Original Research Article

EFFECTS OF APPLICATION OF NIGHT SPLINT IN THE MANAGEMENT OF PLANTAR FASCIITIS

Abstract:

Context: Plantar fasciitis is one of the most common causes of heel pain. The condition usually comes on gradually without any injury. Clinically there is pain and tenderness in the sole of the foot, mostly under the heel, with standing or walking. The diagnosis of patient with planter fasciitis is essentially clinical. Treatment options for planter fasciitis include rest, stretching, strengthening exercise, shoe modification, arch supports, orthotics, night splints, anti- inflammatory agents and surgery. Although injections and NSAIDs bring relief, their effects are often only temporary. Stretching of the calf and plantar fascia may provide some benefit. Surgical treatment is only advocated in chronic planter fasciitis where adequate conservative management fails. In this study an effort was made to evaluate the effects of application of night splint in the management of plantar fasciitis.

Materials and Methods: This randomized clinical trial was conducted on 50 (fifty) patients attending in Physical Medicine and Rehabilitation department of National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), Dhaka who are suffering from planter fasciitis. The patients were divided randomly into two groups, Group A and Group B. Patients in Group A were treated with NSAID, ADL and Night splint, whereas Group B patients were treated with NSAID and ADL. The patients were evaluated clinically and data was collected from both groups in a pre-designed data collection sheet for Pain score, Tenderness index and Visual analogue scale in every 2 weeks interval from the first visit for up to 6 weeks. All the data were analyzed by SPSS version 16.1.

Results: The present study showed pain and tenderness were significantly improved in Group A who were treated with Night Splint, NSAID & ADL instructions than in Group B who were treated with NSAID & ADL instructions after 6 weeks($P<0.05$).

Conclusion: The results of this study suggest that application of Night Splint along with NSAIDs and ADL instructions is more effective in reduction of pain and other symptoms in patient with planter fasciitis than the drugs and ADL.

Keywords: Planter Fasciitis, pain, Night Splint, ADL.

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INTRODUCTION:

Plantar fasciitis (PF) is a painful inflammatory process of the plantar fascia. It is often caused by overuse of the plantar fascia or arch tendon of the foot. There is pain and tenderness in the sole of the foot, mostly under the heel, with standing or walking[1]. Plantar fasciitis is a common problem without known etiology[2]. Sometimes there is a history of sudden increase in sporting activity like running and long distance walking and whose occupation requires prolonged weight bearing or a change of footwear or running surface. The condition is more likely to occur in persons especially in middle aged, obese and who are on their feet most of the day[3, 4]. Changes in the collagen matrix of the plantar fascia are the patho-physiological basis of this condition[4].

The diagnosis of patient with planter fasciitis is essentially clinical. It is estimated that 90 to 95% of patients who have true plantar fasciitis recover with conservative treatment[5].

Treatment of planter fasciitis includes rest, stretching, strengthening exercise, shoe modification, arch supports, orthotics, night splints, anti-inflammatory agents and surgery. Although injections and NSAIDs bring relief, their effects are often temporary. Therapeutic exercises and orthotics to correct the biomechanical faults in athletes bring better results[6]. Stretching of the calf and plantar fascia may provide some benefit. In cases of chronic plantar fasciitis, physical therapy like ultrasound with 3 MHz for 10-15minutes/day may be beneficial[7,8]. Surgical treatment is only advocated in chronic planter fasciitis where adequate conservative management fails.

MATERIALS AND METHODS

The present study was performed on 50(fifty) patients (who fulfilled the selection criteria) suffering from planter fasciitis attending in the Physical Medicine and Rehabilitation department of National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), Dhaka during the period of six months from 1st April, 2013 to 30th September, 2013 in a randomized clinical trial. The patients were divided into two groups (Group A and Group B). Each group consisted of 25 patients. The pre-designed semi structured questionnaire was used for all cases. Assessment included clinical findings, planter fasciitis characteristics, impairments and functional abilities. Group A patients provided with Night splint along with NSAID & ADL

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instructions and Group B patients received NSAID treatment & ADL instructions. Data was collected from both groups in a pre – designed data collection sheet from the first visit. Further data was collected from each patient in every two weeks interval from the first visit for up to 6 weeks. Methods of assessment were Visual analogue scale (VAS) on Pain, Tenderness index and pain scale. All the data were analyzed by SPSS version 16.

