

## Knowledge and Awareness On The Association Between Higher Body Mass Index and Plantar Fasciitis Among Chennai Population - A Survey

Research Article

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### Abstract

**Introduction:** Plantar fasciitis is one of the most common causes or source of heel pain. It represents inflammation of a thick band of tissue at the bottom of the foot that connects your heel bone to your toes (plantar fascia). Body mass index is a value estimated from the mass and height of a person. BMI is defined as the ratio of body mass to the square of the body height.

**Aim:** The aim of this study is to determine the knowledge and awareness regarding the association of higher body mass index and plantar fasciitis among middle aged male and female population.

**Materials and Methods:** Sample size of 108 responders. Each respondent was allowed to take up the survey based on BMI and plantar fasciitis. Prevalence among population estimates the association between plantar heel pain and demographic characteristics, health status measures and lifestyle factors were estimated. The data collection was done during the year 2020 and all the data were analysed during the time period of April - May 2020.

**Results:** Occurrence was slightly higher in females, comparable with significantly higher in those with routine and manual (long-standing) occupations. Plantar heel pain was associated with Physical and mental impairment, more anxiety, Being overweight. Plantar Heel pain is a common, disabling symptom among adults aged 30 years and above.

**Conclusion:** Observed patterns of association indicate that in addition to focused foot management, Primary care and general physical factors, most of the population are not aware of these etiological associations. Hence Knowledge and awareness needs to be initiated and implemented.

**Keywords:** Foot Pain; Plantar Fasciitis; Plantar Heel Pain; Epidemiology; Body Mass Index.

### Introduction

Plantar fasciitis is an ultimate cause of heel pain. Plantar fascia is a toe bone to which the heel bones are connected, any Inflammation in plantar fascia causes this particular plantar fasciitis [1]. It commonly causes stabbing pain that usually occurs with your first steps in morning or after a complete rest. Body mass index is a ratio derived from the mass and height of a person. Increased mechanical loading on the foot, because of the excessive body

weight. It is the major risk factor for chronic alterations in foot pressure, arch structure, ankle range of motion, as well as for different symptoms (example foot pain) and Pathologies which all depend on the overload foot region.

Plantar heel pain is one of the most common musculoskeletal conditions affecting the lower limb, it is known to affect both physically active and sedentary individuals. In Athletes, The most common food related injuries [2]. Despite substantial personal

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disability and the societal burden, the etiology of plantar heel pain remains unclear [3]. In addition to 2 foot level factors such as pronated foot type [4, 5]. Limited ankle joint dorsiflexion [5], first metatarsophalangeal joint dorsiflexion [6] and reduced muscle strength studies have shown that plantar heel pain is associated with the range of personal level factors, including increased body mass index [2],[3], depression, anxiety stress and occupation requiring prolonged periods of standing [7, 8]. plantar heel pain is a multifactorial problem. Obesity is a serious public health issue that has been gradually increasing in all age ranges. The World Health Organisation has recognised its severity, and has declared that obesity is an epidemic of the 21st century [9]. It is a severe disease with adverse impacts of mortality by increasing the risk of chronic disease such as cardiovascular disease, hypertension and diabetes [10, 11].

Obesity lowers the quality of life, And negatively affects psychosocial mental health [12, 13]. Medical Problems related to obesity carry a heavy financial cost which has major impacts on national budgets. Previous studies on obesity have focused on corrective restrictions on daily life activities caused by osteoporosis, weight loss, surgery, lumbago, ambulatory disabilities and weakened lower limbs [13, 14]. The feet are constantly exposed to weight-bearing strains in obese individuals during normal gait, the wait in the feet is approximately 1.2 times the body weight and increases to 2 - 3 times the body weight when running [15, 16]. In obese individuals, weight bearing on the medial longitudinal arch is approximately three times greater than its normal weight of an individual [17], which can cause negative biodynamic changes that can potentially decrease the quality of life and restrict physical and muscular activities. Further more, decreased physical activity [18] can lead to weakened muscle strength due to restricted motion [19].

Excessive weight bearing on feet due to obesity causes abnormal structural and functional changes in the foot. Furthermore, it results in decreased physical activity and weakened muscles, and leads to a series of unfortunate symptoms. These complications may increase socioeconomic costs related to obesity and hence preventing obesity is important. Recent studies on flat feet the showed the importance of investigating the pathophysiology of plantar fasciitis and abnormalities of the feet in obese female adults [20].

