PREVALENCE OF KNEE JOINT OSTEOARTHRITIS AMONG PERIMENOPAUSAL AND POST-MENOPAUSAL WOMEN IN GUWAHATI, ASSAM, INDIA

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ABSTRACT

Knee joint osteoarthritis is the commonest form of osteoarthritis. Literature review unveils that the prevalence of knee joint osteoarthritis shows an upward trend in females during perimenopausal period and continues to soar up throughout menopause. To estimate the prevalence of knee joint osteoarthritis (OA), its determinants and the treatment seeking practices of peri-menopausal and post-menopausal women with knee joint OA in Guwahati, a community based cross-sectional study was accomplished by administering a pre-tested validated questionnaire among 400 women in the age group of 40-65 years in Guwahati, Assam. Information of selected socio-economic and demographic factors, lifestyle factors, menopause status and treatment seeking practices of women regarding knee joint problems were obtained. The prevalence of knee joint osteoarthritis was estimated to be 28.3%. Prevalence was reported high in the age group of 50-59 years (46%) and was significantly associated with age, occupation, menopause, diabetes, hypertension, lifestyle and body mass index. On the contrary, variables such as education, religion, marital status, socio-economic status, and alcohol and tobacco consumption did not show significantl association with knee OA.

Introduction

Osteoarthritis (OA) is a chronic degenerative disease which leads to a decline in the capability to perform activities of daily living by the elderly dependent population in the community (Felson DT, 1990). Millions of people worldwide are affected by this disease. "OA is a heterogeneous group of conditions that lead to joint symptoms and signs which are associated with defective integrity of articular cartilage and related changes in the underlying bone at the joint margins".(Altman R,Asch E,Bloch D,Bole G,Borenstein D,Brandt K etal., 1986).

Knee osteoarthritis, the commonest form of osteoarthritis affects every aspect of an individual's daily life and their overall quality of life (Page CJ, Hinman RS, Bennel KL, 2011; Doherty M, Mazieres B, Le BM ,2003).

"Menopause marks the termination of a woman's menstrual cycles and involves a natural reduction in reproductive hormones. It is officially defined as occurring when 12 successive months have elapsed since the last menstrual period. The months or years straightaway preceding menopause add up to a time termed perimenopause. Perimenopause is defined as the duration during which a woman's body makes the natural transition to menopause signifying the ending of the reproductive years of a woman's life. "Throughout this duration, women suffer from mood changes, irregular periods, vaginal dryness, hot flashes, night sweats, sleep problems, slowed metabolism and subsequent weight gain, thinning hair, dry skin, and breast changes such as loss of fullness". (Midlarsky, Elizabeth & Graber Liat. 2018). Post menopause is the time after complete cessation of menstruation.

Literature review unveils that that the prevalence of knee joint osteoarthritis shows an upward trend in females during peri-menopausal period and continues to soar up throughout menopause. Studies suggest that declining levels of estrogen during menopause increases a women's risk of acquiring osteoarthritis (Spector TD, Campion GD,1989). In contrast to 51 years in western countries, the average menopausal age in Indian women is 46.3 years predisposing Indian women to the risk of developing osteoarthritis at an earlier age in comparison to their western counterparts (Kapur P, Sinha B, Pereira BM ,2009).

A literature search showed that although few attempts were made to analyze the prevalence

and determinants of knee joint OA in the age group of 30-70 years of women in various parts of northern and southern India, no such attempt has been made in the north-eastern part of India. Paucity of community based surveys prompted the authors to plan the present study to evaluate the prevalence of knee joint OA in perimenopausal and post menopausal women in Guwahati city, Assam.

Objectives of the study: To estimate the prevalence of knee joint osteoarthritis, to evaluate the interrelation of knee OA with demographic variables, lifestyle factors, trauma and ability to perform activities of daily living, and to examine the treatment seeking behaviour of perimenopausal and post menopausal women with knee joint OA in Guwahati, Assam.

Materials and Methods

A community-based cross-sectional study was executed in Guwahati City, Assam from 1st May 2019 to 31st October 2019.

