International Journal of Community Medicine and Public Health
Bhaskar A et al. Int J Community Med Public Health. 2016 Oct;3(10):2926-2931
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20163385

Research Article

Osteoarthritis of knee and factors associated with it in middle aged women in a rural area of central Kerala, India

Anitha Bhaskar*, Binu Areekal, Bindhu Vasudevan, Ajith R., Surekh Ravi, Suraj Sankar

Department of Community Medicine, Goverrnment Medical College, Kottayam, Kerala, India

Received: 12 August 2016
Accepted: 08 September 2016

***Correspondence:**
Dr. Anitha Bhaskar,
E-mail: dranithabhaskar@gmail.com

ABSTRACT

Background: Osteoarthritis is the fourth leading cause of years lived with disability around the world. Prevalence of osteoarthritis is more in females compared to males. Objective of the study is to find out the prevalence of osteoarthritis of knee in middle aged women and factors associated with it.
Methods: A cross -sectional study was conducted in ward 16 of Ettumanoor panchayat. A total of 375 women above 40 years were included in the study. The data was collected at their residences using a semi structured interview schedule which include demographic details and various factors associated with osteoarthritis. Weight, height, waist circumference were measured and knee joint examination was done. Data analyzed by SPSS version 19.0.The factors that were found to have a statistical significant relationship with osteoarthritis were analyzed using logistic regression.
Results: The prevalence of knee osteoarthritis in the study sample was 41.6% (95% CI- 41.6±1.25%). Among them 66.2% have bilateral osteoarthritis of knee joint. The factors that had a significant association with osteoarthritis were increasing age (p value of 0.001(OR=2.47(1.61-3.79), attained menopause or not (p value of 0.001(OR=3.15(1.96-5.06), underwent hysterectomy or not (p value of 0.038) (OR=2(1.02-4.04), family history of osteoarthritis (p value of 0.035 (OR=1.61(1.04-2.61), BMI>30 (p value of 0.027(OR=1.86 (1.03-3.33), and history of trauma to the knee joint (p value of 0.042 (OR=1.51(0.88-2.59).
Conclusions: The prevalence of knee osteoarthritis in the study was 41.6% and the factors associated with knee osteoarthritis as per the study were increasing age, attainment of menopause, hysterectomy, family history of osteoarthritis, BMI>30 and history of trauma to the knee joint.

Keywords: Osteoarthritis knee, Prevalence, Kerala, Risk factors

INTRODUCTION

Osteoarthritis (OA) is characterized by focal areas of loss of articular cartilage within synovial joints, which are associated with hypertrophy of bone and thickening of the capsule. Clinically, the condition is characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of local inflammation. With increasing life expectancy, osteoarthritis is estimated to be the fourth leading cause of disability by the year 2020.[1] Disease progression is usually slow but can ultimately lead to joint failure with pain and disability. OA of the hips and knees tends to cause the greatest burden to the population as pain and stiffness in these large weight bearing joints often leads to significant disability requiring surgical intervention. OA may develop in any joint, but most commonly affects the knees, hips, hands, facet joints and feet. Worldwide estimates are that 9.6% of men and 18.0% of women aged ≥60 years have symptomatic osteoarthritis where as in India it ranges from 14-47%.[1-3] The prevalence of osteoarthritis increases indefinitely with age, because the

condition is not reversible. Before the age of 45, more men than women have osteoarthritis; after age 45, it is more common in women.[4] Average menopausal age in Indian women is 46.3 years as compared to 54 years in western countries.[5,6] This predisposes Indian women to the risk of developing osteoarthritis at earlier age compared to their western counterparts. It could be due to loss of estrogen especially close to menopausal years at this time.[7,8]

The cause of OA is not known; however, current evidence indicates that it is multifactorial. Major risk factors for osteoarthritis are age, female sex, obesity, occupational knee-bending, physical labour, genetic factors and race, joint trauma, vitamin D deficiency, and chondrocalcinosis.[9] Lack of proper exercise, obesity and lifestyle diseases like diabetes have aggravated it. Improper postures, trauma and inflammatory diseases add to it. These problems are made more complicated in females in the peri-menopausal age group who gain weight, loss protection of estrogen and become less and less ambulant and active.

Knee/ankle osteoarthritis triggers a vicious cycle. The pain restrict mobility and exercise, thus worsening obesity, diabetes etc. which in turn worsen the joint. Given the absence of a curative treatment, it is important to treat osteoarthritis as effectively as possible using a multidisciplinary approach tailored to the patient's needs. Permanent treatment options are beyond the financial scope of our common women, who tend to seek relief in NSAIDs with resultant kidney injury and ulcer disease. Deformities induced by the inflammatory processes make correction impossible when the disease is in the advanced stage.

