Original article:

Study of Association of Obesity with Knee Joint Osteoarthritis in Females at a Tertiary Care Teaching Hospital

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ABSTRACT:

Introduction: Osteoarthritis (OA) is one of the commonest causes of disability and knee disease is the commonest site leading to loss of function and pain. The present study was conducted to assess whether obesity explains the trend in knee pain and osteoarthritis in females.

Methodology: An Observational, Cross sectional study was conducted in Department of Orthopaedics, Santosh Medical College and Hospital, Ghaziabad, UP (India). 120 female patients (age ranges between 45-70 years) visiting to department of orthopaedics during (Oct 2010-Sept 2011) were included to participate in study. Patients with any evidence of secondary OA, inflammatory arthritis, and those with neurological conditions were excluded.

Results: In present study, among 120 females, 61.67% females were obese, 24.17% females were overweight, 14.17% females had normal BMI. 78.33% of subjects were diagnosed as OA of knee. Frequency of variables showed that 88.3% had a positive family history, 81.9% females were post-menopausal and almost everyone had pain, crepitus and morning stiffness. 87.2% patients had joint swelling.

Conclusion: Present study was conducted to assess whether obesity (described in terms of increased BMI) explains the trend in knee pain and osteoarthritis in females. Study showed that 93.2% of the obese females developed symptomatic OA of knee and obesity is strongly associated with OA.

Key Words: Body Mass Index, Knee, Obesity, Osteoarthritis.

INTRODUCTION

Osteoarthritis (OA) is one of the commonest causes of disability and knee disease is the commonest site leading to loss of function and pain.¹ Osteoarthritis is a degenerative joint disease of multifactorial origin. It is estimated that prevalence range from 4 -30% depending on the age, sex and disease definition.²,³ Obesity, defined by either increased weight (kg) or BMI, is a powerful risk factor for development of knee OA.⁴ Weight loss reduces the risk of symptomatic knee OA,⁵ and for obese patients with knee OA, weight loss and exercise are recommended by both the American College of Rheumatology and the European League Against Rheumatism. However, this recommendation is primarily supported by expert opinion; meta-analysis of randomised controlled trials (RCTs; ie, category 1a evidence) is yet to be undertaken.⁶,⁷ Two major theories have been proposed to

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explain this association (systemic/metabolic mechanisms). The biochemical theory suggests that obesity increases axial loading with consequence degeneration of articular cartilage and sclerosis of subchondral bone, whereas metabolic theory proposes that some metabolic factors adversely affect cartilage.

Many population studies to date have found a cross-sectional association between obesity and OA of the tibiofemoral joint of the knee. Radiographic knee OA is increased 4-fold in obese women, with a range of odds ratios (ORs) between 2 and 9 in different studies.

There is a dose-response relationship between excess weight or obesity and knee OA. These cross-sectional data have been confirmed by longitudinal data from the Framingham Study, the Chingford study, as well as the Baltimore Longitudinal Study of Aging.

The present study was conducted to assess whether obesity explains the trend in knee pain and osteoarthritis in females.

**METHODOLOGY**

An Observational, Cross sectional study was conducted in Department of Orthopaedics, Santosh Medical College and Hospital, Ghaziabad, UP (India). 120 female patients (age ranges between 45-70 years) visiting to department of orthopaedics during (Oct 2010-Sept 2011) were included to participate in study. Patients with any evidence of secondary OA, inflammatory arthritis, and those with neurological conditions were excluded.

Detailed history was taken from all patients regarding onset of pain, aggravating and relieving factor, other joints affected by OA, family history, physical activities, history of menopause etc.

Complete physical examination for OA of the knee joint was done to assess any swelling and note any various movements which may bring on pain.

**Criteria Used to Diagnose OA of Knee Joint**

1) Knee pain for most days of the month
2) Crepitus on active joint motion
3) Morning stiffness more
4) Bony enlargement of the knee on examination.

Ethical approval for the study was granted by the institutional ethical committee. The written consent was taken from all the subjects for participation in the study.

