EFFECTIVENESS OF ADHESIVE ZnO_2 TAPING FOR THE TREATMENT OF PLANTAR FASCIITIS

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EFFECTIVENESS OF ADHESIVE ZnO_2 TAPING FOR THE TREATMENT OF PLANTAR FASCIITIS.

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Declaration

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of information of the study, I would be bound to take written consent of my supervisor and Head, Department of Physiotherapy, BHPI.

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Contents

	Page No.
Acknowledgement	i
Acronyms	ii
List of figures	iii
List of table	iv
Abstract	v
CHAPTER 1: INTRODUCTION	**1-5**
1.1 Background	1-3
1.2 Rationale	4
1.3 Aim	5
1.4 Objectives	5
1.5 Hypothesis and Null Hypothesis	5
1.6 Variables	6
1.7 Operational definition	7
CHAPTER 2: LITERATURE REVIEW	**8-12**
CHAPTER 3:METHODOLOGY	**13-21**
3.1 Study design	13
3.2 Treatment Regime	15
3.3 Study Area	16
3.4 Study Population	16
3.5 Sample Size	16
3.6 Inclusion criteria	17
3.7 Exclusion criteria	17
3.8 Data Processing	18-19

Page No.

3.9 Data Analysis 19-20

3.10 Ethical Issues 21

3.11 Informed Consent 21

CHAPTER 4: RESULTS 22-28

CHAPTER 5: DISCUSSION 29-31

Limitations 31

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS 32

6.1 Conclusion

6.2 Recommendations

REFERENCES 33-36

ANNEXURE 37-67

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Acronyms

BHPI	Bangladesh Health Professions Institute.
BMRC	Bangladesh Medical Research Council
CI	Confidence Interval
CRP	Center for the Rehabilitation of the Paralyzed
MS	Musculoskeletal
PF	Plantar Fasciitis
PT	Physiotherapy
WHO	World Health Organization
ZnO_2	Zinc Oxide

List of Figures

Figure No	Description	Page No
01.	Age Range of the Participants with percentage	22
02.	Gender Distribution with percentage	23
03.	Male-Female Ratio of Experimental and Control groups	23
04.	Frequency of Affected Leg	24
05.	Frequency of taking treatment previously	24
06.	Reduction of Heel Pain on NPRS	25
07.	Mean Reduction of Neck Pain on NPRS	25
08.	Reduction of Pain at Heel in Experimental Group	26
09.	Mean NPRS for Heel Pain in experimental Group	26
10.	Mean Difference of Pain Reduction	27
11.	Plantar and Medial Views of the Foot Demonstrating the Origin and Insertion of the Plantar Fascia and the Location of Nerves in Proximity to the Heel	60

List of Table

Table No	Description	Page No
01.	Mean age of the participants.	22
02.	Mean Difference of pain reduction in control group.	27
03.	Mean Difference of pain reduction in experimental group.	27
04.	*U*-value at various level of probability.	28

ABSTRACT

Purpose: The present study was conducted to analyze and identify the therapeutic effectiveness of the Adhesive ZnO_2 Taping, given along with Conventional Physiotherapy for the treatment of Plantar Fasciitis. This study has made the comparison, in order to discover the most effective treatment to alleviate the symptoms of the condition. *Objectives:* To assess the effect on pain after introducing Adhesive ZnO_2 Taping for Plantar Fasciitis, to measure the severity of pain by using Numeric Pain Rating Scale (NPRS), to identify the distribution of pain, to explore the socio-demography of the participants, to investigate the effect on reducing discomfort and pain related symptoms after introducing Adhesive ZnO_2 Taping. *Methodology*: The study was an experimental design. Total 14 samples were selected conveniently then randomly assigned to two different groups for this study from outpatient treatment service of Musculoskeletal Unit, Physiotherapy Department, Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka. Initially all the subjects were assessed by Musculoskeletal Peripheral Assessment Form at the clinical settings using the Windlass Test and then the data were collected by questionnaires; Numeric Pain Rating Scale (NPRS) was used to assess pain intensity of the patients. Experimental Group received combination therapy of Adhesive ZnO_2 Taping with Conventional Physiotherapy while Control Group received Conventional Physiotherapy only. *Result*: The finding of the study was carried out by using non-parametric Mann-Whitney *U* test to compare the Experimental and Control Group and analysed by interpreting the probability level of significance of *U* value. The results were found to be significant for *U* value at probability level 0.05. *Conclusion*: The study concluded as the adhesive ZnO_2 taping is significantly capable of producing beneficial effects on pain reduction, pain related symptoms minimization in patients with Plantar Fasciitis.

Keywords: Plantar Fasciitis, Taping, Conventional Physiotherapy.

CHAPTER-I INTRODUCTION

1.1 Background

Plantar heel pain is soreness under surface of the heel and may radiate from medial tubercle of the calcaneum extend along the fascia into the medial longitudinal arch of the foot and severity of pain and irritation noticeable on rising after rest. Plantar fasciitis is a common pathological condition affecting hind foot and was first described by Wood in 1812 (Dimou et al., 2004). Often referred to as painful heel syndrome or chronic plantar heel pain, this disorder is diagnosed on the basis of a history of pain on taking the first few steps in the morning, worsening pain with weight-bearing, and pain and tenderness to palpation over the medial calcaneal tubercle (Wolgin et al., 1994; Crawford et al., 2000; Riddle et al., 2004).

In a review Orchard (2012) stated that the plantar fascia is a tight band of connective tissue that supports the arch of the foot like a windlass. Plantar fasciitis occurs at the proximal attachment and is an enthesopathy, the enthesis being the interface between the bony surface (periosteal) and a tendon or ligament attachment. Most tendinopathies (such as tennis elbow) are insertional and hence also enthesopathies. The plantar fascia is a ligament in anatomical terms, because it attaches bone to bone (calcaneus to metatarsal heads, crossing other joints of the foot in its path, figure no. 11) rather than a tendon (which attaches muscle to bone). However, deep to the superficial structure of the plantar fascia is the flexor digitorum brevis muscle with a tendon enthesis attachment to the calcaneus proximally. As stress shielding (failure of a stress deprived deep surface to heal because the superficial element bears most of the load) is potentially implicated in enthesopathy,8 it is possible that proximal tendinopathy of the flexor digitorum brevis muscle is involved in the pathology of plantar fasciitis.

Riddle et al. (2004) described plantar fasciitis as the most common cause of heel pain in the outpatient setting. Additionally, in 2009 a survey of members of the American Podiatric Medical Association revealed that plantar fasciitis was the most prevalent condition receiving treatment in podiatric clinics (Al Fischer Associates, 2003). Plantar fasciitis (PF) causes pain and stiffness in the heel and medial arch of the

plantar surface of the foot and can interfere considerably with activities of daily living (Bennett et al., 2001). Riddle et al. (2004) described plantar fasciitis is one of the most common foot disorders responsible for approximately one million physicians visit per year.

It is estimated to account for 11% to 15% of all foot symptoms requiring treatment in adults (McCarthy, 1979; Pfeffer, 1999). Proximal plantar fasciitis is the most common cause of heel pain affecting more than 2 million Americans each year (DiGiovanni, 2006). The incidence reportedly peaks in people between the age of 40 and 60 years in general population, particularly in females (Furey, 1975). Crawford (2000) stated that plantar fasciitis affects 10% population during the course of life time. In the study of Riddle et al. (2004) said 83% of patients seen with plantar fasciitis (PF) were active, working adults ranging from 25 to 64 years of age. Dimou et al. (2004) also described only 5% undergo surgery in chronic plantar fasciitis. The classical signs and symptoms of chronic plantar fasciitis are localized to medial calcaneal tubercle and pain in the first step in the morning for at least ten months. Plantar fasciitis is also referred to as planter heel pain syndrome, heel spur syndrome, painful heel syndrome, runner's heel, subcalcaneal pain, calcaneodynia, and calcaneal periostitis.

Patients with PF report pain and/or stiffness localized to their heel which may extend distally to the arch of the foot (Bennett et al., 1998). The typical patient describes symptoms during the first steps after rising in the morning described by Furey (1975). In most patients these symptoms vary in intensity and may settle or resolve after a variable period from a few steps to a few hours. In most cases, symptoms then increase as the day progresses (Kwong et al., 1988; Kibler et al., 1991; Baxter, 1995). On palpation of the heel Kibler et al. (1991) found tenderness is focal and localized to the medial calcaneal origin of the plantar fascia.

Osborne & Allison (2006) cited in their trial that various treatment strategies, including orthoses, stretching, taping, extracorporeal shock wave therapy, laser therapy, and drug therapy in the form of systemic medication, percutaneous injection, and topical application, have been investigated and have shown variable clinical benefit.

Athletic taping is the process of applying tape (such as non-elastic adhesive ZnO_2 tape) directly to the skin in order to maintain a stable position of bones and muscles during athletic activity. It is a procedure that uses tape, attached to the skin, to physically keep in place muscles or bones at a certain position. This reduces pain and aids recovery. Taping is usually used to help recover from overuse and other injuries (Bandyopadhyay & Mahapatra, 2012).

Osborne & Allison (2006) in their study found that a protocol of six treatments of acetic acid iontophoresis combined with taping provides greatest relief of the stiffness symptoms of PF. Low-Dye [a 1 inch zinc oxide (rigid) strapping that is non-stretchy; this can be found at most chemists, such as boots] taping provides a short term window of opportunity in the management of symptoms of PF (Radford et al., 2006). They investigated that if tapping is stopped the symptoms flair up again. But if any pharmaceutics (acetic acid or dexamethasone) are introduced through iontophoresis combined with taping, significant treatment effects persist at four weeks (Osborne & Allison, 2006). They recommended to study on the longer term treatment with taping seeing if there will be any effectiveness.

1.2 Rationale

Now-a-days plantar fasciitis is one of the most commonly occurring musculoskeletal diseases around the globe that causes functional limitation in our day to day life.

To develop evidence based project study to strengthen physiotherapy practice as well as the betterment of the patients.

As a physiotherapy student and being a researcher, my interest is to work in this area and to establish an evidence based physiotherapy treatment technique for plantar fasciitis enormously.

Taping has been successfully used by physiotherapists in management of sports injuries. It has been suggested that it can be used to treat diseases like plantar fasciitis however there is a lack of evidence.

Some research articles have been published about physiotherapy interventions of patient with plantar fasciitis but there's no well-developed research on this area in our country.

On the other hand this study will be helpful for professions and professionals of physiotherapy & with this connection to other professionals will have a chance to gather their knowledge from this study.

1.3 Aim

- The aim of the study is to assess the therapeutic effectiveness of adhesive ZnO_2 taping for the treatment of plantar fasciitis.

1.4 Objectives

General objective

- To analyze and identify the therapeutic effectiveness of adhesive ZnO_2 taping for the treatment of patients plantar fasciitis.

Specific objective

1. To find out the rate of recovery according to session.
2. To identify the relation between taping with other treatment techniques over traditional physiotherapy treatments.
3. To know the immediate & long term effects experienced by the patients.

1.5 Hypothesis and Null-Hypothesis

Hypothesis

Adhesive ZnO_2 taping along with conventional physiotherapy is effective for the treatment of plantar fasciitis. ($H_A > H_O$).

Null-Hypothesis

Adhesive ZnO_2 taping along with conventional physiotherapy is not effective for the treatment of plantar fasciitis. ($H_O \neq H_A$).

1.6 Variables

Independent variables

- Adhesive ZnO_2
- Conventional Physiotherapy
- Age
- Sex

Dependent variable

- Plantar Fasciitis

1.7 Operational Definition

Plantar Fasciitis: The plantar fascia is the thick tissue on the bottom of the foot. It connects the heel bone to the toes and creates the arch of the foot. When this tissue becomes swollen or inflamed, it is called plantar fasciitis (Orchard, 2012).

Conventional Physiotherapy: The group of treatments set by the physiotherapist to treat a patient for a certain condition which has been widely used in a certain clinical setting may be denoted as conventional physiotherapy (Kishner & Colby, 2007).

Adhesive ZnO_2 Tape: It is a specific variety of tape which is non-elastic in nature used for treatment purpose to hold a certain body part in a state of resting position to prevent further injury or damage (Radford et al., 2006).

CHAPTER-II LITERATURE REVIEW

Plantar fasciitis (PF) causes pain and stiffness in the heel and medial arch of the plantar surface of the foot and can interfere considerably with activities of daily living (Bennett et al., 2001).