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RESULT:

A total of 50 patients were enrolled in this study. Of which, half (n=25) of the patients were provided with Night splint along with NSAID & ADL instructions, referred as Group A patients and the rest of the patients, who received NSAID treatment & ADL instructions referred as Group B patients. Table-1 shows mean pain score of pretreatment in group-A were 14.31(±2.33) and 13.40(±1.68) were in group-B, p value was ($p>0.05$) that was not statistically significant. Mean pain score in first follow up 10.80(±1.43) were in group-A and 10.48(±1.42) were in group-B. P value was ($p>0.05$), that was statistically not significant. That mean group-A is significantly better than group-B in first follow up but not different in pretreatment (Fig-2).

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Figure -1: Locally made planter fasciitis night splint

Table-1: Mean pain score (0-4) at pre-treatment and 1st follow up of the study population (N=50)

Group	Pre-treatment Mean (±SD)	1st Follow up Mean (±SD)	P value
Group-A	14.31(±2.33)	10.80(±1.43)	0.06
Group-B	13.40(±1.68)	10.48(±1.42)	0.35

Table-2 shows mean pain score of 2nd follow up in group-A were 8.02(±1.31) and 8.65(±1.31) were in group-B, p value was ($p<0.05$), that was statistically significant. Mean pain score in 3rd follow up 4.68(±1.58) were in group-A and 6.74(±1.89) were in group-B. p value was ($p<0.05$), that was statistically significant (Fig-2). That mean group-A is significantly better than group-B in 2nd and 3rd followed up.

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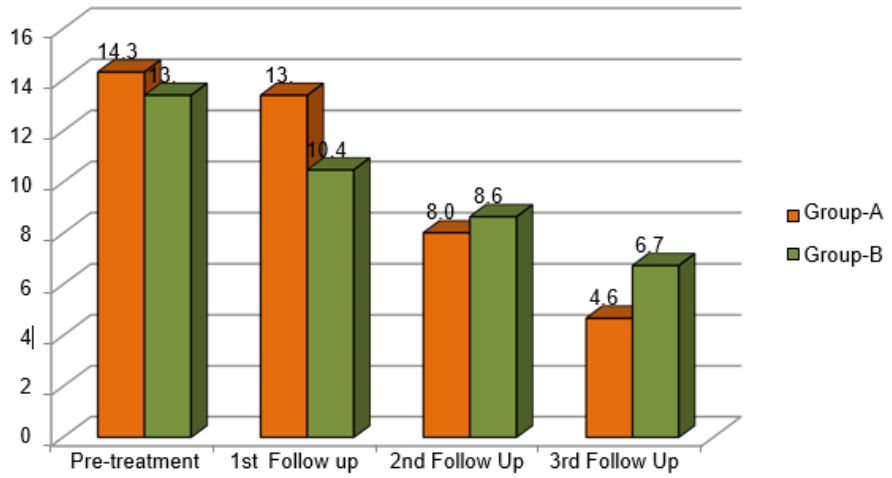

Figure-2: Mean pain score at pre-treatment, 1st follow up, 2nd and 3rd follow up according of the study population (N=50)

Table-2: Mean pain score at 2nd and 3rd follow up of the study population (N=50).

Group	2nd Follow Up Mean (±SD)	3rd Follow Up Mean (±SD)	P value
Group-A	8.02(±1.31)	4.68(±1.58)	0.04
Group-B	8.65(±1.31)	6.74(±1.89)	<0.001

Tenderness index (table-3, Fig-3) was 2.20 ± 0.76 in group A and 2.20 ± 0.61 in group B at their pre treatment observations. Tenderness indexes were improved significantly ($p < 0.05$) in their second follow up at the end of 4th week. However, the differences between groups were highly significant ($p < 0.001$) at their 6th weeks follow ups. Significant difference at the end of 4th week and highly significant difference between group A & B: where group A noticed far improvement at the end of 4th and 6th weeks (t-test) was seen (P <0.001).

