

# Occupation-related physical activities in osteoarthritis of the knee in female

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## Article Info

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Received: 14 March 2019  
Accepted: 26 April 2019  
Available Online: 1 July 2019

ISSN: 2224-7750 (Online)  
2074-2908 (Print)

DOI: 10.3329/bsmmuj.v12i2.41230

**Keywords:** Female; Knee; Occupation; Osteoarthritis; Physical activity

### Cite this article:

Emran M, Ahmed SM, Hasan MI, Emran A. Occupation-related physical activities in osteoarthritis of the knee in female. Bangabandhu Sheikh Mujib Med Univ J. 2019; 12: 84-87.

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### Available at:

www.banglajol.info

A Journal of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

## Abstract

The aim of this study was to determine the role of occupation-related physical activities in the osteoarthritis of the knee. The study was conducted on 87 female patients from September 2016 to August 2017. The same number of healthy females of the same age group were included as a control. Data was collected using a structured interviewer-administered questionnaire, enquiring about demographic data and details of risk factors. There were statistically significant ( $p < 0.05$ ) changes in the occupation-related physical activities like sustained knee bending, climbing stairs ( $> 10$  flights/day), kneeling ( $> 30$  min/day), squatting ( $> 30$  min/day), in patients when compared to the control group. However, there were no significant changes in other occupation-related physical activities. Obese ( $BMI \geq 30$  kg/m<sup>2</sup>) patients were found 29.9% in the patient and 17.2% in the control group. Patients with a positive family history of osteoarthritis of the knee were 13.8% in the case group and 3.4% in the control group. The difference was statistically significant ( $p < 0.05$ ) between the two groups. In conclusion, occupation-related physical activities like sustained knee bending, climbing stairs, kneeling and squatting had a significant association with osteoarthritis of the knee in the female.

## Introduction

Osteoarthritis of the knee is the most common form of joint disease and among the top 10 causes of disability worldwide.<sup>1</sup> It's a degenerative joint disease, occurring primarily in older individuals, characterized by erosion of the articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis, and a range of biochemical and morphological alterations of the synovial membrane and joint capsule.<sup>2</sup>

Multiple factors are responsible in the etiology of osteoarthritis of the knee including generalized constitutional factors for example- age, sex, obesity, heredity, reproductive variables and local adverse mechanical factors for example- trauma, occupational and recreational usage, alignment.<sup>3,4</sup> In a family-based study, the heritability of osteoarthritis ranges between 43% at the knee to 60% and 65% at the hip and hand, respectively.<sup>5</sup>

It is important to identify the risk factors for the development of strategies for primary and secondary prevention of osteoarthritis of the knee.<sup>6</sup>

The occupational activities that causing osteoarthritis of the knee by frequent exposure to several biomechanical stressors are heavy physical workload, bending of the knee, regular

stair climbing, kneeling, squatting, sitting, standing  $\geq 2$  hours per day, walking  $\geq 3$  km/day, jumping and vibration.<sup>7-11</sup>

Activity modification is a very important component in the management of the osteoarthritis of the knee.<sup>12</sup>

Obesity is significantly associated with osteoarthritis of the knee compared to less BMI.<sup>13</sup> The effect of obesity in osteoarthritis of the knee is malalignment.<sup>14</sup> Obese individuals have 1.5 to 2 times the risk of developing osteoarthritis of the knee.<sup>15</sup> Fowler-Brown et al (2015) found that a 5 kg/m<sup>2</sup> increase in BMI was associated with a 32% increase in the probability of osteoarthritis and leptin contributed approximately half of the total effect of obesity on osteoarthritis of the knee.<sup>16</sup>

Until now a few studies of the association between factors related to osteoarthritis of the knee have been carried out in a representative sample. Therefore, it is clear that there is a need to determine the factors related to osteoarthritis of the knee of people.

The present study was designed to examine the relationship between occupation-related physical activities and body mass index with the osteoarthritis of the knee in the female.



## Materials and Methods

This case-control study was conducted from September 2016 to August 2017. In total 174 female participants (age range: 40-70 years) were divided into two groups: 87 patients with osteoarthritis of the knee as the case and 87 were without osteoarthritis of the knee as the control. Data were collected using a structured interviewer-administered questionnaire, enquiring about demographic data and details of risk factors. There was a minimum physical, psychological, social and legal risk. Heights and weights were measured to calculate body mass index.

### Statistical analysis

Statistical analysis was carried out by using the Statistical Package for Social Sciences version 23.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The quantitative observations were indicated by frequencies and percentages. Chi-Squared test was used to analyze the categorical variables, shown with cross tabulation. The p value of <0.05 was considered statistically significant.