**RESULTS AND DISCUSSION**

Table 1: Patients statistics.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>51.9 ± 7.8</td>
</tr>
<tr>
<td>Height</td>
<td>1.56 ± 0.74</td>
</tr>
<tr>
<td>Weight</td>
<td>84.97 ± 16.26</td>
</tr>
</tbody>
</table>
Table 2: Association Between BMI And OA

<table>
<thead>
<tr>
<th>BMI</th>
<th>Osteoarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Normal</td>
<td>4</td>
</tr>
<tr>
<td>Overweight</td>
<td>21</td>
</tr>
<tr>
<td>Obese</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
</tr>
</tbody>
</table>

Table 3: Frequency of variables in diseased patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Family h/o OA</td>
<td>83</td>
<td>11</td>
</tr>
<tr>
<td>Menopause</td>
<td>77</td>
<td>17</td>
</tr>
<tr>
<td>Pain in knee joint, Morning Stiffness, Crepitus</td>
<td>94</td>
<td>00</td>
</tr>
<tr>
<td>Joint Swelling</td>
<td>82</td>
<td>12</td>
</tr>
<tr>
<td>Radiating Pain</td>
<td>71</td>
<td>23</td>
</tr>
<tr>
<td>Difficulty in climbing stairs</td>
<td>94</td>
<td>00</td>
</tr>
<tr>
<td>Weak quadriceps</td>
<td>69</td>
<td>25</td>
</tr>
<tr>
<td>Deformity in knee joint</td>
<td>41</td>
<td>53</td>
</tr>
</tbody>
</table>

In present study, among 120 females, 61.67% females were obese, 24.17% females were overweight, 14.17% females had normal BMI. 78.33% of subjects were diagnosed as OA of knee. Frequency of variables showed that 88.3% had a positive family history, 81.9% females were post-menopausal and almost everyone had pain, crepitus and morning stiffness. 87.2% patients has joint swelling.

Present study was conducted to assess whether obesity (described in terms of increased BMI) explains the trend in knee pain and osteoarthritis in females. Study showed that 93.2% of the obese females developed symptomatic OA of knee and obesity is strongly associated with OA. Several studies have identified a genetic predisposition towards OA. Only one study showed that the offsprings of people with medial tibio-femoral OA walked with a less than normal degree of foot rotation, which may ultimately predate disease.

OA has a substantial disease burden and affects quality of life on many levels. “People with OA have more difficulty and take longer to perform activities of daily living, having less time available for leisure activities, depend significantly more on family and friends for assistance, and spend more money on healthcare than age-matched and sex-matched peers in the general population.”

Knee-joint moments contribute to the stress placed on the knee during walking. Specifically, higher external adduction moments (or internal abduction moment) are related to increased compressive loads transmitted to the medial compartment of the knee.
knee.\textsuperscript{21} Schipplein and Andriacchi proposed that increased compressive forces at the knee represent an adaptive gait strategy to increase dynamic stability in the presence of a high external adduction moment.\textsuperscript{22} During the single-leg stance in the gait cycle, a force of 3 to 6 times that of body weight is transmitted across the knee joint. Likewise, the force exerted across the hip is 3 times that of body weight. These forces are increased several times over during high-impact activities. “Therefore, any increase in weight may be roughly multiplied by these factors to reveal the excess force across the knee when an overweight person walks.”\textsuperscript{23} This increase in force elevates stress on articular cartilage and causes its eventual breakdown, which in turn causes proliferation of periarticular bone (to distribute the increased forces) and culminates in decreased joint space. If unchecked, this vicious cycle continues until the joint space is obliterated. Given that obesity is associated with the onset and progression of OA, weight loss represents an important preventive strategy. The Framingham Study showed that weight control significantly affected the risk of developing knee OA. The women who reduced their BMI by 2 units or more, reduced the odds for developing OA by \textgreater50\%. It can be concluded that obesity is strongly associated with the development of secondary OA of knee in females. Primary and secondary prevention programs aimed at reducing obesity, preventing injury, and improving rehabilitation and physical activity are urgently needed.

REFERENCES


This original research work was conducted by Dr. Arun Bansal and Dr. Santosh Kumar, Associate Professor, Department of Orthopaedics, Santosh Medical College and Hospital, Ghaziabad, UP, India.

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