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**Research Article**

# OCCURRENCE OF PLANTARFASCIITIS IN QSR EMPLYOEES

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**A R T I C L E I N F O**

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Plantarfasciitis, QSR Employees, Windlass Test.

**A B S T R A C T**

**Aim:** To study the occurrence of plantar fasciitis in Quick Service Restaurant employees
**Background:** Plantarfasciitis is a common cause of heel pain in adults. The plantarfascia maintains the arch by windlass mechanism. Plantarfasciitis is thought to be caused by biomechanical overuse from prolonged standing, running; thus creating microtears at the calcaneal enthesis. Most commonly seen in runners, dancers, work related prolonged standing/walking. Quick service restaurant business is a rapidly growing part of food and beverage industry and has become a part of our lifestyle. The job of QSR employees demand standing continuously for a prolonged period of time which is a risk factor of developing plantarfasciitis and hence QSR employees being prone to developing plantarfasciitis.
**Objective:** The objective of our study is to find out occurrence of plantarfasciitis in QSR employees between 20-30 years of age.
**Methodology:** An observational study is conducted with sample of 200 QSR employees fitting in the inclusion criteria. The outcome measure of the study is the clinical diagnostic test- Windlass test correlated with clinical features of plantarfasciitis.
**Results:** 200 employees were studied. 136 employees complained of plantar heel pain, presented with symptoms of plantarfasciitis and a positive Windlass test i.e. 68% employees suffered from plantarfasciitis.
**Conclusion:** This study concluded a high occurrence of plantarfasciitis in QSR employees.



## INTRODUCTION

Plantar Fasciitis is common cause of heel pain in adults.[1,3] Inflammation of the plantar fascia leads to micro tears due to repeated trauma. The plantar aponeurosis plays an important role in providing static foot arch.[6] Strain on the longitudinal arch exerts its maximal pull on the plantar fascia, especially its origin on the medial process of the calcaneal tuberosity.[6] The plantar fascia maintains the arch by the windlass mechanism.[5]
Clinical presentation-[1,3]

- Heel pain with first few steps in the mornings or after getting up after prolonged periods of inactivity or with prolonged periods of standing.
- Tenderness over the infero-medial aspect of the heel.
- Passive ankle dorsiflexion or first toe dorsiflexion causing discomfort over proximal plantar fascia.
- Tightness of TendoAchilles.
- Pain usually worse while walking barefoot on hard surfaces and with stair climbing.
- Patients walk with their affected foot in equine position/ preference of toe walking.

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Most commonly seen in runners, dancers, work related prolonged standing/walking. [1]

Risk factors include pes planus, pes cavus, excessive running, leg length discrepancy, sedentary lifestyle, prolonged standing/ walking occupations, obesity (BMI>30kg/$m^2$), improper shoe fit, tightness of Achilles tendon and intrinsic foot muscles.[3]

QSR (Quick Service Restaurants) like Mc Donalds, Pizza Hut, Burger King, KFC, etc. are characterised by both its fast food cuisine and quick service. Mc Donalds being the first QSR opened in India in 1996. QSR is a wide chain restaurants in Food & Beverage industry with around 4000 outlets in India, employing on an avg. 1.2 lac population. Also it is a fast growing business. The employment opportunity being more in favour of the youth for their ability to provide quick service, the need and requirement to run QSR business.

### *Need of Study*

Quick Service Restaurant business is a rapidly growing part of the Food & Beverage industry and has become a part of our lifestyle. The job of QSR employees demands standing continuously for a prolonged period of time.According to research prolonged standing is a risk factor of developing plantar fasciitis and hence QSR employees being prone to developing plantar fasciitis. Previous studies are done on plantar fasciitis in obese individuals. To our knowledge very

scarce literature is available on plantar fasciitis in prolonged standing occupation. Hence this study has been under taken to find out occurrence of plantar fasciitis in QSR employees.