In a review Orchard (2012) stated that the plantar fascia is a tight band of connective tissue that supports the arch of the foot like a windlass. Plantar fasciitis occurs at the proximal attachment and is an enthesopathy, the enthesis being the interface between the bony surface (periosteal) and a tendon or ligament attachment. Most tendinopathies (such as tennis elbow) are insertional and hence also enthesopathies. The plantar fascia is a ligament in anatomical terms, because it attaches bone to bone (calcaneus to metatarsal heads, crossing other joints of the foot in its path, figure no. 11) rather than a tendon (which attaches muscle to bone). However, deep to the superficial structure of the plantar fascia is the flexor digitorum brevis muscle with a tendon enthesis attachment to the calcaneus proximally. As stress shielding (failure of a stress deprived deep surface to heal because the superficial element bears most of the load) is potentially implicated in enthesopathy,8 it is possible that proximal tendinopathy of the flexor digitorum brevis muscle is involved in the pathology of plantar fasciitis.

Plantar fasciitis is such a well-established phrase that it will almost certainly remain the preferred term for the clinical syndrome of undersurface heel pain. The “itis” suffix denotes an inflammatory disorder, which is a misnomer, as the pathology is not a result of excessive inflammation. Pathological changes are degenerative in nature (although partially reversible), presumably due to repetitive microtrauma. For related tendinopathies, many experts discourage terms such as “Achilles tendinitis,” preferring, say, “Achilles tendinopathy” as a diagnosis (Khan et al., 2002).

Additionally, in 2009 a survey of members of the American Podiatric Medical Association revealed that plantar fasciitis was the most prevalent condition receiving treatment in podiatric clinics (Al Fischer Associates, 2003).

Scher et al. (2009) studied on United States Military reporting that typically plantar fasciitis affects middle aged or older people, women slightly more often than men.

Martin et al. (2014) in their reviewed past systematic review of 2008 updated that increased plantar fascia thickness was found to be associated with symptoms and altered compressive properties of the fat pad in those with plantar heel pain. Changes in plantar fascia thickness were found to be positively associated with changes in pain levels for individuals with plantar fasciitis receiving treatment. In individuals with general foot- and ankle-related disability, pain-related fear of movement was the strongest single contributor to disability. An area of future research may be fear-avoidance behaviors and their role in disability in individuals with plantar fasciitis.

Martin et al. (2014) explained in their updated review about the clinical course of heel pain/plantar fasciitis usually presents as a chronic condition, with symptom duration greater than 1 year prior to seeking treatment. In 2 retrospective cohort studies involving 432 individuals diagnosed with chronic plantar heel pain, the mean duration of symptoms ranged from 13.3 to 14.1 months.

Running was found to be a risk factor for developing plantar fasciitis. Other studies have also found plantar fasciitis to be common among runners, with increased arch height as a potential risk factor. Greater rates of increase in vertical ground reaction forces and a lower medial longitudinal arch were found in female runners with a history of plantar fasciitis (Martin et al., 2014). A systematic review by Butterworth et al. (2012) found a strong association between greater body mass index and chronic plantar heel pain in a nonathletic population. In assembly-line workers, risk factors for plantar fasciitis included time spent standing on hard surfaces, time spent walking, number of times jumping in and out of vehicles (for the truck/forklift drivers), and 4 to 7 years of factory work (Werner et al., 2010). When updating the previous information Martin et al. (2014) found a high-arch foot type and decreased ankle dorsiflexion range of motion were identified as risk factors for developing plantar fasciitis. Also, a positive association was found between hamstring tightness, leg-length discrepancy (with pain in the longer limb), and plantar fasciitis.

Patients with PF report pain and/or stiffness localized to their heel which may extend distally to the arch of the foot (Bennett et al., 1998). The typical patient describes symptoms during the first steps after rising in the morning described by Furey (1975). In most patients these symptoms vary in intensity and may settle or resolve after a variable period from a few steps to a few hours. In most cases, symptoms then

increase as the day progresses (Kwong et al., 1988; Kibler et al., 1991; Baxter, 1995). On palpation of the heel Kibler et al. (1991) found tenderness is focal and localized to the medial calcaneal origin of the plantar fascia.

Martin et al. (2014) in their recent systematic review on Plantar Fasciitis showed different physiotherapy techniques to treat patients. The available treatment options that could be beneficial are manual therapy, stretching, taping, foot orthoses, night splints, electrotherapy modalities, footwear, education and counselling for weight reduction, therapeutic exercise and neuromuscular re-education, dry needling, injection with cortisone and other intervention (extracorporeal shortwave therapy). While some of these interventions have been studied in patients with adhesive capsulitis, it is important to remember that not all clinical interventions have evidence to support their use in specific patient populations. Recall that evidence-based practice is best defined as the use of the best evidence available along with clinical experience while taking into consideration the unique needs of an individual patient.

Cleland et al. (2009) who compared the effects of iontophoresis and manual therapy, respectively, combined with exercise on clinical outcomes associated with plantar heel pain. The home exercise program consisted of calf and plantar fascia stretching. They found this home exercise programme is to be effective. They also have shown the effectiveness of soft tissue mobilisation of plantar fascia and calf in reducing pain and pain related symptoms in a significant extent.

Martin et al. (2014) recommended that clinicians should use manual therapy, consisting of joint and soft tissue mobilization, procedures to treat relevant lower extremity joint mobility and calf flexibility deficits and to decrease pain and improve function in individuals with heel pain/plantar fasciitis.

Evidence from 2 systematic reviews suggests stretching of the ankle and foot provides short-term clinical benefit for individuals with heel pain/plantar fasciitis. Landorf and Menz43 found no studies that compared the effect of stretching to no stretching in individuals with plantar heel pain (Landorf & Menz, 2008; Sweeting et al., 2011). The review by Landorf & Menz (2008) found that the addition of a heel pad to gastrocnemius/soleus and plantar aponeurosis stretching could improve clinical outcomes, and that plantar fascia stretching may be of more benefit than Achilles stretching. A more recent systematic review by Sweeting et al. (2011) concluded that

the main pain-relieving benefits of stretching appear to occur within the first 2 weeks to 4 months, but could not support one method of stretching over another as being more effective for reducing pain or improving function.

Osborne & Allison (2006) in their study found that a protocol of six treatments of acetic acid iontophoresis combined with taping provides greatest relief of the stiffness symptoms of PF. Low-Dye [a 1 inch zinc oxide (rigid) strapping that is non-stretchy; this can be found at most chemists, such as boots] taping provides a short term window of opportunity in the management of symptoms of PF (Radford et al., 2006). They investigated that if tapping is stopped the symptoms flair up again. But if any pharmaceutics (acetic acid or dexamethasone) are introduced through iontophoresis combined with taping, significant treatment effects persist at four weeks (Osborne & Allison, 2006). They recommended to study on the longer term treatment with taping seeing if there will be any effectiveness.

The results of a systematic review looking at the efficacy of taping on plantar heel pain (fasciosis) performed by van de Water & Speksnijder (2010) noted strong evidence for decreasing pain at 1-week follow-up, inconclusive results for change in level of disability, and evidence that taping can have an additional benefit when added to a stretching program. Similar results were found in the systematic review by Landorf & Menz (2008) as they found moderate evidence that taping was more effective than no taping at 1 week for reducing pain with first step and that taping was more effective than sham taping at improving pain at 1 week. However, taping was not more effective than no treatment at 1 week for improving function.

In patients with plantar fasciitis, Antipronation (low-Dye) taping was found to reduce pain and improve function over a 3-week period. Taping was not more effective than a medial longitudinal arch support (El Salam & Elhafz, 2010). Also, antipronation taping (augmented low-Dye) produced an immediate decrease in mean walking plantar pressure and pain when walking and jogging compared with the controls (Van Lunen et al., 2011).

Martin et al. (2014) again suggested that clinicians should use antipronation taping for immediate (up to 3 weeks) pain reduction and improved function for individuals with heel pain/plantar fasciitis. Additionally, clinicians may use elastic therapeutic tape

applied to the gastrocnemius and plantar fascia for short-term (1 week) pain reduction.

Smith et al. (2014) conducted a relevant study with 3 different groups (45 female participants, age range 18 to 40 years, 6 week intervention). They included a combined intervention of taping and lower limb muscle training. This was selected to reflect a tissue stress model approach to management whereby the short term use of external devices (such as taping) is advocated to alleviate tissue stress and then followed by conventional physical therapy techniques. The rigid anti-pronation taping technique (ALD) selected for this randomised controlled trial is a well-established and described technique which has previously demonstrated biomechanical effectiveness in plantar fasciitis. The strength of this randomised controlled trial is the inclusion of a comparative elastic anti-pronation taping technique.

Ferber & Benson (2011) studied healthy individuals and found that plantar fascia strain was reduced by 34% when walking in either the molded or nonmolded semi-custom foot orthoses.

In patients with plantar fasciitis, Chia et al. (2009) reported that both prefabricated and custom orthoses were useful in distributing rearfoot pressure, whereas heel pads increased rearfoot pressure. Bonanno et al. (2011) found that prefabricated foot orthoses were more effective at reducing pressure under the heel when compared to a silicon heel cup, soft foam heel pad, and heel lift in older people (greater than 65 years of age) with heel pain.

CHAPTER-III METHODOLOGY

This research was an experimental design to evaluate the effectiveness of adhesive ZnO_2 taping for the management of pain and other symptoms of the patients with plantar fasciitis. To identify the effectiveness of this treatment regime, Numeric Pain Rating Scale (NPRS) and Foot Pain Questionnaire were used as measurement tools for measuring the pain intensity.

3.1 Study Design

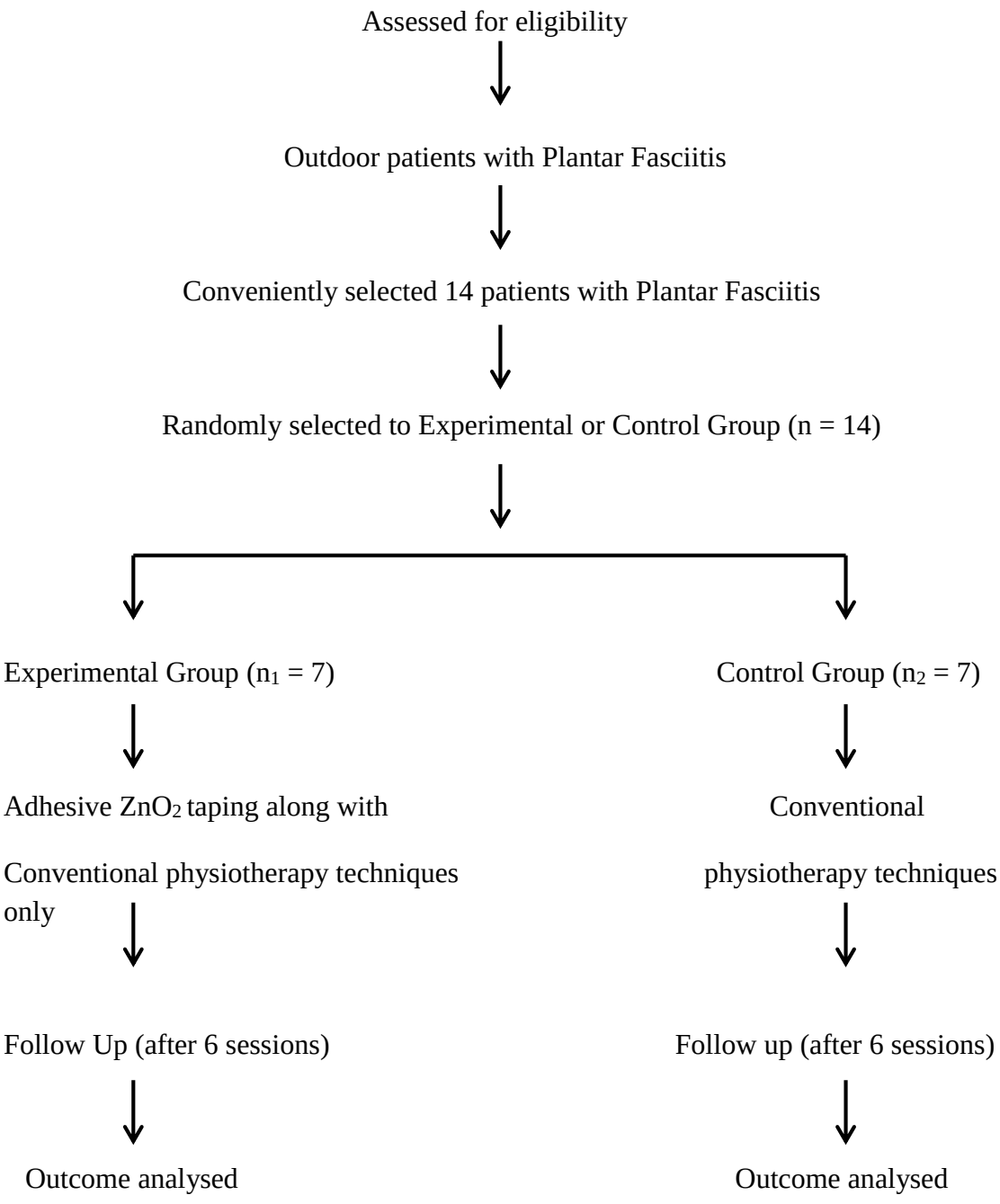
The study is designed using an experimental design quantitative research. According to Depoy & Gitlin (2013) the design could be shown by:

Experimental Group	:	R	O_1	X	O_2
Control Group	:	R	O_1		O_2

The study is an experimental between two subject designs. Adhesive ZnO_2 taping and conventional physiotherapy techniques will be applied to the experimental group and only conventional physiotherapy techniques will be applied to the control group.

