Research Article

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20161356

Prevalence of osteoarthritis knee: four year study based on digital records of comprehensive healthcare setup at Mumbai, India

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Received: 11 February 2016 **Accepted:** 14 March 2016

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ABSTRACT

Background: Ageing starts with chronic diseases, which affects quality of life, osteoarthritis of knee (OAK) is one of major disease, affecting significant geriatric population. Females reported significantly more prevalent than males. Diagnosed cases are treated with exercise, physiotherapy and some medication however in extreme cases knee arthroplasty surgeries are performed. Study aims to examine prevalence of OAK, its association with respect to age group, sex and working status. It also aims, to examine the total knee arthroplasty (TKA) surgery incidences in community during study period.

Methods: Digital data from January 2011 to December 2014 gathered in hospital information system was analyzed. Potential cases of OAK were estimated using 'keyword' search program. Yearly prevalent population of OAK was estimated and their associations calculated for age-group, sex and work status. Logistic regression analysis was performed. Patients undergone through TKA surgery were traced and yearly incidence was examined.

Results: On an average 3.62 per hundred yearly prevalence was found, it increased from 3.31 (2011) to 3.91 (2014). Females were 63%, whereas males were 37%. Among overall prevalent cases, 4.23% were undergone TKA surgeries. Compared to males, odd for females was found at high risk (1.393). Compared to retired population, odd for housewife was found at high risk (1.269).

Conclusions: Study documents four years, prevalence rate of OAK and surgery incidences. In study population females shared better chance of surgical intervention along with males. Policy intervention to manage costly musculoskeletal surgeries are needed with preventive public health awareness programs.

Keywords: Osteoarthritis of knee, Arthroplasty surgery, Musculoskeletal surgeries

INTRODUCTION

Increase in overall life expectancy around the globe has led towards increase in age related disease burden. With ageing, many organs loose active functionality, imposing limitations for day to day activities. Most of the age related diseases are chronic in nature and along with time severity of such diseases may lead to the disability, if they remain untreated. Burden of age related disease is

expected to grow significantly in future among developing countries.

Osteoarthritis (OA) is one of the major diseases, which often starts during ageing and affects significant proportion of geriatric around the globe. With worldwide ageing of population, OA is one of the emerging health issues. Especially in Asian countries in coming two to three decades with huge geriatric concentration in

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population OA will be among the top diseases. Osteoarthritis is common most form of musculoskeletal disease currently fourth most common predictor of health problem in women and eighth common predictor among men worldwide. Knee is the highest reported site of musculoskeletal pain. Osteoarthritis of knee is one of the major reasons for knee pain.

Diagnosed cases are treated with exercise and some medication, however in extreme cases, knee arthroplasty surgeries are performed. Musculoskeletal surgeries are among the top surgical needs of population currently.³ Surgical interventions like arthroplasty offers significant and lasting relief to patients, however it is associated with various factors like affordability, accessibility, infrastructure availability and comorbidity of patients. Severe OA cases with lack of surgical intervention suffer from huge pain and leads to disability, most of the OA disability is attributable to hip and knee.

Regional differences contribute much among the pattern of OA.⁴ In Asia and Africa, OA of hip seems to be less common than in western countries.¹ Also gender differences are observed with higher prevalence in females during menopausal stage.⁵ Asian women with average menopausal age of 46.3 years are at early risk of OA than that of western women with 51 years age.⁶ Apart from ageing and sex other etiological factors of OA described as nature of work, physical activities, community lifestyle and obesity.⁷

In rural region of developing countries people are at risk of higher physical activities even though they are less prevalent to obesity. Due to limited access towards musculoskeletal surgeries most people lives with severe joint pains in older years.⁸

This is a four years retrospective study, based on self-reported cases at community health center. Prevalence of OA knee and knee surgeries incidences are studied. Adjusted odds of such prevalence among a few subgroups like gender, working status and age-groups will be useful for concern policy makers for effective strategy planning of OA knee.

METHODS

Community setup

Retrospective study conducted in community healthcare setup at Mumbai, where 100000 population is availing healthcare facility under Contributory Health service scheme (CHSS) of department of atomic energy (DAE), government of India. Healthcare setup is computerized with 16 primary health centers (dispensaries) and multispecialty community hospital. Demographic details are also registered during the enrollment into CHS scheme and clinical details are maintained in the centralized hospital information system (HIS).