A questionnaire previously used by other researchers in prevalence study related to osteoarthritis was administered among women in the age group of 40-65 years where information of selected socio-economic and demographic factors, lifestyle factors, menopause status and treatment seeking behaviour of women regarding knee joint problems were obtained. "The clinical criteria given by American College of Rheumatology for classification of idiopathic osteoarthritis of knee which can be used in community for diagnosis of osteoarthritis with 95% sensitivity and 69% specificity was used for diagnosis of osteoarthritis. A subject was diagnosed as suffering from osteoarthritis if there was presence of knee pain along with at least three of the following symptoms: Morning stiffness lasting 30 minutes or less, crepitus on motion, bony tenderness, bony enlargement, or no palpable warmth" (AltmanR et al . 1986 and Joshi VL,Chopra A.2009) . Modified Kuppuswamy's Scale was utilized for the assessment of socioeconomic status (Saleem, Sheikh. 2018) . Considering the fact that no prevalence studies on osteoarthritis of knee joint in the northeastern part of India is available in the literature, sample size was calculated using the Cochrane formula for

sample size calculation; $n = 4PQ/L2$, where P was taken as 50% and allowable error as 10% of P. The calculated sample size was 400 (Sarmukaddam SB, Garad SG. 2004)

Ethical clearance approval for the study was granted by the Ethical Clearance Committee of the institution.

Out of 31 municipality wards of the city, 10 wards were selected randomly by lottery method. From each ward, data was collected from 40 women in the age group of 40-65 years. House-to-house visits were made until the desired sample was met. The first house was randomly selected from the particular ward. Then, every 3rd house was visited to collect the data. From each household, all eligible subjects were included in the study, prior to which written informed consent was signed by the participant. Identity of the participant was kept confidential and anonymous. Information was collected on a pretested validated questionnaire.

After collection, data were compiled and reviewed. Data were coded and entered into SPSS version 21.0 software. Percentages and chi square tests were used to draw inferences.

Results

The larger number of the respondents (62%) were from 40-49 years of age group. Majority of them belonged to Hindu (83.8%) religion followed by Muslim (14%) religion, Christian (1.5%) and others (0.8%). Out of 400 respondents, 155(38.7%) were working and 245(61.1%) were homemakers. 45 % (majority) of the respondents belonged to the upper middle socioeconomic status .Prevalence of knee pain was estimated to be 42.5%.113 respondents among 400 fulfilled the clinical diagnostic criterion for knee osteoarthritis. The prevalence of knee OA was recorded to be 28.3%. The prevalence was reported high in 50-59 years (46%) of age group. The prevalence was significantly associated with age, occupation, menopause, diabetes, and hypertension, body mass index (BMI) and lifestyle [Table no.1, 2 and 3]. On the other hand, variables such as education, religion, marital status, socio economic status, tobacco, alcohol consumption were not significantly associated with knee OA [Table no.1, 2 and 3].

Table no.1: "Association of demographic variables and knee OA"

Demographic variables	Suffering from knee OA		Total n=400	Significance
	No%	Yes%		
Age(years) • 40-49	226(91.1%)	22(8.9%)	248	χ^2=121.394 *P*=0.0001[*]
• 50-59	38(42.2%)	52(57.8%)	90	
• >60	23(37.1%)	39(34.5%)	62	
Education • Matriculation or less	60(69%)	27(31%)	87	χ^2=1.409 *P*=0.703
• Senior secondary	82(70.1%)	35(29.9%)	117	
• Graduation	116(73%)	43(27%)	159	
• Post-graduation or more	29(78.4%)	8(21.6%)	37	
Religion • Hindu	245(71.3%)	90(26.9%)	335	χ^2=2.646 *P*=0.449
• Muslim	37(66.1%)	19(33.9%)	56	
• Christian	3(50%)	3(50%)	6	
• Sikh	0	0	0	
• Others	2(66.7%)	1(33.3%)	3	
Marital status • Single	7(77.8%)	2(22.2%)	9	χ^2=o.239 *P*=0.888
• Married	276(71.7%)	169(28.3%)	385	
• Divorced/separated/widow	4(66.7%)	2(33.3%)	6	
Occupation • Home-maker	157(64.1%)	88(35.9%)	245	χ^2=18.343 *P*=0.000[*]
• Working	130(83.9%)	25(16.1%)	155	
Socio-economic status • Upper	34(73.9%)	12(26.1%)	46	χ^2=6.243 *P*=0.182
• Upper middle	119(66.1%)	61(33.9%)	180	
• Lower middle	112(75.7%)	36(24.3%)	148	
• Upper lower	18(85.7%)	3(14.3%)	21	
• Lower	4(80%)	1(20%)	5	

*Significantly associated with knee OA, *p* < 0.05 statistically significant, chi-square (χ^2) test applied, OA: Osteoarthritis.