Early detection and rehabilitation of the patient, education regarding prevention of progressive damage would go a long way in improving the lifestyle of the society and the financial and social burden of the society. Only limited studies available regarding this problem in India. This study aims to find out the prevalence of osteoarthritis in women above the age of 40 and to study the factors associated with osteoarthritis.

METHODS

A cross-sectional study was conducted among women above 40 years in ward 16 of Ettumanoor panchayat Kottayam, Kerala. A previous study in Indian settings reported a prevalence of osteoarthritis in females as 33%.[10] Using this prevalence and 5% absolute precision, sample size was calculated using the formula 4 pq/l 2. Calculated sample size was 354. House to house survey was carried out in the ward 16 to recruit women above 40 years to complete the required sample size.

Information was collected with a semi structured interview schedule after getting consent from the women. Information collected includes socio-demographic variables, details about occupation, past history of illness, present illness, treatment history, weight, height, waist circumference were measured and knee joint examination was done. Osteoarthritis was diagnosed by clinical criteria given by American College of Rheumatology for Classification of idiopathic osteoarthritis of knee which was used for diagnosis with 95% sensitivity and 69% specificity.[11]

The inclusion criteria were females with knee joint pain with any 3 of the following criteria: 1. Age above 50 years, 2. Stiffness more than 30 minutes, 3. Joint line tenderness, 4. Crepitus, 5. Bony out growth, 6. Absence of warmth on touch

First women were asked about knee joint stiffness for more than 30 minutes in the morning. Crepitus is assessed by moving the affected joint passively with one hand, while the other hand placed on joint is used to feel the crepitus. Irregular coarse crepitations are indicative of osteoarthritis. Bony out growth was found out by palpating over the knee joint. Absence of warmth by palpating with the back of hand. Joint line tenderness elicited by palpating lateral aspect of upper one third of leg with index finger of each hand and pressing over the knee joint.

Data was verified and entered in excel spread sheet and analyzed by SPSS 19.0 version software. Prevalence was expressed as percentages and associations were tested for significance using Chi-square test, p value<0.05 was taken as significant.

RESULTS

Of the 375 women studied most of them (35.2%) belonged to the age group 40-50 years followed by 50-60 age groups with 27.7%. Only 6.1% belonged to the above 80 years group. The mean age of study population was 56.82 years with a SD of 12.28 years. As far as education of the study group was concerned most of them had education up to middle school or high school (52.3%) with 40.3% had plus 2 or beyond education. Very few were illiterate (0.8%) or had studied up to primary school (6.7%). 31.2% of the study group was working as semiskilled or skilled workers, few were unemployed or unskilled workers (18.9%), 26.4% were semi-professionals or professionals. As per modified Kuppuswamy classification of socio economic status (updated up to 2015), 27.2% belonged to upper lower class, 30.7% to lower middle, 33.3% to upper middle and 8.8% to upper class.

The prevalence of osteoarthritis in the study sample was 41.6% (95% CI- 41.6±1.25%). Among them 66.2% have bilateral osteoarthritis of knee joint. Among those with osteoarthritis 64.7% had stiffness of knee joint followed by pseudo locking in 43.6%, crepitus in 39.1%, clicking of the joint in 38.5%, joint swelling in 26.2% and bony outgrowths in 22.1%. Restriction of movement of the

knee joint was noticed in 63.5%. Only 63.1% of the total patients were taking treatment for osteoarthritis, out of which 37.7% were taking NSAIDs/steroids/physio-therapy as treatment modality and 25.4% were taking ayurveda treatment.

Table 1: Demographic characteristics of the study population.