Healthcare setup

Retrospective study was conducted for four years from January 2011 to December 2014. Standard criteria of clinical diagnosis of osteoarthritis (OA) knee was used by qualified medical personnel. Which involved the reported symptoms of knee pains, physical examination by the doctor and radiological evidence of knee. Unreported pains are beyond the scope of this study, however under a comprehensive healthcare setup high follow-up rate is usually observed.

As a standard practice, primarily patients report their problem to dispensaries and in case of expert opinion they are referred to specialty clinics at BARC (Bhabha Atomic Research Center) Hospital. In all the service centers of medical division, clinical details are entered in HIS. Based on the opinion of orthopedic doctors and their clinical writing experience, appropriate keywords were identified, which can be a part of clinical summary for potential OA knee patient. Such keywords are then incorporated into computer program based on Visual BASIC macro tool of Microsoft Excel. Clinical summaries of OA knee patients who have visited any of service center during four years of study period were identified. Each identified case was tagged and based on unique identity number, annual distinct cases of OA knee were estimated. Population less than 25 year's age found significantly lower (p<0.0001) to the risk of disease hence excluded from the further consideration.

Socio-demographic characteristic like age, gender and work status was linked to the patient identified for OA knee. Mid-year community census (>age 25 years) was taken as basis to estimate the prevalence of OA knee among community. Yearly crude prevalence rates were estimated for gender and age specific distribution.

Patients undergone the total knee arthroplasty (TKA) surgery during study period were identified. Majority of surgeries were performed in tertiary care hospital while some of them were referred at empanelled hospital in the city. All such information was extracted based on OT (operation theatre) notes and referrals data available in HIS. Sixty two percent of TKA surgeries found to be performed in BARC Hospital while remaining were referred to outside hospitals. Records of TKA surgeries were linked with prevalent OA knee cases for study period. Yearly incidences of surgery was estimated among the prevalent population of OA knee. Age group and gender wise distribution was also estimated to understand their pattern.

Statistical analysis

Data was analyzed using SPSS version 20.0 (SPSS Inc., Chicago, IL, USA) for Windows and Microsoft Excel version 2010. Prevalence rate was estimated per year per hundred community population. Four point trend analysis of OA knee prevalence is carried out. Relative

association were also examined for demographical parameters like sex, age-group and working status using Logistic regression analysis, with an appropriate referent category. Adjusted and unadjusted odds were calculated and shown with 95% confidence interval. TKA Surgery incidence rates among prevalent population were estimated separately.

Ethical notes

Study was approved by the Institutional Ethics Committee of BARC Hospital during their meeting held on November 19, 2015. Also approval was obtained from the Institutional Scientific Committee during their meeting held on November 16, 2015.

RESULTS

Overall yearly prevalence of OA knee, based on digital records of clinical details of patient's visits to community healthcare setup was found 3.62 per hundred. During four years of the study period from 2011 to 2014, prevalence rate of OA knee shows an increasing trend which raised from 3.31 to 3.91 per hundred (Figure 1).

Population of community is observed to increase marginally in the study period, whereas respective prevalence rate was found to be increased significantly. Age specific prevalence rate was found higher for females than that of males, except in older age group of more than 75 years. Sex ratio of OA prevalence rate varies from 1:1.25 for less than 40 years age to 1:2.18 for age group 61-65 years (Figure 2). Overall male to female ratio among prevalent population is found to be 1:1.59, which is found in the similar range of other studies which varying between 1:1.5 and 1:4.9

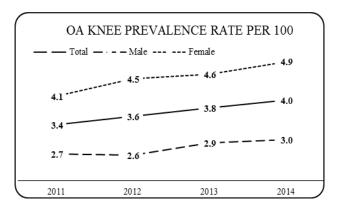


Figure 1: Prevalence of osteoarthritis knee.

Considering age group of less than 50 year as a reference category, persons of age 51-60 years were found to be at significantly higher risk (2.026), than age group 61-70 with risk of 1.94 and 1.14 risk for age group more than 70 years age. Compared to males, an odd for females was found to be at high risk (1.393) of OA knee.

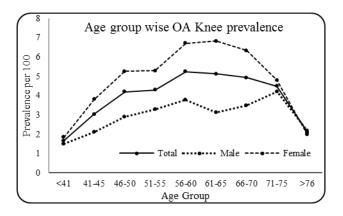


Figure 2: Age group wise-sex wise prevalence rate.

Table 1: Adjusted and unadjusted effect of background characteristics on presence of OA knee, 2011-14.