**REVIEW OF LITERATURE**

1. E.R. Waclawski *et al* (2015), conducted a study to systematically review the evidence of the association between weight bearing (walking or standing) and plantar fasciitis among workers. Four studies were included. Three studies were case-control studies; two used clinic populations and one used volunteers. The other study was cross-sectional involving workforce of an assembly plant. Two case-control studies and cross sectional study found association with weight bearing, but the assessment of weight bearing varied(e.g., time on feet, walking or standing). There was low quality evidence of an association between plantarfasciitis and weight-bearing tasks like standing or walking. Only the engine assembly plant occupation was identified as having higher risk.
2. Robert A. Werner(2009) ,performed a cross sectional observational study to determine the relative contributions of work activity (time spent standing, walking or sitting), floor surface characteristics, weight, body mass index, age, foot biomechanics, and other demographic and medical history factorsto the prevalence of plantarfasciitis at an automobile engine assembly plant. They included full time employees who had been working for atleast 6months. The study demonstrated forefoot pronation on physical examination, high metatarsal pressure on the gait assessment, increasing time spent standing on hard surfaces and walking and an increased number of times getting in and out of the vehicle (for truck/forklift drivers) increased the risk of presenting plantarfasciitis whereas, rotation of shoes during work week was found to reduce the risk of presenting complaints of plantarfasciitis. The study concluded that plantarfasciitis is relatively common in manufacturing setting.
3. Sandra E. Klein (2012) undertook a study to explore the relationship between duration of symptoms in plantarfasciitis patients and demographic factors, the intensity and location of pain, extent of previous treatment and self-reported pain and function and measured the functional score measured by Foot and Ankle Ability Measure (FAAM). Pain severity was measured using visual analog scale. Patients were classified based on duration of symptoms as acute (symptoms less than 6months) or chronic (symptoms equal to or more than 6 months).The study concluded that as plantarfasciitis symptoms extend beyond 6 months, the patients did not experience increase in pain intensity or functional limitation and no specific risk factors were identified for indicating risk of developing chronic symptoms.
4. Bradley K. Kaya. (1996), conducted a study to determine the effectiveness of conservative methods to manage plantarfasciitis in athletes. It emphasized upon the etiological factors and current conservative management.
5. Silvia Gonçalves Ricci Neri *et al*. (2017) performed a cross sectional study to examine the association between obesity and plantar pressure distribution while assessing risk of falls.
   207 elderly women participated in the study. Body mass index was taken for obesity classification. Whole body, android and gynoid fat percentage was assessed using dual-energy X-ray absorptiometry. Peak plantar pressure was evaluated during gait using an Emed AT-4 pressure platform. The study found that- Obese volunteers generated greater peak pressure at midfoot compared to both normal weight and overweight. Peak plantar pressure at midfoot was also greater in overweight compared to normal weight. At forefoot, peak pressure was higher in the obese compared to normal weight volunteers. Additionally, whole body, android and gynoid fat percentage were significantly associated with peak pressure at midfoot and forefoot. Thus, the study suggested that effect of increased body weight on plantar pressure should be considered while assessing risk of falls.
6. Sari Julia Sartika *et al*, (2008) conducted study to investigate effect of prolonged standing. It found that a constrained standing work during 2 hours causes EMG signs of muscle fatigue and discomfort in lower back and edema formation in feet. The study suggests further research is required emphasizing on physiological effect, external factors (flooring effect, shoes, equipment), time duration, task and participant.
7. DiGiovanni *et al* (2003), conducted a study to find out whether tissue specific plantar fascia stretching exercises enhances outcomes in patients with chronic heel pain. A randomized controlled trial was performed. 2 groups were selected. Onegroup performed plantar fascia specific stretch whereas the other performed Achilles tendon stretching. Each stretch was held for 10seconds or 10repetitions 3 times a day. These stretching were performed immediately after getting up in the morning. The study indicated that improvement was seen in both the groups but the plantar fascia specific stretching was superior.
8. Pfeffer G *et al* (1999), undertook a study to compare the effectiveness of custom and pre-fabricated orthosis in initial treatment of plantarfasciitis. A randomized controlled trial study was selected. The patients were randomized propectively into 5 different treatment groups. All the groups performed plantar fascia specific stretching and Achilles tendon stretching in similar manner. One group was treated only with stretching program. The other four groups also used 4 different shoe inserts- silicon heel pad, a felt pad, a rubber heel cup and a custom made propylene orthotic device. Patients were re-evaluated post 8weeks of treatment. The 3 groups using pre-fabricated orthosis in conjunction with stretching program responded better as part of initial treatment than the only stretching program group and the group that used custom propylene orthotic device.

***Aim***

To study the occurrence of plantar fasciitis in Quick Service Restaurant employees.

***Objectives***

To find out occurrence of plantar fasciitis in Quick Service Restaurant employees using clinical diagnostic test- Windlass Test.

***Hypothesis***

***Research Hypothesis***

- There will be high occurrence of plantar fasciitis in Quick Service Restaurant employees.
- There will be low occurrence of plantar fasciitis in Quick Service Restaurant employees.

## MATERIAL AND METHODOLOGY

***Study Design***

- Type of study- observational
- Location- QSR outlets.
- Materials used- Foot stool, pen, paper.

***Sample Design***

- Duration- 1 year.
- Sample size- 200
- Sampling method- convenient.

***Selection Criteria***

***Inclusion Criteria***

- Employees willing to participate.
- Age: 20-30yrs.
- No. of standing hours min. 4hrs/day continuous.
- Job tenure > 6 months

***Exclusion Criteria***

- Any foot deformities.
- Any recent trauma.
- Any recent fractures (Calcaneal stress fracture).
- Calcaneal spur.
- Tarsal tunnel syndrome.
- Lumbar spine disorders (Sciatica).
- Achilles Tendinosis.
- Braxten's neuropathy.