Demographic variables (N=375)	No of subjects	Percentage
Age group		
40-50 years	132	35.2
50-60 years	104	27.7
60-70 years	69	18.4
70-80years	47	12.5
80 years and above	23	6.1
Education		
Illiterate	3	0.8
Primary or middle	25	6.7
High school	196	52.3
Plus two or above	151	40.3
Occupation		
Unemployed/unskilled	71	18.9
Semiskilled	117	31,2
Clerical/shop owner	88	23.5
Semi/professional	99	26.4
Socioeconomic status		
Lower	Nil	0
Upper lower	102	27.2
Lower middle	115	30.7
Upper middle	125	33.3
Upper	33	8.8

The prevalence of osteoarthritis seems to be increasing with age with only 23.5% having osteoarthritis in less than 50 years, but in the 50-60 age category it increases to 46.2% and to 59.4% in the 60-70 age group category. This was also found to be statistically significant with chi square value of 30.52 and p value of 0.001 (OR=2.47(1.61-3.79). As far as occupation of subjects with osteoarthritis the highest prevalence was found in unskilled and skilled laborer group (50.4%) and lowest in clerical and shop owner group (35.2%). But this was not found to be statistically significant. The prevalence of osteoarthritis was increasing with parity. The prevalence was 53.7% among those with 5 or more children compared to 0-2 children where it was only 36.2%. But this was also not found to be statistically significant. There no statistically significant difference between mean ages of menarche among subjects with osteoarthritis and normal (14.52 vs 14.36 years). The proportion of people with osteoarthritis among those who attained menopause was extremely high at 50.4% against 24.4% for those who has not attained menopause. This was found to be statistically significant with chi square value of 23.35 and p value of 0.001 (OR=3.15(1.96-5.06). Another factor that was found to be statistically significantly associated with osteoarthritis was whether the person had undergone hysterectomy or not (Chi square value 3.839 and p value 0.038) (OR=2(1.02-4.04). The proportion of osteoarthritis among those who underwent hysterectomy was 57.1% vs 40.0% among the non hysterectomised group. Family history of osteoarthritis was also found to be associated with 50.6% of those with a family history having osteoarthris against 38.9% in the other group. This was also found to be statistically significant with chi square value of 3.756 and p value of 0.035 (OR=1.61(1.04-2.61). When the study population is categorized as per body mass index as obese and non-obese as per WHO, it was found that osteoarthritis was statistically significantly associated with BMI>30 (54.7% vs 39.4%, Chi square value -4.371 and p value -0.027 (OR=1.68(1.03-3.33). Another factor associated with osteoarthritis was previous trauma to the knee joint. Among those with a history of trauma to the knee joint the prevalence of osteoarthritis was 50% compared to 39.9% among those without trauma (Chi square value-3.56 and p value-0.042), (OR=1.51(0.88-2.59).

Table 2: Factors associated with osteoarthritis of the knee.

Associated factors	% of OA among the group	P value	OR (CI)
Age			
Elderly (>60yrs)	55.4	0.001	2.47 (1.61-3.79)
Non elderly (<60yrs)	33.5		
Menopause			
Attained	50.4	0.001	3.15 (1.96-5.06)
Not attained	24.4		
Hysterectomy			
Done	57.1	0.038	2.0 (1.02-4.04)
Not done	40		
Obesity			
BMI>30	54.7	0.027	1.86 (1.03-3.33)
BMI<30	39.4		
Family history of OA			
Present	50.6	0.035	1.61 (1.04-2.61)
absent	38.9		
Trauma of the knee joint			
Present	50	0.04	1.86 (1.03-3.33)
absent	39.9		

The factors that were found to have a statistical significant relationship with OA were analyzed using logistic regression. The Nagelkerke R^2 value was 0.147 which is a moderate value and factors statistically associated with knee osteoarthritis in multivariate analysis were attainment of menopause OR=2.16 (1.156-4.024), family history of osteoarthritis OR=1.78 (1.062-2.996) and previous trauma to the knee joint OR=1.861 (1.043-3.323)

Other factors that were not found to have a significant association with osteoarthritis were socio economic status of the person, history of oral contraceptive intake, currently taking hormone replacement therapy, history of diabetes mellitus, hypertension, bronchial asthma, type of latrine used and waist circumference.