Variable	Category	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	p Value	
Sex	Male ^R	Referent category			
	Female	1.665 (1.59 - 1.74)	1.393 (1.28 - 1.51)	< 0.0001	
Age group (years)	<50 R	Referent category			
	51-60	2.029 (1.91 - 2.15)	2.026 (1.91 - 2.15)	< 0.0001	
	61-70	1.948 (1.84 - 2.06)	1.940 (1.81 - 2.08)	< 0.0001	
	>70	1.110 (1.04 - 1.19)	1.144 (1.06 - 1.24)	< 0.004	
Occupation	Retired R	Referent category			
	House-wife	1.619 (1.52 - 1.72)	1.269 (1.16 - 1.39)	< 0.0001	
	Working	0.934 (0.87 - 1.00)	1.031 (0.95 - 1.12)	< 0.043	

R: Referent category

Among total prevalent cases reported during the study period 5.25% undergone through total knee arthroplasty surgery. The total operated rate was 3.95% among males whereas 4.12% were among females. Surgical

interventions required to females were reported at younger age than that of males. An average age at surgery was found to be 66 years for female and 73 years for males.

Developing countries reported strong gender bias, with higher priority of treatment often exercised by males. It is to be noted that this study shows females got better chance of relative surgical intervention as and when required. This is mainly because of non-involvement of economic factors in the treatments, secondary responsible factors seen as urbanized and educated community.

DISCUSSION

Current study is based on self-reported cases, under a comprehensive healthcare facility high follow-up rate of patients are observed across all medical service centers. A uniform free healthcare facility eliminates the effects of economic status of an individual. However, possibilities of few OA knee cases being unreported might be possible. Study represented burden of OA knee cases for community, as maximum proportionate of problems are reported across all medical service centers.

Study of osteoarthritis prevalence, was reported in Asian countries by community oriented program for control of rheumatic diseases (COPCORD). Based on survey questionnaire, symptoms and evaluation by doctors, COPCORD reported prevalence for OA knee for various regions, in the range of 3 to 7 per hundred. ¹⁰ Our study reports 3.62 per hundred (Table 2) as the prevalence of OA knee, which lies in the similar ranges.

Table 2: OA knee prevalence for various regions reported by copcord.

Country, Region ^{11,12}	Age group	OA knee prevalence	M/F
Bangladesh-Rural	15+	7	6/9
China - Shanghai	NA	4.1	NA
China Shantou	16-99	4	NA
India - Bhigwan	15+	4	NA
India - Jammu	15+	4	NA
India - Pune	15+	6	NA
Iran	NA	15.3	NA
Lebanon	NA	3	NA
Pakistan - Rural	15 +	4	NA
Pakistan - Urban	15+	4	4/5
Thailand- Nakornayok	15+	6	NA
Vietnam - Hanoi	16+	3	NA
Present Study	25+	3.62	2.75/4.46

Joshi et al. compared rural-urban difference for various sites of musculoskeletal pains in India on COPCORD database. Which shows knee pains are higher among all sites and common too. Other reported sites of joint pains are backache, shoulder and hip.

With available literature in our knowledge, trend analysis of OA knee study was reported in very few studies. Kopec et al shows a trend analysis of osteoarthritis incidences, which reports an increase in the incidence of OA in both men and women due to aging and an additional increase in women beyond the effect of aging. BMI (body mass index) reported as major risk factors for OA knee with other factors are family history, previous injury and occupation work practices. Osteoarthritis must be looked as active joint disease, as the population of world grows older and medical advances lengthen average life expectancy, osteoarthritis will become a larger public health problem. 14

Although musculoskeletal surgeries (TKA) are beyond the affordability of majority of patients in developing countries, their needs are consistently increasing. Singh reports an overall TKA incidence rate increase from 5.5 to 8.7 per 1,000 population in US.¹⁵ Therefore, OA knee is a major public health issue especially among elderly dependent population and there is need to draw an immediate attention towards it.

CONCLUSION

Study documented the emergence of OA knee prevalence and relative surgical incidences for a community. Prevalence of OA knee is found to be comparable with that of found in other parts of world. Since OA knee prevalence increases with age, it will be even more prevalent in future with ageing of developing countries among Asia and Africa. Continuous growth of OA knee prevalence during the period of four years is an important finding. Policy intervention is needed to handle the future growth of disease. As the cost of musculoskeletal surgeries are higher, prevention related awareness program must be addressed through general public health program.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Bhandarkar P, Patil P, Shekhar C, Kamat N. Prevalence of osteoarthritis knee: four year study based on digital records of comprehensive healthcare setup at Mumbai, India. Int J Community Med Public Health 2016:3:1049-53.