Table-3: Mean Tenderness index at different time period

Time Period	Group A (n=25) Mean ±SD	Group B (n=25) Mean ±SD	P value
Tenderness index pre treatment score	2.20(0.76)	2.20(0.61)	1
Tenderness index score at 2nd week	1.40(0.49)	1.30(0.46)	0.42
Tenderness index score at 4th week	0.80(0.61)	1.10(0.30)	0.01
Tenderness index score at 6th week	0.10(0.30)	0.70(0.46)	<0.001

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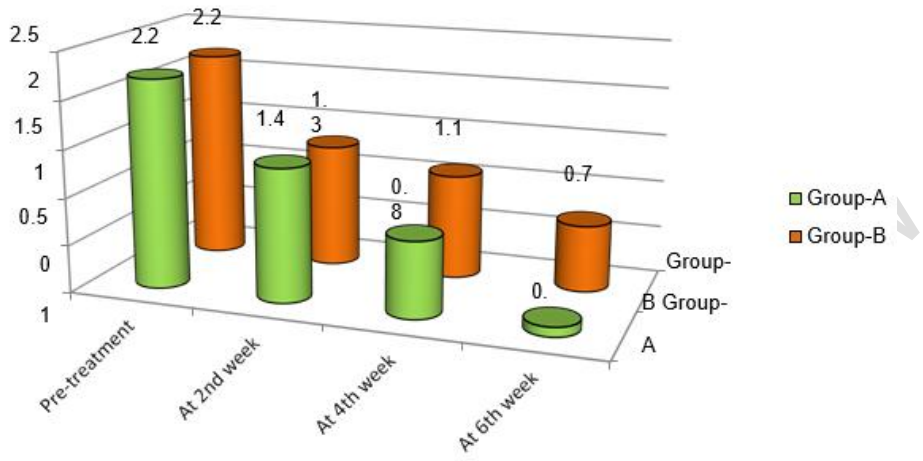

Figure-3: Mean Tenderness index at different time period.

Table-4: VAS on pain before treatment, after 2th, 4th and 6th weeks.

Time Period	Group A Mean ±SD	Group B Mean ±SD	P value
VAS score at pre treatment	7.10(1.32)	7.30(1.11)	0.53
VAS score at 2nd week	5.30(1.29)	5.60(1.13)	0.34
VAS score at 4th week	2.50(1.30)	3.0(1.43)	0.16
VAS score at 6th week	0.20(0.40)	1.10(0.71)	<0.001

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The mean patient's assessment of pain on a 0-10 visual analogue scale (VAS) was 7.10 ± 1.32 in Group A and 7.30± 1.11 in Group B on their respective treatment modalities (table-4). Pain scores on VAS scale after 2, 4 and 6 weeks showed progressive improvement on both group A and B. However, statistically highly significant ($p < 0.005$) improvement was observed at 6th week of management among patient of Group A, who received Night splint along with NSAID and followed ADL instructions (table-4). Group A patient showed more improvement than Group B patient (<0.001).

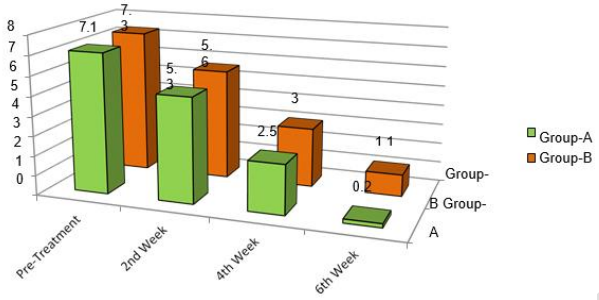

Figure-4: VAS on pain before treatment, after 2th, 4th and 6th weeks

DISCUSSION:

The primary purpose of this study was to assess the effect of night splint on plantar fasciitis. This randomized clinical trial study was performed in the Department of Physical Medicine & Rehabilitation, NITOR, Dhaka. An evaluation was made before the treatment and every 14 days interval. There were 3 visits and these evaluations were always performed by the same examiner. Patient's assessment of pain on VAS scale was 7.10 ± 1.32 and 7.03 ± 1.11 in group A and B, respectively (P=0.53) on pre treatment. At the end of 2nd week, VAS scale was 5.30 ± 1.29 and 5.60 ± 1.13 in group A and B respectively (P=0.34). After 4th week, no significant improvement was observed between the groups (P <0.16).But after the end of 6th week, significant improvement of symptoms of both the groups was found. However, the improvement among group A patients is significantly higher than that of group B patients (P< 0.001). In a very similar study; Beyzadeoğlu T, Gökçe A, Bekler H noticed that there were no significant differences between the two groups with regard to the initial VAS scores, patients using a night splint exhibited significantly higher improvements in both scores at the end of the sixth week[12]. In the present study we have found tenderness index 2.20 ± .76 in group A and 2.20 ± .61 in group B on pre treatment period. After 2nd week it was 1.40 ± .490 and 1.30 ± .46 in group A and B respectively, then 0.80 ± .61 and 1.10 ± .30 after 4th and 0.10 ± .30 and 0.70 ± .46 after 6th week. Significant difference after 4nd week and highly significant difference after 6th week was seen (P =<0.001) between group A(Night splint+ NSAID + ADL instruction) and group B(NSAID+ ADL instruction). In a study conducted by Ahmed H. Alghadir showed that planter fasciitis tenderness index was significantly lowered at the end of six week with the treatment of night splint with other modalities[13].

In the present study mean pain score of pretreatment in group-A were 14.31(±2.33) and 13.40(±1.68) were in group-B, p value was (p>0.05) that was not statistically significant. Mean pain score in first follow up 10.80(±1.43) were in group-A and 10.48(±1.42) were in group-B. P value was (p>0.05), that was statistically not significant. That mean group-A is significantly better than group-B in first follow up but not different in pretreatment. Powell et al. found that only 1 month of wearing the night splint was sufficient to create an 88% improvement of pain in 37 patients with chronic plantar fasciitis[13]. Therefore, based on limited evidence, it would appear that a night splint should be worn between 1 and 3 months to achieve adequate symptom improvement[14].

Currently, studies showing the effects of night splint in reduction of pain on planter fasciitis in our country are limited. Despite this, external device like night splint can be a preferable modality for the treatment of patients of planter fasciitis. A night splint can be made locally with low cost materials so that most of our poor people can afford to buy that. The result of our study showed that addition of Night splint to NSAID and ADL instruction in patients with planter fasciitis is superior to NSAID+ ADL instruction in improving pain and functional performance.

CONCLUSION:

In Bangladesh number of planter fasciitis patient become increasing day by day though we have little statistics about it. In spite of getting conventional treatment such as NSAIDs, thermotherapy, exercise, wearing soft soled shoe, heel pad; many patients do not get better result, & recurrence of attack occurs. Besides this treatment application of night splint has found much improvement in dorsiflexion ROM, pain on the first step in morning & foot function. Night splint is an easy, non surgical and cost effective one which can be applied with other modalities.

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LIMITATION OF THE STUDY:

The study has some limitations. The sample size included in the study was small, the study duration was short and there was no long term follow up. Also the different modalities of treatment used to treat plantar fasciitis (orthoses, stretching exercise, foot wear etc.) cannot be measured as we only use night splint.

RECOMMENDATION:

1. A more elaborate, multi-centered, long term, prospective study with relatively larger sample size may provide more information on the future prospect of night splint in the management of planter fasciitis.
2. As night splint is a less expensive, non surgical and easily operable external device, it could be readily adopted in the hospitals with rehabilitation services available. Follow up study for longer duration after night splint application can be done for better management of planter fasciitis patient.Further study with standardized protocol of only night splint modality can be organized in different hospitals having Physiatric specialty.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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