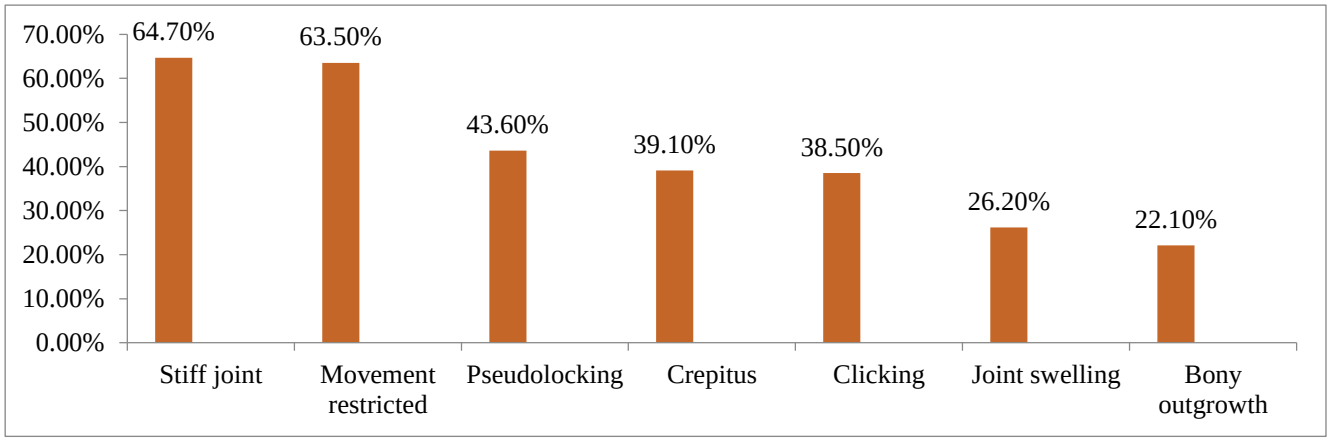

Figure 1: Clinical features of osteoarthritis among study population.

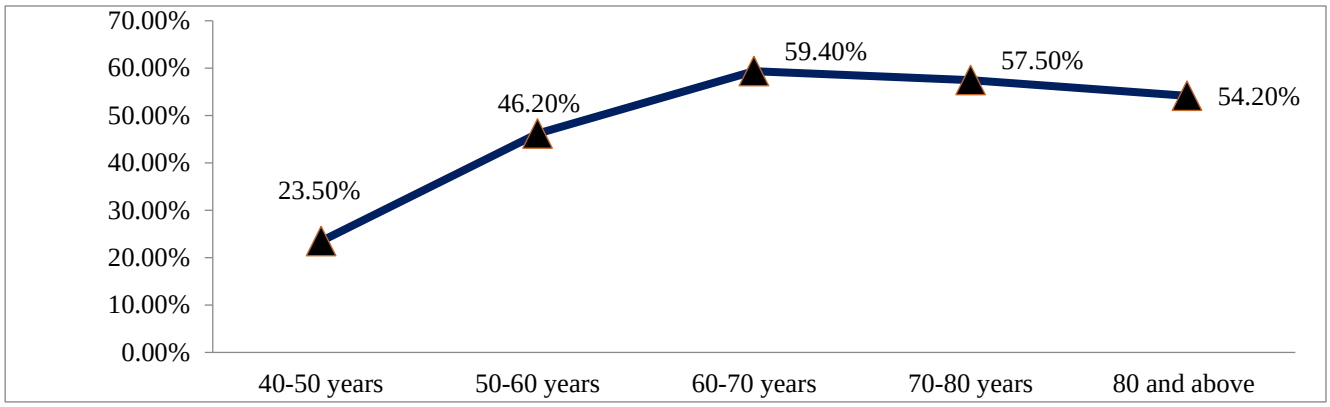

Figure 2: Age specific prevalence of osteoarthritis.

DISCUSSION

Looking at the age structure of the population studied it can be seen that all age groups have been represented from 40 years to over 80 years which could have added to the validity of the study. As far as education and occupation is concerned it can be noted that the study group is a typical cross section of the Kerala society with its high literacy rate (92.07%) and high occupation rate even among women.[12]

When we compare the prevalence of osteoarthritis of the present study (41.6%) with other studies around the world it can be seen that they are comparable. As per the study conducted by Salve et al in south Delhi among females above 40 years the prevalence was 47.3%.[2] In another study by Ajit et al across seven villages under Mugalur sub-center under Sarjapura primary health centre area, Anekal Taluk, Bangalore urban district showed a prevalence of 54.1% among elderly.[13] In another study conducted by Sharma et al conducted in the urban and rural areas in the UT, Chandigarh showed a prevalence of osteoarthritis among elderly at 56.6%.[14]

The symptoms and signs elected in the present study are similar to the findings of other studies around the world. As per Zhang et al the most important symptoms and signs of osteoarthritis were persistent knee pain, limited morning stiffness and reduced function and three signs were crepitus, restricted movement and bony enlargement.[15] When all the six were present the estimated probability of having radiographic knee OA is 99%.