A pre-test (before intervention) and post-test (after intervention) will be administered with each subject of both groups to compare the pain effects before and after the treatment.

Flow-chart of the phases of Randomized Controlled Trial



3.2 Treatment Regime

By three qualified physiotherapists who are expertized in adhesive ZnO_2 taping.

Experimental Group

a. Conventional Physiotherapy Techniques
- Soft Tissue Mobilization Technique (plantar fascia & foot) for 5 minutes
- Plantar Fascia and Tendo-Achilles Stretching for 5 repetitions
- Ultrasound Therapy for 5-7 minutes
- Footwear modification
- Education and counseling for losing weight

b. Adhesive ZnO_2 taping

Control Group

- Conventional Physiotherapy Techniques
  - Soft Tissue Mobilization Technique for 10 minutes
  - Plantar Fascia and Tendo Achilles Stretching for 5 repetitions
  - Ultrasound Therapy for 5-7 minutes
  - Footwear modification
  - Education and counseling for losing weight

Adhesive ZnO_2 Taping

Procedure

The subjects were treated with adhesive ZnO_2 taping for plantar fasciitis for 5 days. For this, participants was taken to a comfortable prone lying position with affected leg flexed and supported by the physiotherapist. Antipronation taping technique was applied to the affected foot/feet. Tape was applied initially to the lateral aspect of the dorsum of the foot, drawn across the plantar aspect of the foot and fixed to the medial arch to place the foot into inversion (Osborne & Allison, 2006).

Experimental group was treated with antipronation taping technique and advised to continue it for 48 hours. After 48 hours, they are advised to remove the tape by emerging the treated leg in comfortable warm water and follow the home advice.

3.3 Study Area

Musculoskeletal Outpatient Unit of Physiotherapy Department at CRP, Savar, Dhaka.

3.4 Study Population

The study population was the patients diagnosed as Plantar Fasciitis attended in the Musculoskeletal Outpatient Unit of Physiotherapy Department at CRP, Savar, Dhaka.

3.5 Sample Size

Sample size for this study was 14. Among them 7 participants were in experimental group and 7 participants in control group.

Sampling Technique

Simple Random sampling technique was used for data collection.

Subjects, who met the inclusion criteria, were taken as sample in this study. 14 patients with Plantar Fasciitis were selected conveniently from outpatient musculoskeletal unit of physiotherapy department of CRP, Savar and then 7 patients were randomly assigned to Experimental group comprising of treatment approaches of Adhesive ZnO_2 Taping along with conventional physiotherapy techniques and 7 patients to the Control group treated with only the conventional physiotherapy techniques for this study. The study was a single blinded technique. After the completion of sample collection, the researcher had randomly assigned the participants into experimental and control group, because it improves internal validity of experimental research. The samples was given numerical number C_1, C_2, C_3 etc. for the control group and E_1, E_2, E_3 etc. for experimental group. Total 14 samples were

included in this study, among them 7 patients were selected for the experimental group [received Adhesive ZnO_2 Taping along with conventional physiotherapy techniques] and rest 7 patients were selected for control group [received only the conventional physiotherapy techniques].

3.6 Inclusion criteria

- Diagnosed plantar fasciitis patients.
- Pain in either one heel or both.
- Age group 18 to 75 years of age.
- Both male & female patients were included.
- Females were given more priority as the prevalence of plantar fasciitis is more amongst females.
- Patients who had found less changes in symptoms during previous sessions of treatment.

3.7 Exclusion Criteria

- Patients with other health conditions of musculoskeletal origin.
- Specific pathology from trauma or other coexisting symptomatic foot pathology requiring treatment.
- History of calcaneal stress fracture, gout, bone tumour, osteomyelitis.
- Patient having hypersensitivity or irritation to tape.
- Patients who were taking analgesics during the study.
- Surgery for PF within the previous six months.
- Any previous or current history of psychiatric or psychological treatment.
- New orthotics or corticosteroid treatment in the previous month.

3.8 Data Processing

3.8.1 Data Collection Tools

- Record or Data collection form
- Informed Consent
- Structured questionnaire (both open ended and close ended questionnaire).
- Numeric Pain Rating Scale (NPRS) – for measuring pain.
- Foot Pain Questionnaire
- Pen, Papers

3.8.2 Measurement Tools

Numeric Pain Rating Scale (NPRS) McCaffery & Pasero (1999) used a numeric scale to rate the pain status experienced by patients. It is known as Numeric Pain Rating Scale. The scale is a 10cm long scale ranging from 0-10. Here a zero (0) means no pain, 1-3 indicates mild pain, 3-5 indicates that pain is in moderate state and 6-10 is worst possible pain feeling experienced by patients.

Foot Pain Questionnaire This is a set of questionnaire that has been designed to provide information regarding how the patient's intensity foot pain affects his/her everyday life (Giannakopoulos, 2011).

Windlass Test Windlass Test or Windlass Mechanism is the test to detect plantar fasciitis among the patients suffering from plantar heel pain. The test can be done in both non-weight bearing and weight-bearing positions. The test describes when the patient is in standing while keeping the toes hanging off the edge of a stool and dorsiflexion of the first metatarsophalangeal joint is performed passively; a provocation to pain is said to be positive Windlass Test (De Garceau et al., 2003).

3.8.3 Data Collection Procedure

The study procedure has conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at the department, the patients were assessed by a qualified physiotherapist. 6 sessions of treatment was provided for every subject. 14 subjects were chosen for data collection according to the inclusion criteria. The researcher divided all participants into two groups and was coded C_1, C_2, C_3, C_4, C_5, C_6, C_7 for control group and E_1, E_2, E_3, E_4, E_5, E_6, E_7 for experimental group.

Data was gathered through a pre-test, intervention and post-test and the data was collected by using a written questionnaire form which has been formatted by the researcher. Pre-test was performed before beginning the treatment and the intensity of pain was noted with NPRS score and foot pain questionnaire form. The same procedure was performed to take post-test at the end of 6 sessions of treatment. Researcher provided the assessment form to each subject before starting treatment and after 6 sessions of treatment patient was instructed to put mark on the line of NPRS according to their intensity of pain. The researcher has collected the data of both experimental and control group in front of the qualified physiotherapist in order to reduce the biasness. At the end of the study, non-parametric Mann-Whitney *U*-test has been done for statistical analysis.

3.9 Data Analysis

Statistical analysis has performed by using Microsoft Excel 2013 and scientific calculator.

3.9.1 Statistical Test

For the significance of the study, a statistical test was carried out. Statistical analysis refers to the well-defined organization and interpretations of the data by systemic and mathematical procure and rules (DePoy & Gitlin, 2013).

The Mann-Whitney *U*-test was done for the analysis of the reduction of pain after six session treatment of both control and experimental groups.

According to Hicks (2009), experimental studies with the different subject design where two groups are used and each tested in two different conditions and the data are either ordinal and interval/ratio should be analysed with Mann-Whitney *U* test. This test is used when the experimental design compares two separate or different unmatched groups of subjects participating in different conditions. When calculating the Mann-Whitney *U*-test, we find the value called *U* which we then look up in the probability tables associated with the Mann-Whitney *U*-test to find out whether the *U* value represents a significant difference between the results from two groups.

The formula of Mann-Whitney *U*-test:

$$U = n_1 n_2 \frac{n_x(n_x + 1)}{2} - T_x$$

n_1 = the number of the subjects in trail group

n_2= the number of the subject in control group

n_x= the number of the subjects of the group with larger rank total

T_x= the larger rank total

3.9.2 Level of Significance

In order to find out the significance of the study, the "p" value was calculated. The p values refer to the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A p value is called level of significance for an experiment and a p value of <0.05 was accepted as significant result for health service research. If the p value is equal or smaller than the significant level, the results are said to be significant.

3.10 Ethical Issues

The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. The proposal of the dissertation including methodology was presented to the Institutional Review Board (IRB). Then the proposal of the dissertation including methodology was approved and obtained permission from the concerned authority of ethical committee of Bangladesh Health Professions Institute (BHPI). Again before the beginning of the data collection, researcher has obtained the permission from the concerned authorities ensuring the safety of the participants. The researcher strictly maintained the confidentiality regarding participant's condition and treatments.

3.11 Informed Consent

The researcher has obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they have the right to meet with outdoor doctor if they think that the treatment is not enough to control the condition or if the condition become worsen. The participants were also informed that they are completely free to decline answering any question during the study and are free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study did not affect their treatment in the physiotherapy department and they still had got the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

CHAPTER-IV RESULTS

Mean Age of the Participants

Experimental Group		Control Group	
Subjects	**Age (Years)**	**Subjects**	**Age (Years)**
E_1	35	**C_1**	32
E_2	45	**C_2**	35
E_3	42	**C_3**	37
E_4	63	**C_4**	42
E_5	38	**C_5**	57
E_6	41	**C_6**	52
E_7	52	**C_7**	45
Mean Age	**45 years**	**Mean Age**	**43 years**

Table no. 1: Mean age of the participants.

Age Range

The majority of the participants 72% (n=10) were in both "31-40" and "41-50" years of age groups, followed by 21% (n=3) were in "51-60" years, 7% (n=1) were in "61-70" years of age group.

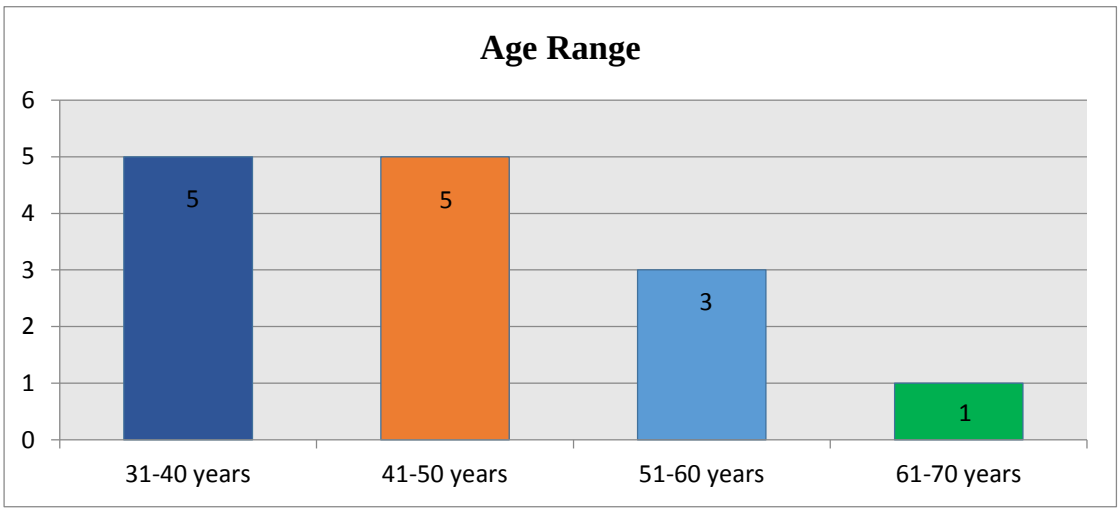


Figure – 1: Age Range of the Participants with percentage.

Sex of the Participants

14 Patients with Plantar Fasciitis were included as sample of the study, among them 36% (n=5) were Male and 64% (n=9) were Female.

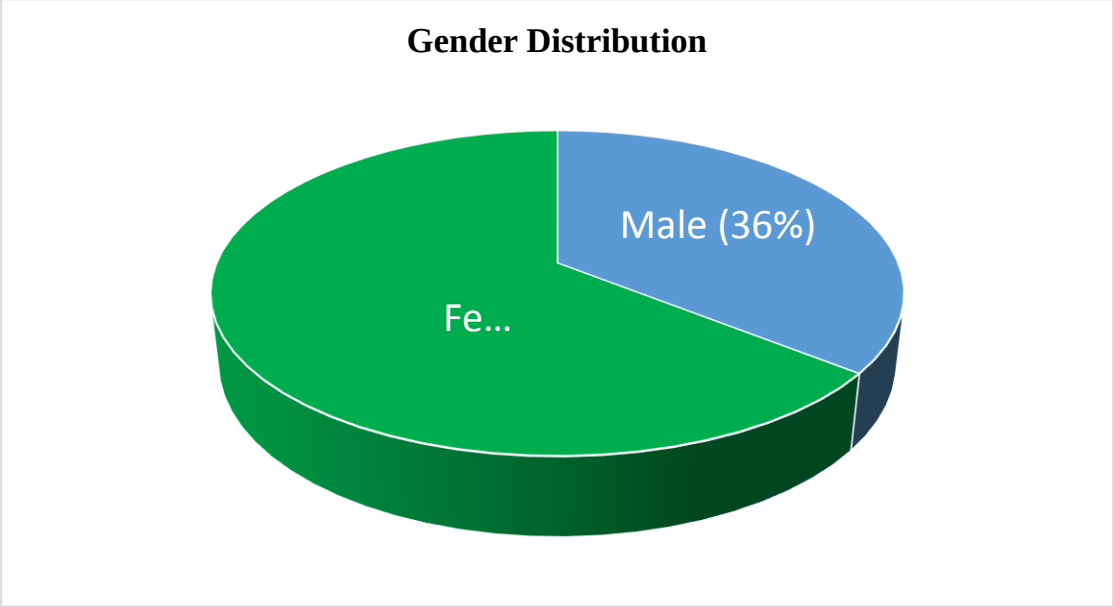


Figure – 2: Gender Distribution with percentage.

