BODY MASS INDEX AND HEEL PAIN- A HOSPITAL-BASED STUDY

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ABSTRACT

BACKGROUND
Heel pain is one of the fastest growing problems in the community. Overweight or obesity is suggested as a key factor associated with heel pain.

MATERIALS AND METHODS
A prospective observational study consisting of 194 patients with chief complaints of heel pain were included in the study conducted from 1st July 2006 to 31st November 2007. The height and weight measures were used to calculate the participant’s BMI (weight in kg divided by the square of height in metres). Stratification of BMI using the World Health Organization (WHO) International classification for BMI: underweight (< 18.50 kg/m²), normal (18.50 - 24.99 kg/m²), overweight (25.00 - 29.99 kg/m²) and obese (> 30.00 kg/m²) was done. Standardised self-reported heel pain questionnaire, clinical examination and standard weight bearing antero-posterior and lateral radiographs were obtained in all cases of heel pain.

RESULTS
Out of a total of 16,480 patients attending Orthopaedics OPD, 194 cases with heel pain were included in the study (1.18%). 43% cases had a BMI of > 25. Amongst the total sample size, 111 patients were male and 83 were female. 41 male patients (37%) and 42 female patients (51%) had BMI > 25. No cases were reported in the first two decades. The youngest patient was aged 20 years and the oldest was 79 years old. Maximum patients belonged to the fourth decade. Medial aspect of heel (72%) was most commonly reported in heel pain.

CONCLUSION
This is probably the first study of its kind in the North Eastern Region of the country demonstrating that high BMI is a likely risk factor for the development of heel pain, particularly in the females.

KEY WORDS
Body Mass Index, Heel Pain, Obesity.


BACKGROUND
In 1922 Stell[1] stated- "Painful heel appears to be a condition which is seldom efficiently treated for the simple reason that the causation is not exactly diagnosed." Lapidus and Guidotti[2] in 1965 stated that the name of painful heel is used deliberately in preference to any other more precise aetiological diagnosis, since the cause of this definite clinical entity still remains unknown. Now even after 50 years, the cause of heel pain still remains a diagnostic dilemma.

The foot is a complex structure of 28 bones, 33 joints, 57 articulating surfaces, 112 ligaments and 20 muscles. Enormous amount of forces act upon the foot during walking and running. The heel can absorb 110% of the body’s weight during walking and 200% of the body’s weight during running.[3]

Heel pain is one of the fastest growing problems in the community. It is a common problem in adults that may cause significant discomfort and disability. Various soft tissue, osseous and systemic disorders can cause heel pain such as Achilles tendonitis, fat pad trophy, heel contusion, plantar fascia rupture, tarsal tunnel syndrome, abductor digit five nerve entrapment, Sever’s disease, calcaneal stress fracture, osteomyelitis etc.[4]

Overweight or obesity may be a key factor associated with heel pain.[5] Both heel pain and obesity peak around middle age, predominantly in women.[6] There are three hypotheses relating to heel pain and BMI. Firstly, heel pain develops first and causes a decrease in activity levels resulting in weight gain.[7] Second, a high Body Mass Index (BMI) or obesity precedes foot pain that causes increase in load on the joints and structures of the feet resulting in heel pain.[8,9] A third and more recent hypothesis suggests that there may be a metabolic element with regard to body composition, generally increased adipose tissue and foot pain.[10,11]

In this prospective observational study, we have tried to find out the incidence of obesity in heel pain patients and also some other factors such as age, sex, site of distribution in the heel etc. are dealt here.

MATERIALS AND METHODS
Study Sample and Study Design
194 patients attending the Outpatient Department of Orthopaedic Surgery, Assam Medical College and Hospital, Dibrugarh with the chief complains of heel pain were included in the study. This prospective observational study was conducted from 1st July 2006 to 31st November 2007, a...
duration of seventeen months. All cases presenting with painful heel during this period were included. Acute heel pain due to trauma or acute infection were excluded. Also, any other pathological condition of the heel such as tumours were excluded. Foot deformities such as cavus foot, heel valgus and flat foot were excluded.