As it is a degenerative disease it is logical to assume that the prevalence of osteoarthritis increases with increase in age as seen in the present study. The slightly lower prevalence in the above 80 year age category could be due to the low number of people in that category as seen in Figure 1. As per Framingham osteoarthritis Study

radiographic evidence of OA increased with age, from 27% in subjects younger than age 70, to 44% in subjects age 80 or older.[16] Similar findings have been seen in the Johnston County osteoarthritis project also.[17] As age advances aged chondrocytes respond poorly to growth factor stimulation and so are unable to maintain homeostasis in the articular cartilage. The aging changes observed in the cells and extracellular matrix of joint tissues likely increase the susceptibility of older adults to OA when other OA risk factors are also present as per the study by Anderson et al.[18] Another finding in the study was the high prevalence of osteoarthritis among those who had attained menopause. Estrogens influence the biology of joint tissues by regulating the activity and expression of key signaling molecules in several distinct pathways. Thus menopause where estrogen levels drastically drop, chances of osteoarthritis could go up.[7,8] The prevalence of osteoarthritis among those taking hormone replacement therapy after menopause was also lower that those not taking therapy (50% vs 41.1%) (P >0.05). This again shows a relation between estrogen and osteoarthritis. Another factor that was found to be associated with osteoarthritis was hysterectomy. This may not have been a direct association. As discussed earlier the relationship between estrogen and osteoarthritis could be attributed in this case also. Similar relationship of hysterectomy and osteoarthritis has also been documented in the study by Spector et al.[19] An increased rate of hysterectomy was also observed in the severe knee OA group after adjustment for age and number of children, or even after adjustment for body mass index as per study by Inoue et al.[20] Familial tendency of osteoarthritis was also seen in the present study. Classic twin studies have shown that the influence of genetic factors is between 39% and 65% in radiographic OA of the hand and knee in women, about 60% in OA of the hip, and about 70% in OA of the spine.[21] Genes implicated in association studies include VDR, AGC1, IGF-1, ER alpha, TGF beta, CRTM (cartilage matrix protein), CRTL (cartilage link protein), and collagen II, IX, and XI. Another factor associated with knee osteoarthritis was obesity with BMI>30 .This could have been because mechanical overload on weight-bearing joints activates chondrocytes and accelerates cartilage degeneration.[22] In the study by Coggon et al it was seen that relative to a body mass index (BMI) of 24.0-24.9 kg/m², the risk of knee OA increased progressively from 0.1 (95% CI 0.0-0.5) to 1 3.6 (95% CI 5.1-36.2) for a BMI of 36 kg/m² or higher. If all overweight and obese people reduced their weight by 5 kg or until their BMI was within the recommended normal range, 24% of surgical cases of knee OA (95% CI 19-27%) might be avoided.[23] Previous trauma to the joint was another factor found to be significantly associated with osteoarthritis. This has been well documented in many previous studies like the one by Gelber which showed Joint injury at cohort entry or during follow-up substantially increased the risk for subsequent osteoarthritis at that site (relative risk, 5.17 [CI, 3.07 to 8.71] and 3.50 [CI, 0.84 to 14.69] for knee and hip, respectively).[24]

CONCLUSION

The prevalence of osteoarthritis in the study was 41.6% (95% CI=41.6±1.25%). Factors associated with knee osteoarthritis as per the study in univariate analysis were found to be increasing age, attainment of menopause, hysterectomy, family history of osteoarthritis, BMI>30 and history of trauma to the knee joint. But in multivariate analysis (binary logistic regression) only 3 factors were found to be significantly associated with osteoarthritis of knee. They were attainment of menopause OR=2.16 (1.156-4.024), family history of osteoarthritis OR=1.78 (1.062-2.996) and previous trauma to the knee joint OR=1.861 (1.043-3.323).

ACKNOWLEDGEMENTS

Authors would like to acknowledge the support of all residents of ward 16 of Ettumanoor gramapachayat and the panchayat officials. We also would like to acknowledge the 5th semester MBBS students of government medical college, Kottayam who helped in data collection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. Bulletin of the World Health Organization. 2003;81(9):646–56.
2. Salve H, Gupta V, Palanivel C, Yadav K, Singh B. Prevalence of knee osteoarthritis amongst perimenopausal women in an urban resettlement colony in South Delhi. Indian J Public Health. 2010;54:155-7.
3. Ganvir SD, Zambare BR. Prevalence and Identification of Risk Factors for Knee Osteoarthritis among Elderly Men and Women. SJAMS. 2013;1(6):700-3.
4. Handout on Health. Osteoarthritis, National Institute of Arthritis and Musculoskeletal and Skin Diseases. http://www.niams.nih.gov/health_info/Osteoarthritis /default.asp. Accessed on 20 July 2016.
5. Dasgupta D, Ray S. Menopausal Problems Among Rural and Urban Women From Eastern India. Journal of Social Behavioral and Health Sciences. 2009;3(1):20–33.
6. Dratva J, Gómez Real F, Schindler C, Ackermann-Liebrich U, Gerbase MW, Probst-Hensch NM, et al. Age at menopause increasing across Europe? Results on age at menopause and determinants from two population-based studies. Menopause. 2009;16(2):385-94