Previously our team had conducted numerous studies on bones [21-25] and studies on bioinformatics, genetics [26, 27] and in-vivo animal studies [28], anthropometric studies [29-31]. Our In-

stitute has also studied the effects of technology [32-35] over the past 5 years. Now we are focusing on epidemiological surveys. The idea for this survey stemmed from the current interest in our community.

## Materials and Methods

A survey based study is conducted, a self-structured questionnaire was prepared. Online settings - South Indian population. The study was approved by the Institutional Research Board. The data collection was done by preparing a questionnaire that was circulated online and the participants were allowed to respond online. Which had questions based on self-reported BMI, socioeconomic status, age, gender, occupation, specific foot pain questions were included. any pain stiffness and aching in the foot [36] were asked to mention. The study procedure was explained to those participants who agreed to take up the survey. A total of 109 responses were collected through an online questionnaire. The questionnaire revolved around various age groups and professions like teachers, students, business personnel, etc. It was based on simple random sampling methods. This questionnaire was used to estimate the association between plantar heel pain and the following variables: age, gender, Physical health status, BMI and occupation.

The data collected from this questionnaire was imported to the SPSS software and the variables were defined. Chi Square test, correlation and analysis was done on the data analysed using SPSS software. The data collection was done in the year 2020. The data analysis was done during the time period of April - May 2020.

## Results

A full description of participant recruitment. The majority of those with plantar heel pain had stabbing disabled pain. It was only slightly more female prevalent and comparable across age groups (Figure 1), but occurrence was most common in those with higher BMI (Figure 2) and with routine and Manual occupations like long standing occupations. 66.06% (Figure 3) of the respondents are not aware of higher BMI as the major risk factor of plantar heel pain/plantar fasciitis. Positive association with increased severity and increased BMI respectively.

Nearly 56.88% (Figure 4) of participants with plantar heel pain had consulted a Health Care professional for foot pain and are taking treatment for plantar fasciitis, out of which 47.66% (Figure 5) of the respondents' treatment schedule was associated with reducing BMI. Most of the respondents have a stabbing pain in

**Figure 1.** Bar graph represents the frequency distribution of study participants based on age group. X-axis represents age groups and Y-axis represents the number of participants. Among the total study population, 11.01 % were old aged, 58.72 % were middle aged and 30.28 % were teen aged people. Plantar fasciitis was more prevalent among the middle aged population than other age groups.

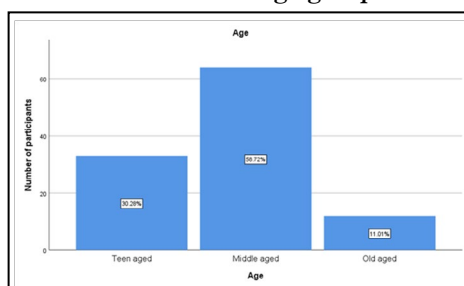


Figure 2. Bar graph represents the frequency distribution of study participants based on BMI of the responders. X-axis represents the BMI categories and Y-axis represents the number of participants. Among the total study population, 30.28 % were of lower BMI category, 38.53 % were of higher BMI category and 31.19 % were of normal BMI category.

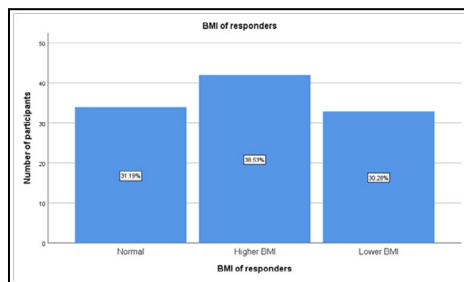


Figure 3. Bar graph represents the frequency distribution of study participants based on awareness on risk factors of plantar fasciitis. X-axis represents the answer to the question “Are you aware of risk factors that cause plantar fasciitis?” and Y-axis represents the number of participants. Among the total study population, 33.94% answered yes to the question and 66.06% answered no to the question. Most of the participants are not aware of the risk factors that cause plantar fasciitis.

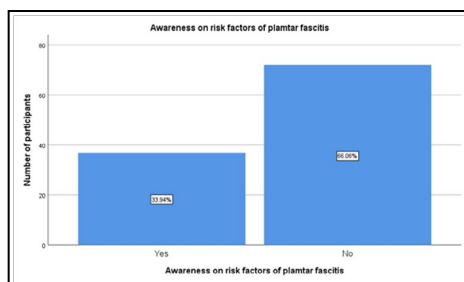


Figure 4. Bar graph represents the frequency distribution of study participants based on taking treatment for plantar fasciitis. X-axis represents the answer to the question “Are you taking treatment for plantar fasciitis?” and Y-axis represents the number of participants. Among the total study population, 56.88% answered yes to the question and 43.12% answered no to the question. Most of the participants are undergoing treatment for plantar fasciitis.