On the other hand, In Experimental Group 21% (n=3) were Male and 29% (n=4) were Female and in Control Group 36% (n=5) were Male and 14% (n=2) were Female.

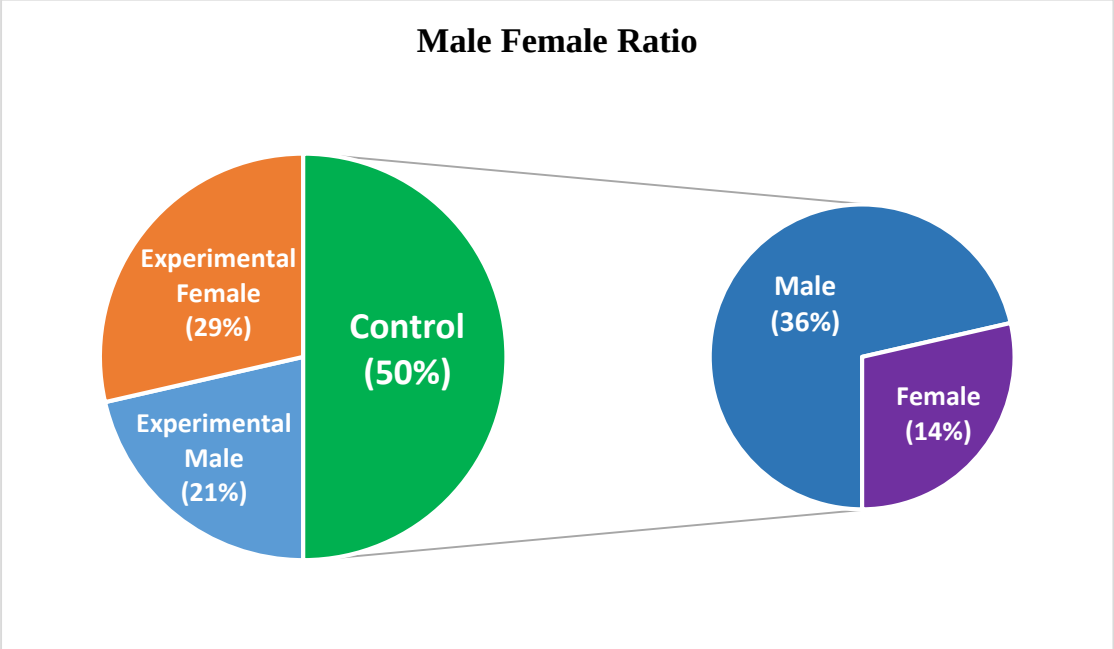


Figure-3: Male-Female Ratio of Experimental and Control groups.

Frequency of Affected Leg

Among the 14 participants 50% (n=7) were Left side affected, 36% (n=5) were Right side affected and 14% (n=2) had both legs affected.

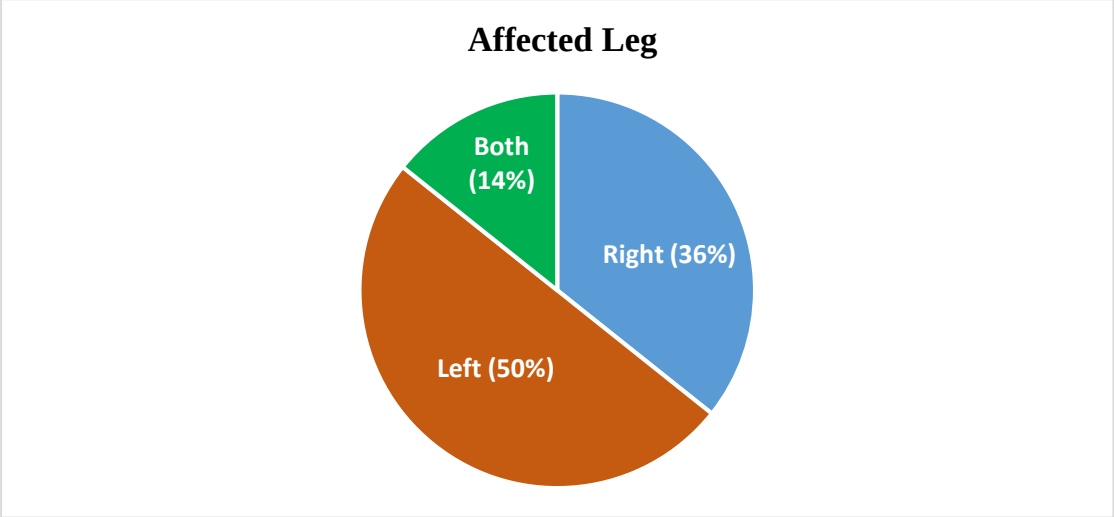


Figure-4: Frequency of Affected Leg.

Frequency of taking treatment previously

All the patient 100% (n=14) took anti-inflammatory for plantar heel pain. Among them 43% (n=6) took Rest, 29% (n=4) received Physiotherapy and New Shoes, 7% (n=1) elevated leg and 7% (n=1). None of them had any surgery or other treatment.

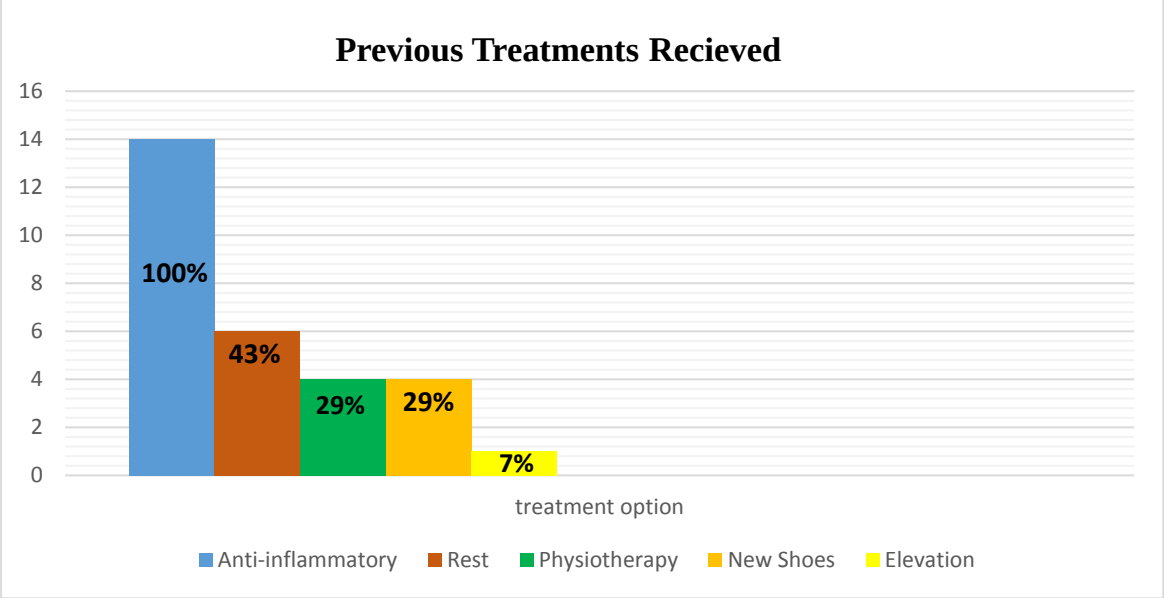
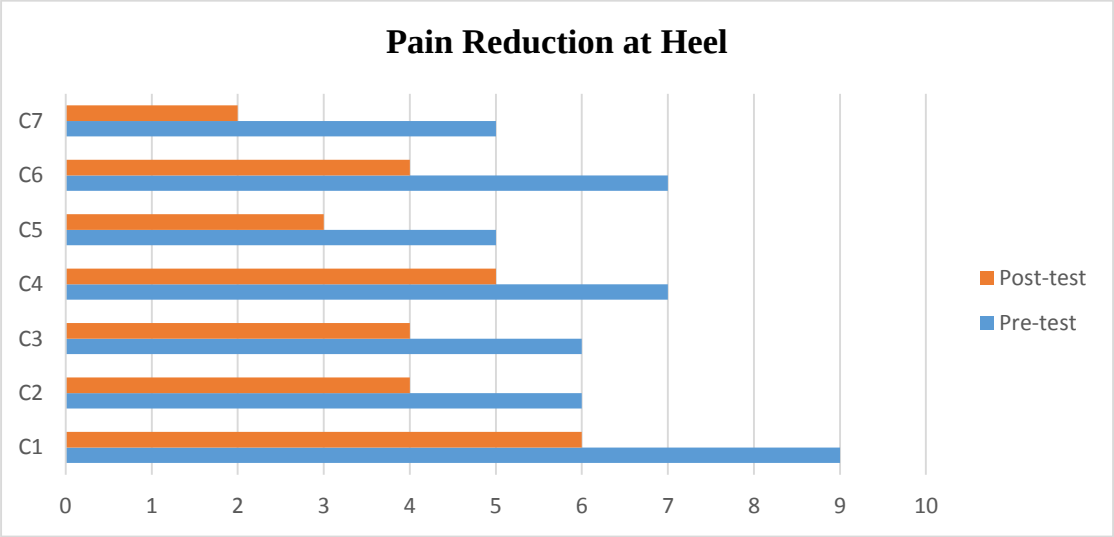


Figure-5: Frequency of taking treatment previously.

Total 14 (fourteen) patients with Plantar Fasciitis were enrolled in the study. All subjects of both experimental and control group scored their pain on Numeric Pain Rating Scale (NPRS) before and after completing treatment.

Reduction of Overall Heel Pain in Control Group

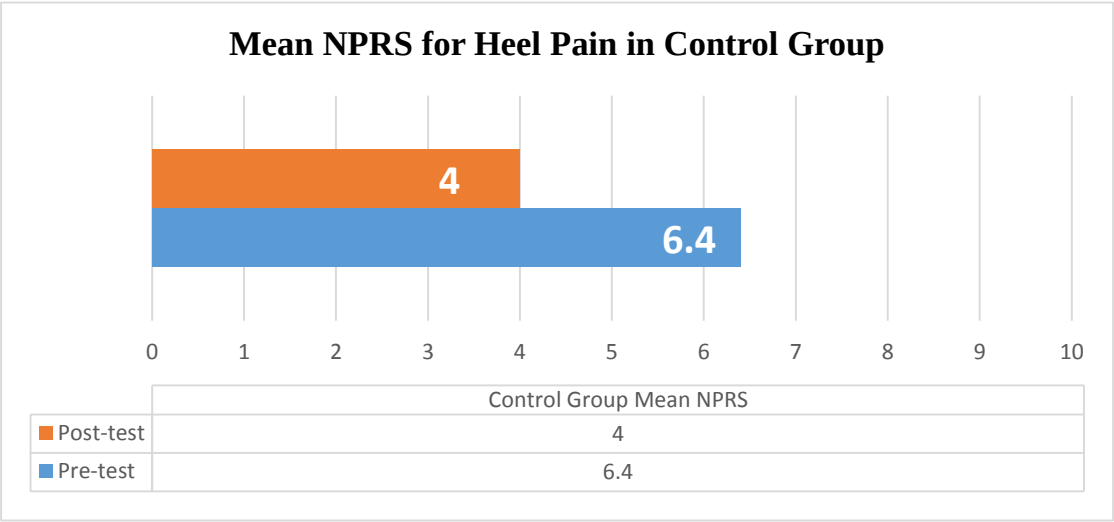
Reduction of pain of control group during pre-test and after completing 6 sessions is shown in the following diagram.



Figure–6: Reduction of Heel Pain on NPRS.