## Results

The mean age of both groups was 57 years. Among the 87 patients, 23 were doing activities with sustained knee bending, 18 with climbing stairs >10 flights/day, 17 with kneeling >30 min/day, 11 with squatting >30 min/day whereas, in control group, the values were 9, 8, 6, and 2 respectively. The p-value was found significant (p<0.05). The other occupation-related physical activities were not statistically significant (p>0.05) between the two groups (Table I).

The number of patients with obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) was 26 and in the control group, it was 15 which was statistically significant (p<0.05) between the two groups.

There were 12 patients with a positive family history of osteoarthritis of the knee and the value was 3 in the control group, which was significant (p<0.05).

## Discussion

This study reveals sustained knee bending, climbing stairs, kneeling, squatting were important in the development of osteoarthritis of the knee in the female. However, other occupation-related physical activities were not statistically significant (p>0.05) between the two groups. Obesity and family history of osteoarthritis of the knee were significantly higher in the case group than the control group.

This study agrees with Haq and Davatchi (2011) where squatting and cycling were modifiable risk factors for osteoarthritis of the knee.<sup>17</sup>

In a previous study, sustained knee bending was found responsible for osteoarthritis of the knee, in which 8 participants were in the case group and 11 were in the control group.<sup>18</sup>

The other study observed there was an association between the stair climbing and osteoarthritis of the knee and there is 2 times more possible chance to develop osteoarthritis of the knee due to stair climbing regularly.<sup>19</sup>

It is found in a study that occupational knee bending is a positive risk factor for the development of osteoarthritis of the knee. The odds of getting osteoarthritis with increased occupational knee bending were significantly higher than for those who had no knee bending. The odds ratio varied from 1.2 to 6.9 for different types of knee bending.<sup>20</sup>

Haq and Davatchi (2011) explained overweight as a risk factor for osteoarthritis of the knee<sup>17</sup> but this study revealed that obesity a significant one and agree with Shakoore et al. (2009)<sup>21</sup> and Dieppe (1995)<sup>22</sup> Excess body weight is a risk for developing osteoarthritis of the knee.<sup>23</sup> Obesity has been identified as a significant risk factor for osteoarthritis of the knee in Britain,<sup>24</sup> Sweden,<sup>25</sup> and Japan.<sup>26</sup> A study in Morocco found that the mean BMI was 30.5  $\pm$  4.4 kg/m<sup>2</sup> in the case group and 27.6  $\pm$  3.8 in control group. The difference was statistically significant (p<0.05) between the two groups.<sup>27</sup> These findings support the result of this study. Some studies showed overweight as significant for osteoarthritis of the knee and there is 2.25 times more possible chance to occur osteoarthritis of the knee due to overweight.<sup>18, 19</sup> Other studies also observed that 70.6% of patients had BMI  $\geq 25.0$  kg/m<sup>2</sup> in men group and 47.7% in woman group.<sup>28</sup> Mean BMI was high 29.4  $\pm$  7.8 in osteoarthritis cases.<sup>29</sup>

According to review heritability for the

Table I

### Occupation-related physical activities of the study population

Occupation-related physical activities	Case (n= 87)	Control (n= 87)	p value
Squatting (>30 min/day)	11	2	0.009 <sup>s</sup>
Kneeling (>30 min/day)	17	6	0.014 <sup>s</sup>
Climbing stairs (>10 flights/day)	18	8	0.033 <sup>s</sup>
Walking (>2 miles/day)	27	24	0.617 <sup>ns</sup>
Standing (>2 hours/day)	31	26	0.419 <sup>ns</sup>
Sitting (>2 hours/day)	26	21	0.393 <sup>ns</sup>
Sustained knee bending	23	9	0.006 <sup>s</sup>

s= significant, ns= not significant

osteoarthritis of the knee ranges between 43%.<sup>5</sup> Some studies found an association between the positive family history and the osteoarthritis of the knee.<sup>18</sup> Patil et al. (2012) reported 19.4% of patients had a positive family history in the female group.<sup>30</sup> These are in favor of this present study.

## Conclusion

Sustained knee bending, climbing stairs, kneeling, squatting, obesity, positive family history are risk factors for osteoarthritis of the knee.

## Conflict of interest

There is no conflict of interest.

## Ethical Issue

A well-informed, voluntary, signed written consent was taken in an understandable local language from the study subjects before enrollment after convincing them that privacy, anonymity, and confidentiality of data information identifying any patient were maintained strictly. Each patient enjoyed every right to participate or refuse or even withdraw from the study at any point in time. The protocol was approved by the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University (BSMMU/2017/441).

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