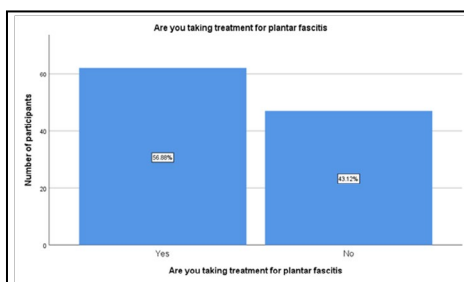
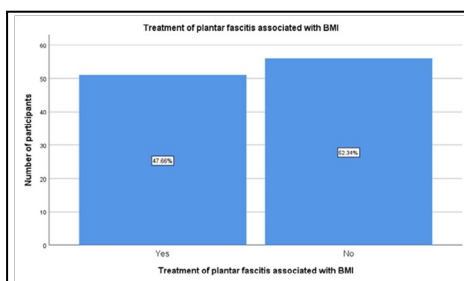


Figure 5. Bar graph represents the frequency distribution of study participants based on the treatment modalities of plantar fasciitis associated with BMI reduction. X-axis represents the answer to the question “Is your treatment of plantar fasciitis associated with BMI reduction?” and Y-axis represents the number of participants. Among the total study population, 47.66% answered yes to the question and 52.34% answered no to the question. Slight majority of the participants are not undergoing treatment that is associated with BMI reduction.



which they are not able to place their leg on the floor immediately after bed, majority of the respondents have pain even after exercise.

Most of the respondents are teachers, (Figure 6) who stand for a long period of time and maintain their whole body weight at their

lower Limbs. Majority of the respondents body mass index.

### Discussion

Ultimate aim of this study is to examine the association between higher body mass index and plantar fasciitis among the middle

Figure 6. Bar graph represents the occupation of responders. Represents the distribution of study participants based on occupation. X-axis represents the occupation of the responders and Y-axis represents the frequency distribution among the study participants. Among the total study population, 38.89 % were teachers, 30.56 % were business personnel and 30.56 % were students. Hence, most of the responders are teachers with long-standing professions.

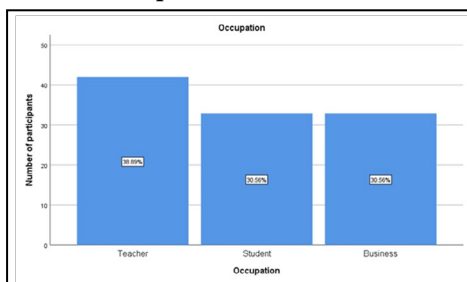


Figure 7. Bar graph represents the association between age and BMI category of responders. X-axis represents the age of the participants and the Y-axis represents the number of participants. Middle aged people had higher BMI and were more obese than the teen age and old age groups, depicting significant difference between the age groups. Chi square test showing  $p=0.00$  ( $p<0.05$ ) indicating statistical significance.

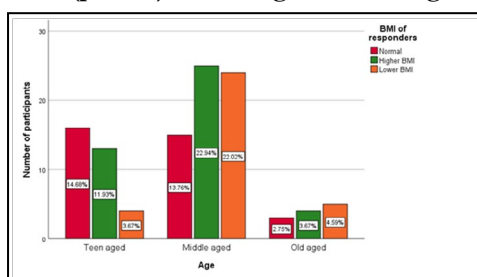


Figure 8. Bar graph represents the association between age and responders undergoing treatment for plantar fasciitis. X-axis represents the age of the participants and the Y-axis represents the number of participants. It was found that more participants among the middle age group were undergoing treatment for plantar fasciitis and are more prone to plantar fasciitis than the teen and old aged groups, depicting significant differences between the age groups. Chi square test showing  $p=0.00$  ( $p<0.05$ ) indicating statistical significance.