Mean Reduction of Overall Heel Pain in Control Group

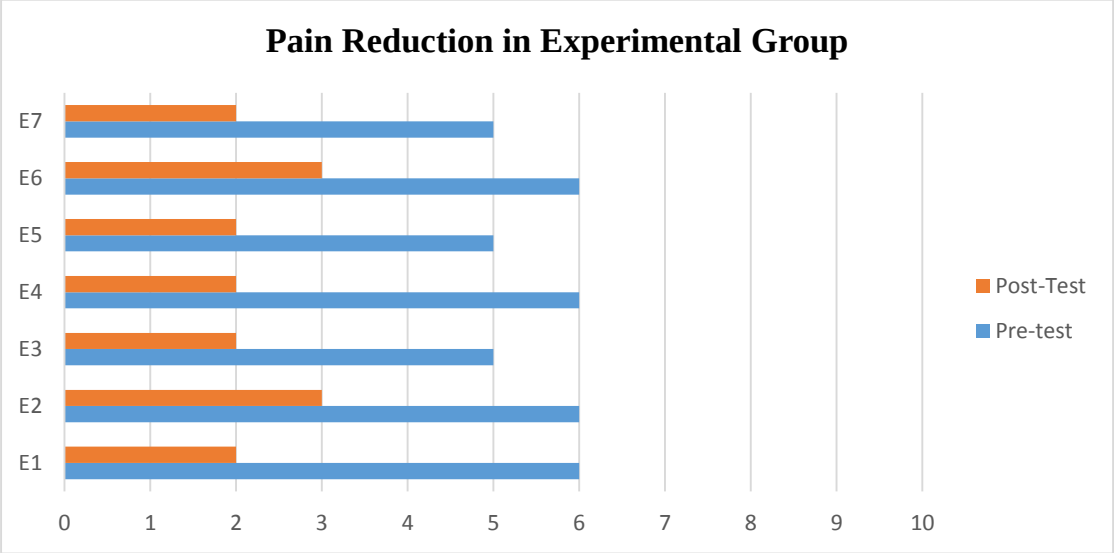
The mean pain reduction of control group between pre-test and post-test is being showed in the following diagram.



Figure–7: Mean Reduction of Neck Pain on NPRS.

Reduction of Overall Heel Pain in Experimental Group:

Reduction of pain of experimental group during pre-test and after completing 6 sessions is shown in the following diagram.



Figure–8: Reduction of Overall Pain at Heel in Experimental Group.

Mean Reduction of Overall Heel Pain in Experimental Group:

The mean pain reduction of experimental group between pre-test and post-test are being showed in the following diagram.

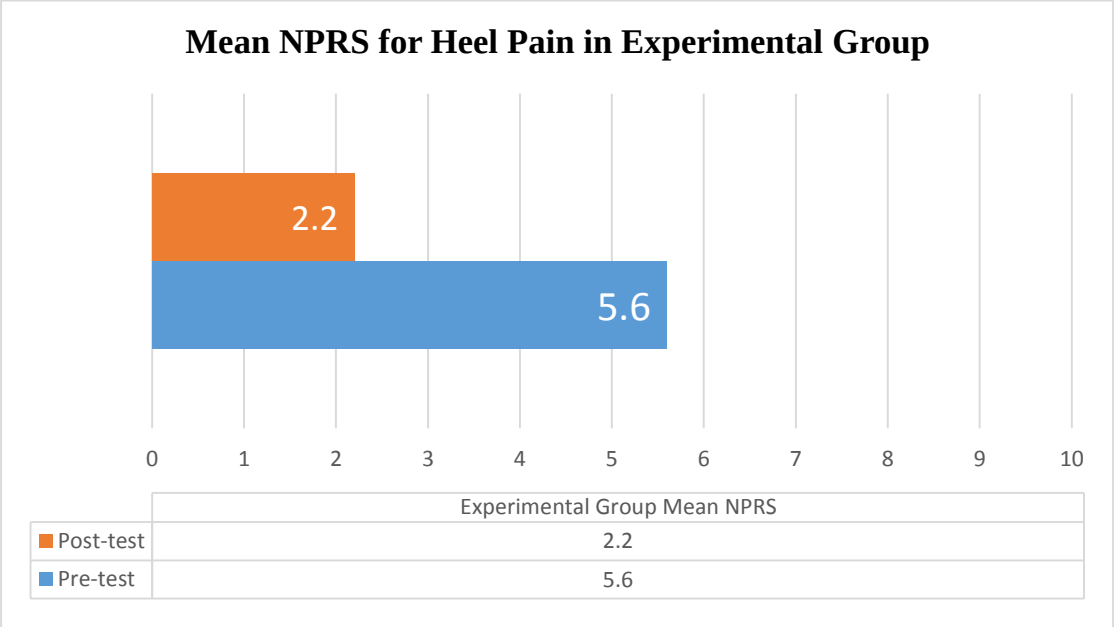


Figure -9: Mean NPRS for Heel Pain in experimental Group.

Mean Difference of Overall Pain Reduction in Control Group

Control Group	Heel Pain	
	Pre Test	Post Test
Mean	6.4	4
Mean Difference	**2.4**	

Table no. 2: Mean Difference of overall pain reduction in control group.

Mean Difference of Overall Pain Reduction in Experimental Group

Experimental Group	Heel Pain	
	Pre Test	Post Test
Mean	5.6	2.2
Mean Difference	**3.4**	

Table no. 3: Mean Difference of overall pain reduction in experimental group.

Mean Difference of Pain Reduction

The following bar chart is showing the comparison of post-test pain reduction among control & experimental groups.

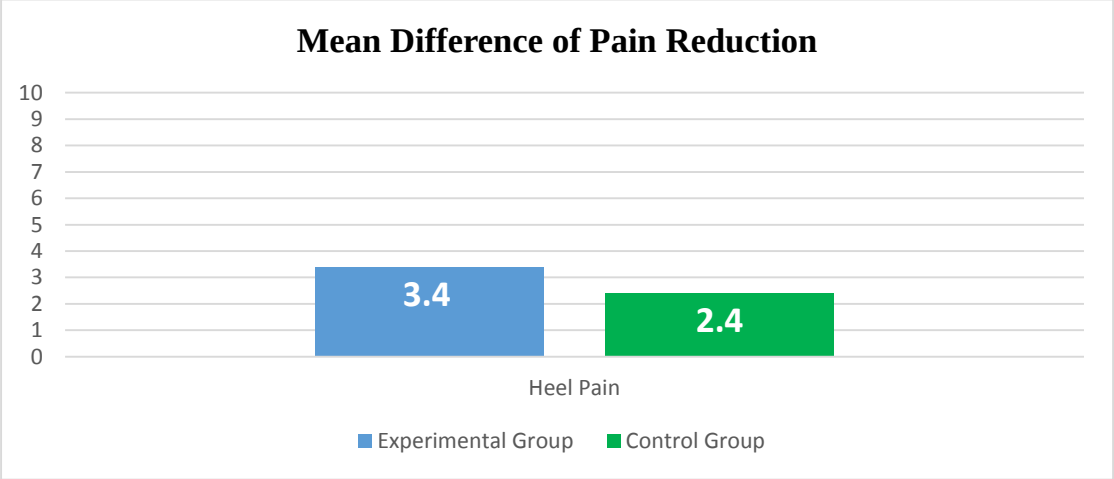


Figure – 10: Mean Difference of Overall Pain Reduction.

Variables in the study statistically significance at the following level of significance

No	Variables	Observed '*U*' value	Critical value of *U* at p≤ 0.05 is	Significance (Value ≤ 11)
1	Resting Pain Reduction	19.3	11	Not significant (*U*>11)
2	Pain Reduction during Fast Walking	8	11	Significant (*U*<11)
3	Pain Reduction in Windlass Test	8	11	Significant (*U*<11)
4	Reduction of Palpable Pain	10	11	Significant (*U*<11)

Table no. 4: *U*-value at various level of probability.

CHAPTER-V DISCUSSION

The result of this study reported that adhesive ZnO_2 taping along with conventional physiotherapy techniques may be beneficial for patients with Plantar Fasciitis.

The analysis of significance was carried out by using non-parametric Mann-Whitney *U* test (U=19.7; U=8; U=8; U=10; $U \leq 11$; $n_1 = n_2 = 7$) to compare the effectiveness of adhesive ZnO_2 taping along with conventional physiotherapy techniques compared to conventional physiotherapy techniques alone for the management of pain and other symptoms of the patients with plantar fasciitis.

By using non-parametric Mann-Whitney *U* test on the data the results were found to be significant ($p < 0.05$ for a one-tailed hypothesis). The null hypothesis can therefore be rejected. This means that adhesive ZnO_2 taping along with conventional physiotherapy techniques is more effective than conventional physiotherapy techniques alone for reducing pain and other symptoms in patients with Plantar Fasciitis.

In this study the total number of participants was 14. Among them 36% (n=5) were male and 64% (n=9) were female. Participants were distributed to two groups, each containing 7 individuals. On the other hand, In Experimental Group 21% (n=3) were Male and 29% (n=4) were Female and in Control Group 36% (n=5) were Male and 14% (n=2) were Female.

The majority of the participants 36% (n=5) were in “31-40” years and “41-50” years of age followed by 21% (n=3) were in “51-60” years, 7% (n=1) were in “61-70” years of age range group.

The mean age for control and experimental groups were 43 and 45 years with a mean difference of only 2 years.

Osborne & Allison (2006) conducted a RCT with the age range 18 to 75 years and a mean age difference 2 years which completely support my criteria for inclusion and randomization of groups.

For comparison, we included a combined intervention of taping and lower limb muscle training. This was selected to reflect a tissue stress model approach to management whereby the short term use of external devices (such as taping) is

advocated to alleviate tissue stress and then followed by conventional physical therapy techniques. The rigid anti-pronation taping technique selected for this randomised controlled trial is a well-established and described technique which has previously demonstrated biomechanical effectiveness in plantar fasciitis. The strength of this randomised controlled trial is the inclusion of a comparative elastic anti-pronation taping technique. Whereas Smith et al. (2014) conducted a relevant study with 3 different groups (45 female participants, age range 18 to 40 years, 6 weeks intervention) combining adhesive anti-pronation taping technique and leg muscles strengthening which was effective.

As we discuss about the mean of overall pain reduction between control and experimental groups I have found the difference 1. The mean pain reduction of control group was 2.4 and mean pain reduction of experimental group was 3.4 in NPRS. This denotes the bare eye significance of the study but not in a greater or clear extent in the view of statistics. To make the study statistically significant non-parametric Mann-Whitney *U*-test was used. While considering the main 4 (four) variables for measuring the level of significance the level of resting pain, pain during fast walking, pain in Windlass Test and palpable pain the values of *U* were calculated. They were as serially 19.3, 8, 8, and 10. Among the four *U* values, except the level of resting pain reduction ($U=19.3$, $U>11$, $p<0.05$) rest of the three variables have found to be significant at 0.05 probability level.

This result shows more statistical & clinical effectiveness of Adhesive ZnO_2 along with conventional physiotherapy techniques than conventional physiotherapy techniques alone for the patients with plantar fasciitis.

Limitations

The study was conducted with 14 patients of Plantar Fasciitis, which was a very small size of samples in both groups and was not sufficient enough for the study to generalize its findings to the wider population and variable patient mass of this condition.

There was no system of long term follow-up after the post-test of the study.

In this study, the researcher could not maintain external validity but maintained internal validity during data collection due to time limitation. It was limited by the fact daily activities of the subject were not monitored which could have influenced.

In this study, interventions were given by 4 clinical physiotherapists. So, the inter-rater reliability was not maintained due to lack of time and patient's availability.

The research was carried out at the clinical settings of Outpatient treatment service, musculoskeletal unit of CRP, Savar, such a small environment, so it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blind method was used in this study.

There was no available research done in this area in Bangladesh. So, relevant information about Plantar Fasciitis patient with specific intervention for Bangladesh was very limited in this study.

CHAPTER-VI CONCLUSION and RECOMMENDATION

6.1 Conclusion

The study was an experimental design to examine the effectiveness of Adhesive ZnO_2 Taping along with Conventional Physiotherapy Techniques for Plantar Fasciitis, where the results of the study have demonstrated that the combination technique is significantly capable of producing beneficial effects on pain reduction, pain related symptoms minimization in patients with Plantar Fasciitis.

Reduction of pain and associated symptoms were greater in the patients treated with combination of Adhesive ZnO_2 Taping along with Conventional Physiotherapy Techniques than those are treated with Conventional Physiotherapy Techniques alone.

6.2 Recommendation

Despite the limitations of the study particularly small sample size, the results of the study give further motivation to controlled clinical trials with sufficient time and sample size. Future study should include a multiple blinding procedure of data collection to maintain intra-rater reliability. It could be also suggested that for future studies can be carried out with comparable patient variables with emphasis on ergometrics and functional levels.