Assessment of Demographic and Clinical Characteristics
Age was recorded in whole years depending on the participant’s age on the day of their first visit. The patient’s history, clinical examination was systematically recorded which gave a clue to those patients who required investigations. Height was measured in cm (to the nearest 0.1 cm) in a standing position and barefoot using a wall-mounted stadiometer and then was converted to metres. Weight was measured in kg (to the nearest 0.1 kg) by electronic scales with shoes removed.

Body Mass Index (Quetelet’s Index)
The height and weight measures were used to calculate the participant’s BMI (weight in kg divided by the square of height in metres) \( \text{BMI} = \frac{\text{Weight in kg}}{\text{Height in m}^2} \). Stratification of BMI was made using the World Health Organization (WHO) International classification for BMI: underweight (<18.50 kg/m²), normal (18.50 – 24.99 kg/m²), overweight (25.00 - 29.99 kg/m²) and obese (>30.00 kg/m²).\(^\text{[12]}\) However, BMI may not correspond to the same degree of fatness in different population due, in part, to differences in body proportion.

Heel Pain
A standardised self-reported heel pain questionnaire was used to capture information regarding the duration, onset, characteristic and factors related to the pain symptoms. The questionnaire excluded other associated systemic and local causes such as trauma and infection. Clinical examination was done to reinforce the findings of the questionnaire and to rule out any other pathologies and foot deformity. Also, standard weight bearing antero-posterior, lateral and axial radiographs were obtained in all cases of heel pain.

RESULTS
A total of 16,480 patients attended the Orthopaedics OPD of AMCH, out of which 194 cases with heel pain were included in the study comprising an incidence of about 1.18% (Figure-1). 43% (84 cases) of the total cases of heel pain had a BMI (Body Mass Index) of >25, i.e. overweight patients (Figure-2). Out of the 194 included heel pain patients, 111 patients were male and 83 were female. 41 male patients (37%) and 42 female patients (51%) had BMI >25. Thus, BMI may be more strongly related as a risk factor in the female patients than the male patients (Table-1).

There were no cases in the age group of 0 - 19 years. The youngest patient in the study was aged 20 years and the oldest was 79 years old. Maximum patients belonged to fourth decade (Table-2).

The site of heel pain was most commonly found in the medial aspect of heel (72%) followed by pain in the sole (13%) and pain in the post part of the heel (12%). Diffuse heel pain involving medial, lateral, posterior and sole of the heel comprises 3% of heel pain (Figure-3).

<table>
<thead>
<tr>
<th>BMI Values</th>
<th>Number of Patients</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>7</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>18.5-24.99</td>
<td>63</td>
<td>32</td>
<td>95</td>
</tr>
<tr>
<td>25-29.99</td>
<td>35</td>
<td>28</td>
<td>63</td>
</tr>
<tr>
<td>&gt;=30</td>
<td>7</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
<td>83</td>
<td>194</td>
</tr>
</tbody>
</table>

Table 1. Correlation of BMI, Sex Ratio and Heel Pain
In our study of 194 cases, we found 43% of the total cases of heel pain have BMI (Body Mass Index) of > 25, i.e. overweight patients. There are numerous reasons and risk factors for heel pain in adults and isolating a single factor implicating for the same is difficult. Here, in this study, the patients with heel pain are observed and all other causes or risk factors are tried to be excluded. Also, out of the 111 male patients 41 patients have BMI > 25, comprising about 37% of the total male patients. Of the 83 female patients, 42 patients have BMI > 25, comprising about 51% of the total female cases. Thus, a high BMI was found commonly in the female patients than the male patients with heel pain.

**CONCLUSION**

This is probably the first study of its kind in the North-Eastern Region of the country, which evaluated heel pain and BMI. However, a comparative study including the work pattern, foot structure and type of foot wear used by patients with a longer follow-up is required to find out whether high BMI might have a significant impact on heel pain.

**REFERENCES**