7. Mahajan A, Tandon V, Verma S, Sharma S. Osteoarthritis and menopause. J Indian Rheumatol Assoc. 2005:13:21-5.
8. Roman-Blas JA, Castaneda S, Largo R, Herrero-Beaumon G. Osteoarthritis associated with estrogen deficiency. Arthritis Research & Therapy. 2009;11:241.
9. Felson DT, Lawrence RC, Dieppe PA, Hirsch R, Helmick CG, Jordan JM, et al. Osteoarthritis: New Insights. Part 1: The Disease and Its Risk Factors. Ann Intern Med. 2000;133(8):635-46.
10. Joshi K, Kumar R, Avasthi A. Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India. Int J Epidemiology. 2003;32(6):978-87.
11. Altman R, Asch E, Bloch D, Bole G, Borenstein D, Brandt K, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association. Arthritis Rheum. 1986;29(8):1039-49.
12. Kerala Population Census data 2011. http://www.census2011.co.in/census/state/kerala.html. Accessed on 25 June 2016.
13. Ajit NE, Nandish B, Fernandes RJ, Roga G, Kasthuri A, Shanbhag DN, et al. Prevalence of knee osteoarthritis in rural areas of Bangalore urban district. Internet J Rheumatology and Clinical Immunology. 2013;1(1):1-8.
14. Sharma MK, Swami HM, Bhatia V, Verma A, Bhatia SPS, G Kaur. An Epidemiological Study of Correlates of Osteo-Arthritis in Geriatric Population of UT Chandigarh. 2007;32(1)77-8.
15. Zhang W, Doherty M, Peat G, Bierma-Zeinstra MA, Arden NK, Bresnihan B, et al. EULAR evidence-based recommendations for the diagnosis of knee osteoarthritis. Ann Rheum Dis. 2010;69(3):483-9
16. Felson DT, Naimark A, Anderson J, Kazis L, Castelli W, Meenan RF. The prevalence of knee osteoarthritis in the elderly. The Framingham Osteoarthritis Study. Arthritis Rheum. 1987;30(8):914-8.
17. Jordan JM, Helmick CG, Renner JB, Luta G, Dragomir AD, Woodard J, et al. Prevalence of knee symptoms and radiographic and symptomatic knee osteoarthritis in African Americans and Caucasians: the Johnston County Osteoarthritis Project. J Rheumatol. 2007;34(1):172-80.
18. Anderson S, Loeser RF. Why is Osteoarthritis an Age-Related Disease?. Best Pract Res Clin Rheumatol. 2010;24(1): 15.
19. Spector TD, Brown GC, Silman AJ. Increased rates of previous hysterectomy and gynaecological operations in women with osteoarthritis, BMJ. 1988;297:8
20. Inoue K, Ushiyama T, Kim Y, Shichikawa K, Nishioka J, Hukuda S. Increased rate of hysterectomy in women undergoing surgery for osteoarthritis of the knee. OARS. 1995;3(3):205-9.
21. Spector TD, Mac-Gregor AJ. Osteoarthritis and Cartilage. Risk factors for osteoarthritis. Genetics. 2004;12:39-44.
22. Ellam J, Berenbaum F. Osteoarthritis and obesity. Rev Prat. 2012;62(5):621-4.
23. Coggon D, Reading I, Croft P, McLaren M, Barrett D, Cooper C. Knee osteoarthritis and obesity. International Journal of Obesity & Related Metabolic Disorders. 2001;25(5):622-6.
24. Gelber AC, Hochberg MC, Mead LA, Wang NY, Wigley FM, Klag MJ. Joint Injury in Young Adults and Risk for Subsequent Knee and Hip Osteoarthritis. Intern Med. 2000;133(5):321-8.

Cite this article as: Bhaskar A, Areekal B, Vasudevan B, Ajith R, Ravi S, Sankar S. Osteoarthritis of knee and factors associated with it in middle aged women in a rural area of central Kerala, India. Int J Community Med Public Health 2016;3:2926-31.