Table no. 2: "Association between lifestyle factors and knee OA"

| Characteristics	Suffering from knee OA		Odds ratio (95% CI)	P=
	Present %	Absent %		
Tobacco				
• Yes	17(24.3%)	53(75.7%)	0.782(0.431,1.419)	0.417
• No	96(70.9%)	234(29.1%)		
Alcohol				
• Yes	16(34%)	31(66%)	1.362(0.713,2.601)	0.348
• No	97(27.5%)	256(72.5%)		
Diet				
• Vegetarian	26(43.3%)	34(56.7%)	2.224(1.263,3.916)	0.005
• Mixed	87(25.6%)	253(74.4%)		
Family h/o knee OA				
• Yes	86(74.1%)	30(25.9%)	27.286(15.363,48.463)	0.001[*]
• No	27(9.5%)	257(90.5%)		
Diabetes				
• Yes	51(52%)	47(48%)	4.200(2.587,6.821)	0.001[*]
• No	62(20.5%)	240(79.5%)		
Hypertension				
• Yes	80(53.7%)	69(46.3%)	7.659(4.704,12.472)	0.001[*]
• No	33(13.1%)	218(86.9%)		
BMI				
• Normal	21(7.6%)	255(92.4%)	0.29(0.016,0.052)	0.001[*]
• Over weight	52(64.2%)	29(35.8%)	7.584(4.450,12.925)	
• Obese	40(93%)	3(7%)	51.872(15.606,172.413)	
Lifestyle				
• Active	13(5.8%)	211(94.2%)	0.047(0.025,0.088)	0.001[*]
• Moderate	29(30.9%)	65(69.1%)	1.179(0.712,1.953)	
• Sedentary	71(86.6%)	11(13.4%)	42.416(20.786,86.553)	

Chi-square test was applied, *p*< 0.05 statistically significant, CI: confidence interval, BMI: Body Mass Index, OA: Osteoarthritis.

Table no. 3: "Association between knee OA and menopause"

Characteristics	Suffering from knee OA		Odds ratio(95% CI)	Significance P=
	Present%	Absent %		
Menopause status				
• Peri-menopause	26(10.7%)	218(89.3%)	10.572(6.317,17.693)	0.001[*]
• Post-menopause	87(55.8%)	69(44.2%)		

Chi-square test was applied, *p*< 0.05 statistically significant, CI: confidence interval, OA: osteoarthritis.

Figure no. 1: "Depicting the treatment seeking behaviour of knee osteoarthritis affected individuals"
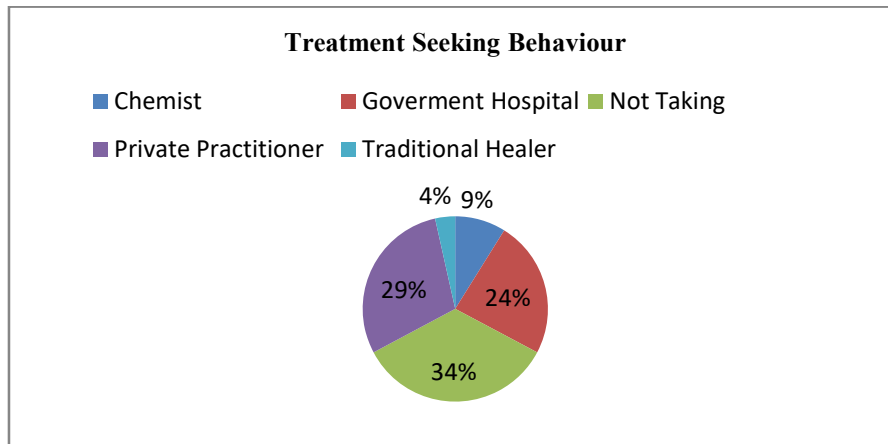
Out of 113 women suffering from osteoarthritis, only 66% were currently on treatment, out of which 24% were receiving treatment from government hospitals whereas 29% from private practitioners, 4% and 9% from chemist and traditional healers respectively. 34% of the study participants didn't seek any kind of treatment [Figure no. 1].

