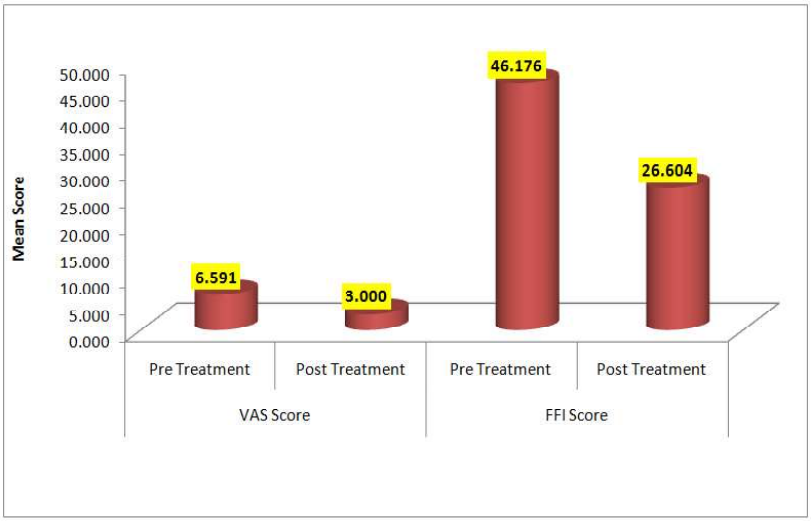
**TABLE 1**

| Demography Charcteristics | | Mean ± SD /NO (%) |
|---|---|---|
| AGE (Years) | | 45.4091 ± 12.8198 |
| SEX | Male | 11 (50%) |
| | Female | 11 (50%) |

**TABLE 2**

| | | N | Mean | Std. Deviation | " t " Value | P Value |
|---|---|---|---|---|---|---|
| VAS Score | Pre Treatment | 22 | 6.591 | 1.436 | 15.339 | 0.000 < 0.001 |
| | Post Treatment | 22 | 3 | 0.976 | | |
| FFI Score | Pre Treatment | 22 | 46.176 | 16.787 | 6.327 | 0.000 < 0.001 |
| | Post Treatment | 22 | 26.604 | 7.734 | | |

**GRAPH 1**




Visual Analog Scale showed reduction in pain from pre to post-treatment, there is significant reduction in the pain with 'P' value 0.01. These results are consistent with the findings of previous studies, It is suggested that frequency range from 1 to 100 Hz is suitable for pain reduction and neuralgia treatment despite the general recommendation to use continuous mode.[11] Study done by Ordahan et al [9]. stated that both high-intensity and low-level laser treatments improved the pain levels, but High Intensity Laser Therapy had a more significant effect than Low Level laser therapy. Foot Functional index (FFI) showed improvement in disability associated with foot from pre to post-treatment. There is significant improvement in FFI score with 'P' value 0.01.

In summary, our findings revealed that Hilthera 4.0 training is effective in reducing the pain and disability of plantar fasciitis. Further, with the limitations outlined in mind, researchers can cautiously use these minimal important differences to assist in prospective sample size calculations for clinical trials.

**Limitations of the study:** Small sample size may affect the external validity of the results, thus care should be taken in generalizing these results to a wider population. A larger multi centered randomized clinical trials would be recommended to improve external validity of the results. Further Studies can be done on chronic plantar fasciitis cases alone and with different treatment parameters.

## CONCLUSION

This study shows that Hilthera 4.0 laser treatment is very effective in reducing pain and improving foot function related to Plantar Fasciitis.

**Conflicts of interest:** None

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