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ANNEXURE

1. Informed Consent (Bangla)
2. Questionnaire (Bangla)
3. Informed Consent (English)
4. Questionnaire (English)
5. Figure of Plantar and Medial Views of the Foot Demonstrating the Origin and Insertion of the Plantar Fascia and the Location of Nerves in Proximity to the Heel
6. Calculation of non-parametric Mann-Whitney *U*-test
7. Statistical Probability Table
8. Permission Letter

সম্মতিপত্র

আসসালামুয়ালাইকুম/নমস্কার, আমি মোঃ মাহফুজ হোসেন, ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা অনুষদের অধিভুক্ত বাংলাদেশ হেলথ প্রফেশনস্ ইন্সিটিউট এর বি.এস.সি ইন ফিজিওথেরাপী কোসের ৪র্থ বর্ষের একজন শিক্ষার্থী। অধ্যায়নের অংশ হিসেবে আমাকে একটি গবেষণা সম্পাদন করতে হবে এবং এটা আমার প্রাতিষ্ঠানিক কাজের একটা অংশ। নিম্নোক্ত তথ্যাদি পাঠ করার পর অংশগ্রহণকারীদের গবেষণায় অংশগ্রহনের জন্য অনুরোধ করা হলো।

আমার গবেষণার বিষয় হল "প্লানটার ফাসাইটিস রোগীদের ক্ষেত্রে আঠালো জিঙ্ক অক্সাইড টেপের কার্যকারিতা"। এই পরীক্ষামূলক গবেষণার মাধ্যমে আমি একটি অনুমান পরীক্ষা করব যে, প্লানটার ফাসাইটিস রোগীদের ক্ষেত্রে শুধুমাত্র প্রচলিত ফিজিওথেরাপি অপেক্ষা প্রচলিত ফিজিওথেরাপির সাথে আঠালো জিঙ্ক অক্সাইড টেপ বেশী কার্যকর। আমার গবেষণার উদ্দেশ্য হলো থেরাপী দেবার পূর্বে ও পরে রোগীদের ব্যথা পরিমাপ করা। আমি যদি আমার গবেষণাটি সার্থকভাবে সম্পূর্ণ করতে পারি তবে যেসব রোগীরা প্লানটার ফাসাইটিস রোগে ভুগছেন তারা উপকৃত হবেন এবং এটি হবে একটি পরীক্ষামূলক প্রমাণ।

গবেষণাটি সম্পাদনের জন্য, আমার তথ্য সংগ্রহ করা প্রয়োজন হবে। গবেষণার ক্ষেত্র বিবেচনা করে আপনার মাঝে আমার গবেষণায় অংশগ্রহণ করার জন্য প্রয়োজনীয় বৈশিষ্ট্য লক্ষ্য করা গেছে। এজন্য, আপনি আমার গবেষণার একজন সম্মানিত অংশগ্রহণকারী হতে পারেন এবং আমি আপনাকে আমার গবেষণায় অংশগ্রহন করতে অনুরধ জানাচ্ছি।

আমি প্রতিজ্ঞা করছি যে, এই গবেষণা আপনার জন্য ঝুঁকিপূর্ণ হবে না অথবা আপনার কোন ক্ষতি করবে না। গবেষণা চলাকলীন সময়ে কোন রকম দ্বিধা বা ঝুঁকি ছাড়াই যেকোন সময়ে আপনি এটাকে বাদ দিতে পারবেন। এই গবেষণার প্রাপ্ত তথ্য সম্পূর্ণভাবে গোপনীয় থাকবে এবং অংশগ্রহণকারীর ব্যাক্তিগত তথ্য অন্য কোথাও প্রকাশ করা হবে না।

যদি আপনার গবেষণা সম্পর্কে কোনো জিজ্ঞসা থাকে তবে আপনি অনুগ্রহপুবক যোগাযোগ করতে পারেন গবেষক মোঃ মাহফুজ হোসেন অথবা নাসিরুল ইসলাম, সহযোগী অধ্যাপক, ফিজিওথেরাপি বিভাগ বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩ এর সাথে।

শুরু করার আগে আপনার কি কোন প্রশ্ন আছে ?

আমি কি শুরু করতে পারি ?

☐ হ্যা ☐ না

অংশগ্রহণকারীর স্বাক্ষর ও তারিখ .....

গবেষকের স্বাক্ষর ও তারিখ .....

সাক্ষীর স্বাক্ষর ও তারিখ .....

প্রশ্নাবলী (বাংলা)

পর্ব-ক (১): ব্যক্তিগত তথ্যাবলী

এই প্রশ্নপত্রটি গড়ে তলা হয়েছে প্লানটার ফাসাইটিস রোগীদের ব্যথা পরিমাপ করার জন্য। ব্যক্তিগত তথ্যাবলী অংশটি ফিজিওথেরাপিস্ট কালো/নীল কলমের দ্বারা পূরণ করবেন।

রোগীর কোড নং:

তারিখ:

১. রোগীর নাম:

২. বয়স:

৩. লিঙ্গ: i. মহিলা ii. পুরুষ

৪. ঠিকানা:

৫ পেশা:

i. গৃহিণী
ii. চাকুরীজীবী
iii. ব্যবসায়ী
iv. অবসরপ্রাপ্ত
v. অন্যান্য

পর্ব-ক (২): বৈষয়িক তথ্যাবলী

১. কি সমস্যার কারণে আজ আপনি ফিজিওথেরাপিস্ট এর কাছে এসেছেন? (সঠিক জবাবটিতে টিক ☐ চিহ্ন দিন)

i. ব্যথা
ii. অস্বস্তিকর জুতা পরিধান
iii. অস্থায়িত্ব
iv. অঙ্গবিকৃতি

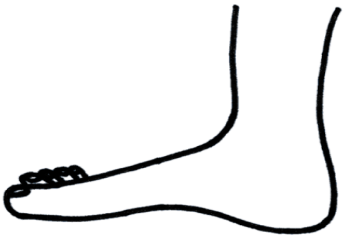
v. মচকানো

vi. সাম্প্রতিক আঘাত

২. আপনার বর্তমান পায়ের সমস্যা কতদিন ধরে? _____

৩. আপনার কোন পায়ে সমস্যা? ডান/বাম/উভয়

- ব্যথার ব্যাপারে, পায়ের তালুর যে অংশে ব্যথা সবচেয়ে বেশী নিচের চিত্রের সেই স্থানটি তীর চিহ্নের সাহায্যে সনাক্ত করুন।
- একের অধিক স্থানে ব্যথা থাকলে সবগুলো স্থান সনাক্ত করুন সবচেয়ে বেশী থেকে কমের ক্রমানুসারে (#১, #২, #৩ ইত্যাদি চিহ্ন ব্যবহার করতে পারেন)।
- যদি উভয় পা সংশ্লিষ্ট থাকে তাহলে ডান (R) – বাম (L) লিখে সনাক্ত করুন।



৪. ০-১০ ক্রমের একটি স্কেলে আপনার ব্যথা কে কত নম্বর দিয়ে সনাক্ত করবেন?

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৫. কোন অবস্থায় আপনার সমস্যা বেশী অনুভূত হয়? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

i. বসে থাকলে

ii. দাঁড়িয়ে থাকলে

iii. উভয় অবস্থায়

৬. আপনার সমস্যাটির অগ্রগতি কেমন? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

i. উন্নতির দিকে

ii. অবনতির দিকে

iii. অপরিবর্তিত

৭. আপনার সমস্যাটি কখন অনুভূত হয়? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

i. জুতা পরা অবস্থায়

ii. খালি পায়ে

iii. উভয় অবস্থায়

৮. আপনার কাজের কত শতাংশ নিম্নের অবস্থায় করেন?

- দাঁড়িয়ে _____% এবং
- বসে _____%

৯. আপনার বর্তমান সমস্যার কারণে আপনি কী কী কাজ উপভোগ করতে পারছেন না?_____

_____

১০. এখানে আসার আগে পর্যন্ত আপনি কী কী ধরনের চিকিৎসা নিয়েছেন? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

i. ব্রেস

ii. ফিজিওথেরাপি

iii. চাকরি পরিবর্তন

iv. বিশ্রাম

v. নতুন জুতা

vi. বরফ চিকিতসা

vii. পা উচু করে রাখা

viii. ইনজেকশন

ix. মেরুদণ্ডের/অস্থিসন্ধির বিশেষ চিকিতসা

x. প্রদাহ নিরোধকারী পথ্য

xi. অর্থটিক জুতা

১১. আপনার সমস্যাটি কি আঘাতজনিত? হ্যাঁ/না। হ্যাঁ হলে কোন ধরণের?_____

১২. আপনার ব্যথা ঠিক কোথায়?

i. ব্রিদ্ধাঙ্গুল

ii. কনিষ্ঠ আঙ্গুল

iii. মধ্য পা

iv. পশ্চাত পা

v. গোড়ালি

১৩. আপনার ব্যথা কতদিন ধরে? _____

১৪. আপনার ব্যথা দিনের কোন ভাগে বেশী বোধ হয়?

i. সকাল

ii. সন্ধ্যা

iii. সারাদিন

১৫. কি করলে ব্যথা কম বোধ করেন? _____

১৬. কি করলে ব্যথা বেশী বোধ করেন? _____

১৭. আপনি কোন অর্থটিক জুতা/ডিভাইস ব্যবহার করেন? হ্যাঁ/না|

১৮. আপনার নিজের কিংবা আপনার পরিবারের কারও ডায়াবেটিস এর ইতিহাস আছে? হ্যাঁ/না। যদি থাকে তাহলে আপনি কি ইনসুলিন বা মুখে কোন পথ্য গ্রহণ করেন? হ্যাঁ/না|

১৯. আপনার পায়ের মাপ কি সাম্প্রতিক সময়ে পরিবর্তন হয়েছে? হা/না। যদি হয়ে থাকে তাহলে ব্যাখ্যা করুন

_____

চিকিতসার পূর্বে ব্যথার পরিমান

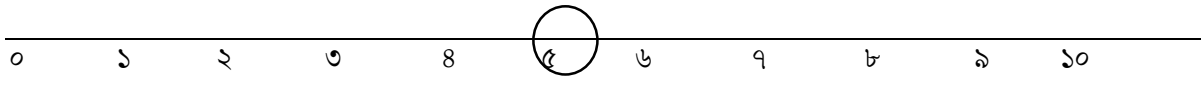
পর্ব-খ: ব্যথার পরিমাণ।

এই প্রশ্নাবলী প্লানটার ফাসাইটিস রোগীদের জন্য পরিকল্পনা করা হয়েছে। প্রশ্নপত্রের এই অংশটি রোগী নিজে পূরণ করবেন কালো না নীল করম দ্বারা। রোগীর কোন প্রশ্নের মানে বুঝতে না পারলে, ফিজিওথেরাপিস্টকে নির্দিষ্ট অংশের অর্থ পরিষ্কার করতে অনুরোধ করা হল।

McCaffery এবং তার সহযোগীরা (১৯৯৯) রোগীদের ব্যথা অভিজ্ঞতা ব্যখ্যা করার জন্য একটি সংখ্যাসূচক ব্যথা নির্ধারক ব্যবহার করেন। এটা সংখ্যাসূচক ব্যথা নির্ধারক স্কেল হিসাবে পরিচিত হয়। এখানে স্কেলে শূন্য (০) মানে কোন ব্যথা নেই (১-৩) মানে হালকা ব্যথা (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

সরলরেখা ব্যথা পরিস্থিতি উপস্থাপন করে, বাম হাত দিকে শূন্য (০) কোন ব্যথা এবং ডান হাত দিকে দশ (১০) প্রতিনিধিত্ব করে তীব্র ব্যথা মানে প্রতিনিধিত্ব করে। নিম্নলিখিত প্রশ্নে আপনার ব্যথার পরিমান লাইন চিন্হিত করুন। আপনার উত্তর দেয়ার সুবিধার্থে একটি নমুনা দেয়া হল।

ধরুন, কোন প্রশ্নের জবাবে আপনার ব্যথার পরিমাণ সহনীয় বলে মনে করছেন যেটা সংখ্যাসূচক ব্যথা নির্ধারক স্কেলে ৪ থেকে ৬ এর মাঝে অবস্থান করে। এখন আপনার উত্তর যদি ৫ হয় তাহলে কলম দিয়ে স্কেলের ৫ চিহ্নিত অংশে নিম্নে দেখানো পদ্ধতিতে বৃত্ত আঁকুন।



১. বিশ্রামরত অবস্থায় আপনার ব্যথার পরিমান কত ?

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

২. বলপূর্বক পায়ের পাতা উপরের দিকে নেয়ার পর আপনার ব্যথার পরিমান কত?

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৩. জোরপূর্বক পায়ের পাতা কুঁচকানোর পর আপনার ব্যথার পরিমান কত?

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৪. হাঁটার সময় পর্যায়ক্রমে অতিরিক্ত গতিতে হাঁটলে আপনার ব্যথার পরিমান কত?