***Procedure***

The employees will be screened as per the inclusion and exclusion criteria.

The entire study would be explained and an informed written consent will be taken in the language best understood by them.
Screen employees for heel pain- Y/N

Criteria for diagnosing plantarfasciitis

- Pain and stiffness over the plantar heel region during first few steps in the morning or getting up after prolonged period of inactivity or after prolonged standing or walking.
- On physical examination, palpation indicates a sharp, stabbing pain over inferomedial aspect of the calcaneum.
- Limited active and passive ankle and first toe dorsiflexion range of motion.
- The windlass test.

***Outcome measures***

***Windlass test***

The patient stands on a stool with the foot positioned so that the metatarsal heads rest on the edge of the stool while the patient maintains weight through the leg.

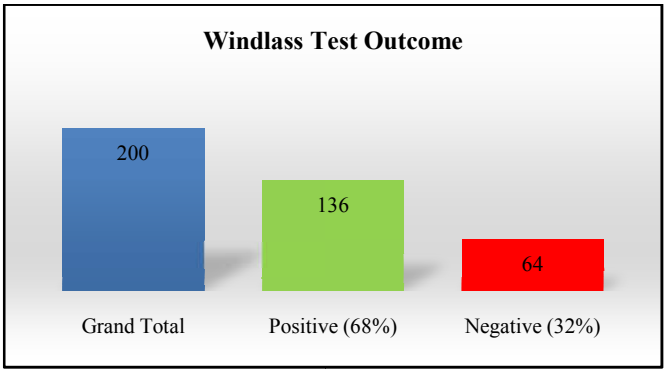
The examiner then passively dorsiflexes the great toe.
Pain or increased pain at insertion of plantar fascia indicates a positive test for plantar fasciitis.

***Data Analysis and Interpretation***

200 employees were studied. 136 employees complained of plantar heel pain, presented with symptoms of plantarfasciitis and a positive Windlass test i.e. 68% employees suffered from plantarfasciitis.

**Table**

| Windlass Test | No. of employees |
|---|---|
| Negative | 64 |
| Positive | 136 |
| Grand Total | 200 |




**Graph**

***Inference:*** Thus we conclude that plantarfasciitis is seen in QSR employees with a positive result of 68% Windlass test.

## DISCUSSION

This study revealed a high occurrence of plantarfasciitis in QSR employees due to prolonged standing, a risk factor for developing plantarfasciitis. In accordance to the windlass mechanism,during weight bearing there are compressive forces on the struts (bones) whereas the tie-rod (plantar aponeurosis) is subjected to tensile forces thus minimizing injury due to bending moments at the bone. Prolonged standing causes high loading on Achilles tendon which further transmits increased tensile loading on the plantarfascia exposing individuals to plantarfasciitis.

Birtane *et al*., mentioned in his study regarding distribution of weight bearing was variable in standing position with a larger load under the rearfoot with peak pressures almost twice as under the forefoot. In industrial work places, workers perform processes jobs in standing position for long time period. Working in standing position is linked to versatility because the mobility of leg position and having larger degree of freedom. This working position promotes workers to be more efficient and productive, an advantage contributing high value for company profits, however standing for long period leads to discomfort, muscle fatigue and occupational injuries to workers. Based on publish researches, work related musculoskeletal disorders, chronic venous insufficiency, preterm birth and spontaneous abortion, carotid atherosclerosis have been identified as common health problems associated with prolonged standing.

The American Podiatric Association reported 83% of industrial workers in US experienced lower limb or foot discomfort or pain with prolonged standing.

In our study, the QSR employees are subjected to a continuous 4hour standing period, the total duration being 8-10hours/day according to the survey.

According to study conducted by Robert A. *et al* (2009) prolonged standing for 4hoursor more causes an increased risk for subject to develop musculoskeletal disorders with low backache being the highest followed by foot and lower leg disorders.

Tau Im Yi *et al* (2011) in their study stated that the occupation involving prolonged periods of standing increased risk of plantarfasciitis.

Werner *et al*. (2010) conducted a study to find out risk factors for plantarfasciitis in assembly plant workers, working for atleast 6 months concluded plantarfasciitis to be relatively common in manufacturing setting.

## CONCLUSION

This study concluded a high occurrence of plantarfasciitis in QSR employees.

***Clinical Implications***

1. Shoe modification- heel counter semi rigid cups to reduce stress on the heel, medial arch support to minimize foot pressure can be done. Also, rotation of shoes can be implied.
2. Work-rest schedules can be adopted for efficient performance.
3. Anti-fatigue mats for the flooring can be used if affordable for the setup.

***Limitations and Suggestions***

***Limitation***

Gender differentiation was not taken into consideration.

***Suggestion***

A larger sample size can be taken for the study.
Further study should take gender differentiation into consideration.

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