In the present study, 68 out of 113 women who were diagnosed to have osteoarthritis had trauma to the knee joint (60.17%).A significant association was found between knee OA and trauma to the knee [χ^2=0.728,P=0.001] .

A significant association was also found between osteoarthritis and difficulty in performing activities of daily living [χ^2=0.740, P=0.001]. 70 out of 113 women who fulfilled the diagnostic criteria for knee OA had difficulty in performing the activities of daily living (61.94%).

Discussion

In the present study, the estimated prevalence of knee osteoarthritis among women aged 40-65 years was-28.3% .It is within the range of 17-60.6% reported globally. The prevalence was reported to be slightly higher (21.6 %) for women in comparison to a study conducted in Gurdaspur, Punjab (Kaur R, Ghosh A. 2018) . However, this prevalence was lower than some previous studies conducted in various parts of India. Other studies exhibiting higher prevalence in India for knee OA were conducted by Narasimha *et al* (2016), Mahajan A *et al*.(2003), Salve *et al* (2010), Pal CP *et al*

(2016), with prevalence of 55%,42.4%, 47.3% and 28.7% respectively.

However, the prevalence observed in our study was higher than that found in Shanghai ,China (Du H, Chen SL et al. 2005); North Carolina, US(Felson DT *et al*. 2000) and Hoshiarpur, Punjab (Kaur R, Sharma VL,Singh A. 2015) for symptomatic knee OA (7.2%,16% and 19.5% respectively). In these studies, the included samples were above 40 years of age which is comparable to the inclusion criteria pertaining to age in the present study.

In the present study, it was estimated that age and knee joint OA were significantly associated. This finding is analogous to those of the studies conducted in various other places (Salve H *et al*. 2010 ;Kaur R, Ghosh A.2018 ; Sharma MK *et al*. 2007; Patil PS, Dixit UR,Shettar CM.2012; Joshi K, Kumar R,Avasthi A. 2003) .

The prevalence was also reported to be significantly associated with the sedentary lifestyle and greater BMI which is similar to the findings in the studies done by Kaur R *et al*(2018) and Oboirien M *et al* (2018). Inactive or sedentary lifestyle may cause obesity, in turn increasing BMI and making an individual more susceptible to knee OA (Driban JB *et al*. 2014). Knee OA may also give rise to sedentary lifestyle due to pain and decreased mobility, which furthermore restricts the activities or exercise. The restriction of the mobility may give rise to obesity which additionally contributes to the progression of the disease. It is a vicious cycle: a sedentary lifestyle being a risk factor for the development of knee OA, or a consequence of knee OA. On

the contrary, a study suggests that more active individuals may see a greater reduction in the risk of knee OA from avoiding a high BMI than those less active (Martin KR *et al*. 2013).

In the present study, out of 113 women who fulfilled the diagnostic criteria for osteoarthritis of knee joint, 26 women were peri-menopausal (23%) and 87 women were post-menopausal (77%). The association between knee OA and menopause was found to be statistically significant (p=0.001) which is supported by a number of studies which have proven that declining levels of estrogen during the transition towards menopause increases women's risk of acquiring knee osteoarthritis (Kaur R,Sharma VL, Singh A. 2015 and Srikanth VK *et al*. 2005).

The present study revealed that educational level was not significantly associated with knee joint osteoarthritis. This finding is contradictory to other studies stating the association between literacy level and knee OA (Callahan LF *et al*. 2010).

Limitations Of The Study

The major limitation of the study was the usage of clinical criteria with sensitivity of 95% and specificity of 69 % for diagnosis of osteoarthritis. As this study was carried out in the community, obtaining knee X-rays or laboratory reports to confirm Knee joint osteoarthritis was not possible. Hence, only symptomatic cases were considered.

Conclusion

The prevalence rate of knee OA was estimated to be 28.3% among women in the age group of 40-65 years in Guwahati, Assam. The prevalence of knee OA increased with increasing age. Prevalence was more in post-menopausal women. Sedentary lifestyle and greater BMI also emerged as factors associated with knee OA. Only 66% of the respondents with knee OA were currently receiving treatment. Hence, to address the growing burden of OA at the earliest, there is a requirement to develop screening methods specifically for women for assessment of OA. Suitable steps should be taken to raise an awareness related to importance of daily exercise, control over modifiable risk factors such as obesity and availability of various treatment options like physiotherapy, and advanced surgical management such as joint replacement.

Acknowledgements

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