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৫. বিছানা কিংবা টুল এর প্রান্তে পা ঝুলিয়ে বসে ব্রিদ্ধাঙ্গুল উপরের দিকে নেয়ার পরে আপনার ব্যথার পরিমান কত? (Windlass Test)

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৬. বলপূর্বক বৃদ্ধাঙ্গুল উপরের দিকে নেয়ার পর আপনার ব্যথার পরিমান কত?

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৭. প্রভাবিত এলাকায় স্পর্শ করলে আপনার ব্যথার পরিমান কত?

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

প্রশ্নাবলী (বাংলা) (চিকিৎসা পরবর্তী)

পর্ব-ক (১): ব্যক্তিগত তথ্যাবলী

এই প্রশ্নপত্রটি গড়ে তলা হয়েছে প্লানটার ফাসাইটিস রোগীদের ব্যথা পরিমাপ করার জন্য। ব্যক্তিগত তথ্যাবলী অংশটি ফিজিওথেরাপিস্ট কালো/নীল কলমের দ্বারা পূরণ করবেন।

রোগীর কোড নং:

তারিখ:

১. রোগীর নাম:

২. বয়স:

৩. লিঙ্গ: i. মহিলা ii. পুরুষ

৪. ঠিকানা:

পর্ব-ক (২): বৈষয়িক তথ্যাবলী

১. গত ৬ দিনের চিকিতসার পর ০-১০ ক্রমের একটি স্কেলে আপনার ব্যথা কে কত নম্বর দিয়ে সনাক্ত করবেন?

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

২. গত ৬ দিনের চিকিৎসার পর আপনার সমস্যাটির অগ্রগতি কেমন? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

iv. উন্নতির দিকে

v. অবনতির দিকে

vi. অপরিবর্তিত

৩. গত ৬ দিনের চিকিৎসার পর কোন অবস্থায় আপনার সমস্যা বেশী অনুভূত হয়? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

iv. বসে থাকলে

v. দাঁড়িয়ে থাকলে

vi. উভয় অবস্থায়

৪. গত ৬ দিনের চিকিৎসার পর আপনার সমস্যাটি কখন অনুভূত হয়? (সঠিক জবাবটিতে টিক চিহ্ন দিন)

iv. জুতা পরা অবস্থায়

v. খালি পায়ে

vi. উভয় অবস্থায়

৫. গত ৬ দিনের চিকিৎসার পর এখন আপনার ব্যথা ঠিক কোথায়?

vi. ব্রিদ্ধাঙ্গুল

vii. কনিষ্ঠ আঙ্গুল

viii. মধ্য পা

ix. পশ্চাত পা

x. গোড়ালি

৬. গত ৬ দিনের চিকিৎসার পর আপনার ব্যথা দিনের কোন ভাগে বেশী বোধ হয়?

iv. সকাল

v. সন্ধ্যা

vi. সারাদিন

৭. গত ৬ দিনের চিকিৎসার পর আপনার পায়ে কোন ধরণের জ্বালা পোড়া/ফুস্কুড়ি/চুলকানি হয়েছে কি?

i. হ্যাঁ

ii. না

চিকিৎসা পরবর্তী ব্যথার পরিমান

পর্ব-খ: ব্যথার পরিমাণ।

এই প্রশ্নাবলী প্লানটার ফাসাইটিস রোগীদের জন্য পরিকল্পনা করা হয়েছে। প্রশ্নপত্রের এই অংশটি রোগী নিজে পূরণ করবেন কালো না নীল করম দ্বারা। রোগীর কোন প্রশ্নের মানে বুঝতে না পারলে, ফিজিওথেরাপিস্টকে নির্দিষ্ট অংশের অর্থ পরিষ্কার করতে অনুরোধ করা হল।

McCaffery এবং তার সহযোগীরা (১৯৯৯) রোগীদের ব্যথা অভিজ্ঞতা ব্যখ্যা করার জন্য একটি সংখ্যাসূচক ব্যথা নির্ধারক ব্যবহার করেন। এটা সংখ্যাসূচক ব্যথা নির্ধারক স্কেল হিসাবে পরিচিত হয়। এখানে স্কেলে শূন্য (০) মানে কোন ব্যথা নেই (১-৩) মানে হালকা ব্যথা (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

সরলরেখা ব্যথা পরিস্থিতি উপস্থাপন করে, বাম হাত দিকে শূন্য (০) কোন ব্যথা এবং ডান হাত দিকে দশ (১০) প্রতিনিধিত্ব করে তীব্র ব্যথা মানে প্রতিনিধিত্ব করে। নিম্নলিখিত প্রশ্নে আপনার ব্যথার পরিমান লাইন চিন্হিত করুন। আপনার উত্তর দেয়ার সুবিধার্থে একটি নমুনা দেয়া হল।

ধরুন, কোন প্রশ্নের জবাবে আপনার ব্যথার পরিমাণ সহনীয় বলে মনে করছেন যেটা সংখ্যাসূচক ব্যথা নির্ধারক স্কেলে ৪ থেকে ৬ এর মাঝে অবস্থান করে। এখন আপনার উত্তর যদি ৫ হয় তাহলে কলম দিয়ে স্কেলের ৫ চিহ্নিত অংশে নিম্নে দেখানো পদ্ধতিতে বৃত্ত আঁকুন।

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

১. চিকিৎসার পর বিশ্রামরত অবস্থায় আপনার ব্যথার পরিমান কত?

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

২. চিকিৎসার পর বলপূর্বক পায়ের পাতা উপরের দিকে নেয়ার পর আপনার ব্যথার পরিমান কত?

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই (১-৩) মানে হালকা ব্যথা (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৩. চিকিৎসার পর জোরপূর্বক পায়ের পাতা কুঁচকানোর পর আপনার ব্যথার পরিমান কত?

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৪. চিকিৎসার পর হাঁটার সময় পর্যায়ক্রমে অতিরিক্ত গতিতে হাঁটলে আপনার ব্যথার পরিমান কত?

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৫. চিকিৎসার পর বিছানা কিংবা টুল এর প্রান্তে পা ঝুলিয়ে বসে ব্রিদ্ধাঙ্গুল উপরের দিকে নেয়ার পরে আপনার ব্যথার পরিমান কত? (Windlass Test)

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০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৬. চিকিৎসার পর বলপূর্বক বৃদ্ধাঙ্গুল উপরের দিকে নেয়ার পর আপনার ব্যথার পরিমান কত?

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০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

৭. চিকিৎসার পর প্রভাবিত স্থানে স্পর্শ করলে আপনার ব্যথার পরিমান কত?

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০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

এখানে শূন্য (০) মানে কোন ব্যথা নেই, (১-৩) মানে হালকা ব্যথ, (৪-৬) মানে সহনীয় ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা।

Consent Form

Assalamualaikum\ Namashker,

I am Md. Mahfuz Hossain, 4th Professional B.Sc. in Physiotherapy student of Bangladesh Health Professions Institute (BHPI) under the Medicine faculty of University of Dhaka. To obtain my Bachelor degree, I shall have to conduct a research and it is a part of my study. The participants are requested to participate in the study after reading the following.

My research title is "**Effectiveness of adhesive ZnO_2 taping for the treatment of plantar fasciitis**". Through this study I will find the effectiveness of adhesive ZnO_2 taping along with other physiotherapy for the treatment of plantar fasciitis. If I can complete this study successfully, patient may get the benefits who have been suffering from plantar fasciitis and it will be an evidence based treatment.

To fulfil my research project, I need to collect data. Considering the area of my research, which criteria is necessary for my research is present of you. So, you can be a respected participant of my research and I would like to request you as a subject of my study. I want to meet you a few couple of session, during your regular therapy. The exercises that will be given are pain free and safe for you.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. I assure that all data will be kept confidential. Your participation will be voluntary. You may have the right to withdraw consent and discontinue participation at any time of the experiment. You also have the right to answer a particular question that you don't like.

If you have any query about the study or right as a participant, you may contact with me.

Do you have any questions before I start?

So, may I have your consent to proceed with the interview?

Yes ☐ No ☐

Signature of the participant & Date…….

Signature of the researcher & Date……..

Signature of the witness & Date……..

Questionnaire (English)

SECTION-A: Subjective Information

This questionnaire is developed to measure the pain of the patient with plantar fasciitis. And this section will be filled by physiotherapist using a black or blue pen.

Code No:

Patients name:

Age: Sex: Male/Female

Address:

Occupation:

i. Housewife
ii. Service Holder
iii. Businessman
iv. Teacher
v. Others

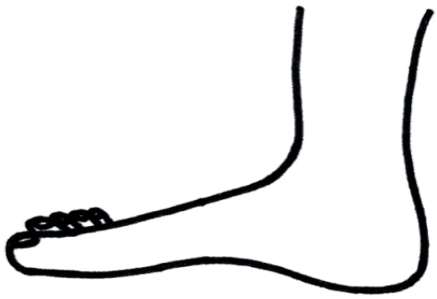
1. What is the main issue that brought you in today (circle all that are appropriate)?

i. Pain
ii. Uncomfortable shoe wear
iii. Instability
iv. Deformity
v. Sprain
vi. Recent Injury

2. How long has the current problem been going on? _____

3. Which side is involved? (Encircle the side) RIGHT/LEFT/BOTH

- If pain is the concern, please use an arrow to indicate the area on the diagram that hurts the most
- If more than one area of pain exists, please rank the sites from most to least painful (i.e. #1, #2, etc.)
- If both sides are involved label the areas L (left) and R (right)



4. On a scale of 0 to 10 what is the level of pain? _____

5. Does this affect you mainly while i. standing/ ii. sitting/ iii. both? [Encircle the appropriate answer]

6. Is the problem i. improving/ ii. worsening/ iii. staying the same? [Encircle the appropriate answer]

7. Does this problem occur i. with shoes/ ii. without shoes/ iii. both? [Encircle the appropriate answer]

8. What % of sitting ____ and standing ____ do you have at work?

9. What activities are you unable to enjoy as a result of this condition?

10. Circle the treatments that you have tried until this point?

i. Brace
ii. Physical Therapy
iii. Change of job
iv. Rest
v. New shoes
vi. Ice Massage
vii. Elevation
viii. Injection
ix. Chiropractor Surgery
x. Anti-inflammatory
xi. Orthotic

11. Is your problem related to an injury? _____ If yes, what kind? _____

12. Where is your pain? Great toe, lesser toe, mid-foot, hind-foot, ankle? _____

13. How long have you had your pain? _____

14. Is your pain worse in the morning, evening, or all day? _____

15. What improves your pain? _____

16. What worsens your pain? _____

17. Do you wear orthotics? _____

18. Do you have a personal history or family history of Diabetes? _____ If so, do you take insulin or medication by mouth? _____

19. Has your foot size or shape changed recently? _____ If so, please explain_____

SECTION-B: Pain Status

This questionnaire is designed for plantar fasciitis patients. McCaffery et al. (1999) used a numeric scale to rate the pain status experienced by patients. It is known as Numeric Pain Rating Scale. The scale is a 10cm long scale ranging from 0-10. Here a zero (0) means no pain, 1-3 indicates mild pain, 3-5 indicates that pain is in moderate state and 6-10 is worst possible pain feeling experienced by patients.

This portion of questionnaire will be filled by the patient using a black or blue coloured ball pen. If the patient struggles to understand the meaning of a question, physiotherapist is requested to clear the meaning of certain portions.

Rate the average amount of pain in your heel/foot by encircling the number that best describes your pain on a scale from 0-10. A zero (0) represents no pain and a ten (10) represents worst pain you have ever experienced.

1. How severe your pain is at resting position?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

2. How severe is your pain during forceful dorsiflexion?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

3. How severe is your pain during a strong squeezing?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

4. How severe is your pain while walking with increased speed?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

5. How severe is your pain while keeping the toes hanging off the edge of a stool and dorsiflexion of the first metatarsophalangeal joint was performed?
(Windlass Test)

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

6. How severe is your pain during forceful great toe dorsiflexion?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

7. How severe is your pain on palpation to the affected area?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

Questionnaire (English)

SECTION-A: Subjective Information

This questionnaire is developed to measure the pain of the patient with plantar fasciitis. And this portion will be filled by physiotherapist/researcher using a pencil.

Code No:

Patients name:

Age: Sex: Male/Female Occupation:

Address:

SECTION-B: Pain Status

This questionnaire is designed for plantar fasciitis patients. McCaffery et al. (1999) used a numeric scale to rate the pain status experienced by patients. It is known as Numeric Pain Rating Scale. The scale is a 10cm long scale ranging from 0-10. Here a zero (0) means no pain, 1-3 indicates mild pain, 3-5 indicates that pain is in moderate state and 6-10 is worst possible pain feeling experienced by patients.

This portion of questionnaire will be filled by the patient using a black or blue coloured ball pen. If the patient struggles to understand the meaning of a question, physiotherapist is requested to clear the meaning of certain portions.

Rate the average amount of pain in your heel/foot by encircling the number that best describes your pain on a scale from 0-10. A zero (0) represents no pain and a ten (10) represents worst pain you have ever experienced.