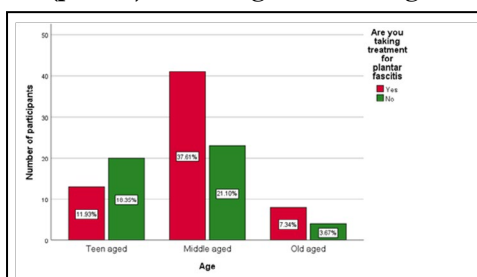
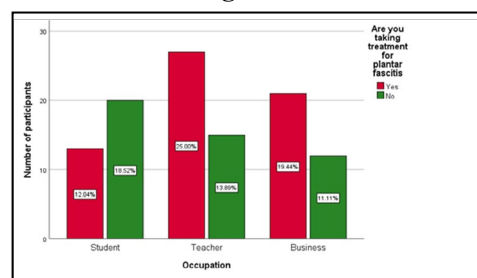


Figure 9. Bar graph represents the association between occupation and responders undergoing treatment for plantar fasciitis. X-axis represents the occupation of the participants and the Y-axis represents the number of participants. It was found that the treatment for plantar fasciitis was more common among the teachers than the students and business groups, depicting significant differences between the occupation groups. Chi square test showing  $p=0.00$  ( $p<0.05$ ) indicating statistical significance.



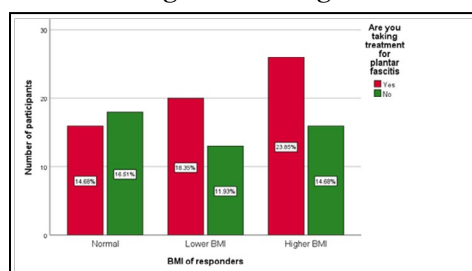
aged population. The observed minimal gender difference is also consistent with previous estimates [37, 38].

The collected data were analysed using SPSS software, general characteristics were analysed using descriptive statistics the dif-

ference between normal weight and obese groups were analysed using an independent T test [33, 34].

The age stratification prevalence of this study estimates for plant for heel pain that are largely comparable with systemic review

**Figure 10.** Bar graph represents the association between BMI of the responders and responders undergoing treatment for plantar fasciitis. X-axis represents the BMI of the participants and the Y-axis represents the number of participants. Higher BMI categories were found to be undergoing treatment for plantar fasciitis more than the normal BMI and lower BMI categories, depicting significant differences between the BMI categories. Chi square test showing  $p=0.00$  ( $p<0.05$ ) indicating statistical significance.



findings that chronic plantar heel pain appears to occur most commonly between the age of 40 to 59 years [4]. The observed positive association with higher BMI, less physical health, anxiety and low physical activity and participation are consistent with previous observations [39]. These findings suggest that general physical and psychological factors could potentially act as barriers to treatment adherence and recovery in people with plantar heel pain. Previous studies suggest that increased BMI and CPHP is supported and is in acceptance with the current study [40].

The underlying pathology driving the symptoms of plantar heel pain also remain unknown with in this sample. Increased BMI causes decrease in the stiffness of plantar fascia and an increase in the thickness of the plantar fascia as well as the thickness and stiffness of HP. Increased body mass could cause changes in the mechanical properties of plantar fascia and HP.

BMI is associated with knee pain [41] and BMI is associated with foot problems [42]. Imaging studies have shown positive associations between PHP and the presence of plantar calcaneal Spurs, thickening and hypoechogenicity of the plantar fascia. Bone scans may be useful in the evaluation of plantar fasciitis by localising soft tissue inflammation, ruling out stress fractures.

The plantar fascia is a structure that maintains the shape of the medial longitudinal arch and provides mechanical support to the foot [43]. The obese group in a study had a relatively greater thickness of plantar fascia due to increased weight bearing and support. Obesity is a risk factor for plantar fasciitis [18, 44]. Obese and overweight patients have a higher mean plantar pressure than normal weight individuals [17, 45].

Increased mechanical load due to higher BMI is a possible source of increased plantar facial stress. Therefore, adiposity related informative mechanisms play a role [46, 47]. Histopathological changes in the plantar fascia taken from surgical biopsy confirm a range of degenerative processes resulting in collagen breakdown, fibrocyte cell population changes and vascular ingrowth [44, 45]. Thus, obese young adults should undergo periodic evolution of foot structure and functions. Further studies are needed to develop management programs to improve structural and functional problems in the feet of obese young adults [43].

The present study has some limitations. There was a lack of detailed classification of obesity and most of the population was selected from participants in their 40 - 50s. which may limit the conclusions for the general population.

## Conclusion

Plantar heel pain is a common, disabling symptom among adults aged 30 to 50 years. Most of the respondents are not aware that plantar fasciitis can also be caused due to higher BMI. But, there is an association between higher BMI and plantar fasciitis. Hence, knowledge and awareness needs to be initiated and implemented to the concern.

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