1. How severe your pain is at resting position after treatment?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

2. How severe is your pain during forceful dorsiflexion after treatment?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

3. How severe is your pain during a strong squeezing after treatment?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

4. How severe is your pain while walking with increased speed after treatment?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

5. How severe is your pain while keeping the toes hanging off the edge of a stool and dorsiflexion of the first metatarsophalangeal joint was performed after treatment? (Windlass Test)

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

6. How severe is your pain during forceful great toe dorsiflexion after treatment?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

7. How severe is your pain on palpation to the affected area after treatment?

0	1	2	3	4	5	6	7	8	9	10
No pain										worst pain

A zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7-10) means severe pain.

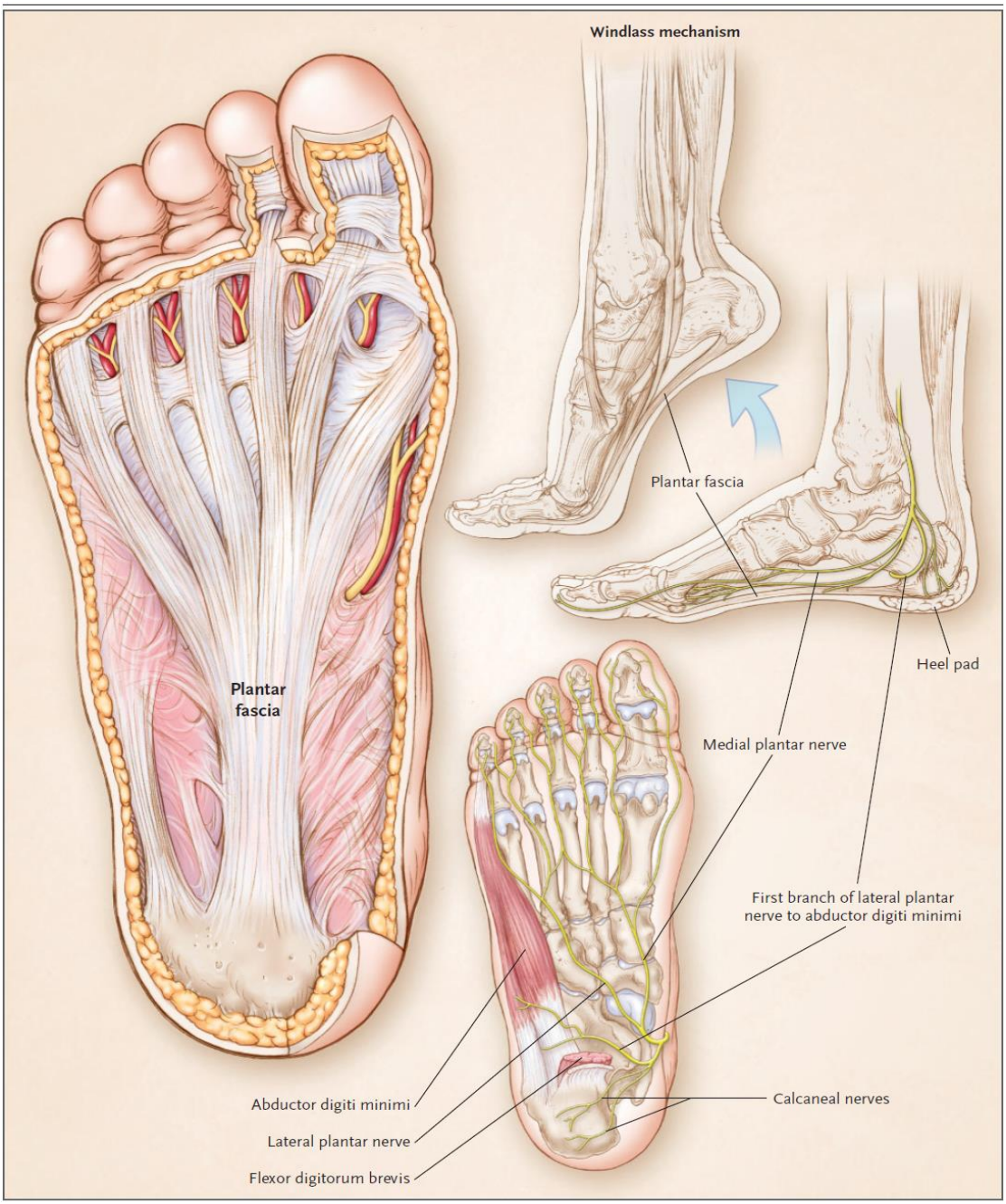


Figure-11: Plantar and Medial Views of the Foot Demonstrating the Origin and Insertion of the Plantar Fascia and the Location of Nerves in Proximity to the Heel (Buchinder, 2004).

The windlass mechanism, or bowstring effect, of the plantar fascia refers to its function in raising the arch of the foot during the push-off phase of walking. (*Image courtesy by Rachelle Buchbinder, M.B., B.S., F.R.A.C.P. Department of Clinical Epidemiology, Cabrini Hospital; and the Department of Epidemiology and Preventive Medicine, Monash University — both in Melbourne, Vic., Australia*).

Analysis of Resting Pain Reduction

Subject (Control Group)	Pain Score in NPRS	Rank	Subject (Experimental Group)	Pain Score in NPRS	Rank
C1	5	13	E1	1	2.5
C2	2	6.5	E2	3	6.7
C3	2	6.5	E3	1	2.5
C4	2	6.5	E4	1	2.5
C5	3	6.7	E5	0	0
C6	4	12	E6	1	2.5
C7	2	6.5	E7	3	6.7
		$\sum T$ = 57.7			$\sum T$ = 23.4

We Know,

The formula of Mann-Whitney *U* test: $U = n_1\, n_{2+} \frac{n_x(n_x+1)}{2} - T_x$

$= 7\times 7 + \frac{7(7+1)}{2} - 57.7$

$= 77 - 57.7$

$= 19.3$

n_1 = the number of the subjects in experimental group = 7

n_2= the number of the subject in control group = 7

n_x= the number of the subjects of the group with larger rank total = 7

T_x= the larger rank total = 57.7

Analysis of Pain Reduction during Fast Walking

Subject (Control Group)	Pain Score in NPRS	Rank	Subject (Experimental Group)	Pain Score in NPRS	Rank
C1	6	13	E1	2	2.5
C2	3	6	E2	0	0
C3	4	9.5	E3	2	2.5
C4	4	9.5	E4	3	6
C5	4	9.5	E5	2	2.5
C6	5	12	E6	2	2.5
C7	4	9.5	E7	3	6
		$\sum T$ = 69			$\sum T$ = 22

We Know,

The formula of Mann-Whitney *U* test: $U = n_1\, n_{2+} \frac{n_x(n_x+1)}{2} - T_x$

$= 7\times 7 + \frac{7(7+1)}{2} - 69$

= 77 - 69

= 8

n_1 = the number of the subjects in experimental group = 7

n_2= the number of the subject in control group = 7

n_x= the number of the subjects of the group with larger rank total = 7

T_x= the larger rank total = 69

Analysis of Pain Reduction in Windlass Test

Subject (Control Group)	Pain Score in NPRS	Rank	Subject (Experimental Group)	Pain Score in NPRS	Rank
C1	6	13	E1	2	7
C2	3	10	E2	1	3
C3	2	7	E3	1	3
C4	3	10	E4	1	3
C5	3	10	E5	1	3
C6	4	12	E6	1	3
C7	2	7	E7	0	0
		$\sum T$ = 69			$\sum T$ = 22

We Know,

The formula of Mann-Whitney *U* test: $U = n_1\, n_{2+} \frac{n_x(n_x+1)}{2} - T_x$

$= 7\times 7 + \frac{7(7+1)}{2} - 69$

$= 77 - 69$

$= 8$

n_1 = the number of the subjects in experimental group = 7

n_2= the number of the subject in control group = 7

n_x= the number of the subjects of the group with larger rank total = 7

T_x= the larger rank total = 69

Analysis of Palpable Pain Reduction

Subject (Control Group)	Pain Score in NPRS	Rank	Subject (Experimental Group)	Pain Score in NPRS	Rank
C1	4	10.5	E1	3	7
C2	4	10.5	E2	2	3.5
C3	4	10.5	E3	2	3.5
C4	4	10.5	E4	2	3.5
C5	4	10.5	E5	2	3.5
C6	5	14	E6	2	3.5
C7	4	10.5	E7	2	3.5
		$\sum T$ = 67			$\sum T$ = 28

We Know,

The formula of Mann-Whitney *U* test: $U = n_1\, n_{2+} \frac{n_x(n_x+1)}{2} - T_x$

$= 7\times 7 + \frac{7(7+1)}{2} - 67$

$= 77 - 67$

$= 10$

n_1 = the number of the subjects in experimental group = 7

n_2= the number of the subject in control group = 7

n_x= the number of the subjects of the group with larger rank total = 7

T_x= the larger rank total = 67

Statistical Probability Table

Critical values of *U* for a one tailed test at 0.05 for $n_1 = n_2 = 7$.

n_2	$n_1 = 7$
7	**11**

	n_1																		
n_2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	—	—	—	—	—	—	—	–	—	—	—	—	—	—	—	—	—	—	0	0
2	—	—	—	—	0	0	0	1	1	1	1	2	2	2	3	3	3	4	4	4
3	—	—	0	0	1	2	2	3	3	4	5	5	6	7	7	8	9	9	10	11
4	—	—	0	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	17	18
5	—	0	1	2	4	5	6	8	9	11	12	13	15	16	18	19	20	22	23	25
6	—	0	2	3	5	7	8	10	12	14	16	17	19	21	23	25	26	28	30	32
7	—	0	2	4	6	8	11	13	15	17	19	21	24	26	28	30	33	35	37	39
8	—	1	3	5	8	10	13	15	18	20	23	26	28	31	33	36	39	41	44	47
9	—	1	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54
10	—	1	4	7	11	14	17	20	24	27	31	34	37	41	44	48	51	55	58	62
11	—	1	5	8	12	16	19	23	27	31	34	38	42	46	50	54	57	61	65	69
12	—	2	5	9	13	17	21	26	30	34	38	42	47	51	55	60	64	68	72	77
13	—	2	6	10	15	19	24	28	33	37	42	47	51	56	61	65	70	75	80	84
14	—	2	7	11	16	21	26	31	36	41	46	51	56	61	66	71	77	82	87	92
15	—	3	7	12	18	23	28	33	39	44	50	55	61	66	72	77	83	88	94	100
16	—	3	8	14	19	25	30	36	42	48	54	60	65	71	77	83	89	95	101	107
17	—	3	9	15	20	26	33	39	45	51	57	64	70	77	83	89	96	102	109	115
18	—	4	9	16	22	28	35	41	48	55	61	68	75	82	88	95	102	109	116	123
19	0	4	10	17	23	30	37	44	51	58	65	72	80	87	94	101	109	116	123	130
20	0	4	11	18	25	32	39	47	54	62	69	77	84	92	100	107	115	123	130	138

*Dashes in the table mean that no decision is possible for those *n* values at the given level of significance.

March 07, 2015

Head
Department of Physiotherapy
Centre for the Rehabilitation of the Paralysed (CRP)
CRP-Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI

Subject: Seeking permission to collect data to conduct my research project on "Effectiveness of adhesive ZnO_2 taping for the treatment of plantar fasciitis".

Dear Sir,

With due respect and humble submission to state that I am Md. Mahfuz Hossain, a student of 4th Professional B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). As per approval of ethical review committee of BHPI, I have been conducting a research project on "Effectiveness of adhesive ZnO_2 taping for the treatment of plantar fasciitis". Mr. Nasirul Islam, Associate Professor of BHPI has been supervising me in order to accomplish this study. However, conducting this research project is partial of the requirement for the degree of B.Sc. in Physiotherapy. I want to collect necessary data from the patients attending at musculoskeletal outpatient department of CRP Savar and Mirpur. Therefore I need to obtain your kind written permission to initiate data collection from the targeted patients. I would like to assure that ethical principles would be followed as per guidelines of my institution/department.

I therefore, pray and hope that you would be kind enough to grant my application and permit me to collect required data to accomplish my research objectives.

Yours faithfully,
Md. Mahfuz Hossain
07.03.15
.....
Md. Mahfuz Hossain
4th Professional B.Sc. in Physiotherapy
Session: 2009-2010
Bangladesh Health Professions Institute (BHPI)
(An academic institution of CRP)
CRP-Chapain, Savar, Dhaka-1343.

Forwarded
08/03/15

Forwarded for Approval
10/03/15

Approval Given Permission for data Collection at MS-unit, PT Dept CRP. Please contact with Mostafiz Kamal, CRP as a counterpart of your data collection procedure.
11/03/15

Md. Anwar Hossain
Associate Professor &
Head of Physiotherapy Dept.
CRP, Chapain, Savar, Dhaka-1343