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Original Research Paper

Medicine

# PREVALENCE AND RISK FACTORS OF OSTEOARTHRITS KNEE AMONGCOASTAL POPULATION OF VIZHINJAM

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**ABSTRACT**

**Introduction:** Osteoarthritis knee is a degenerative condition. It has an important role in the morbidity of people and it affect badly to the occupational efficacy of manual labourers. Thus it influence the economy of the population. **Objectives:** What is the prevalence of Osteo arthritis knee among people of coastal area of Vizhinjam above 20 years of age group? What are the risk factors of Osteoarthritis knee among the study population? Is there any association between Osteoarthritis knee and BMI? **Study design** - Cross sectional study. **Study setting** - Coastal area of Vizhinjam Panchayat, Kerala, India. **Conclusion:** Overall prevalence of Osteoarthritis knee in the coastal population of Vizhinjam is 39.7. Age, BMI, Nature of terrain surroundings the house, walking on loose sand and Squatting for longer time were found to be significantly associated with osteoarthritis knee in the study population.

**KEYWORDS** : Osteoarthritis knee, Coastal population

## RELEVANCE / RATIONALE OF THE STUDY

Osteoarthritis knee is a degenerative condition. It has an important role in the morbidity of people and it affect badly to the occupational efficacy of manual labourers. Thus it influence the economy of the population.

## DIAGNOSTIC CRITERIA FOR KNEE OA

1. ACR Criteria
2. Epidemiological

### ACR Criteria

1. Clinical and Laboratory
2. Clinical, Laboratory and Radiographic

### Clinical and Laboratory

1. Knee Pain and
2. Crepitus, morning stiffness ≤ 30 minutes, age ≥ 38 years. OR
3. Crepitus and morning stiffness > 30 minutes and bony enlargement. OR
4. No crepitus and bony enlargement.
   Sensitivity – 89%, Specificity – 88%

### Clinical, Laboratory and Radiographic

1. Knee pain and Osteophytes. OR
2. OA Synovial fluid (Clear, Viscous, WBC < 2000/mm$^3$) and morning stiffness ≤ 30 minutes and crepitus.
   Sensitivity - 94%, Specificity – 88%

### Defining OA for Epidemiologic study

Knee pain most days of a month within the preceding year along with radiological evidence.

### Kellgren and Lawrence grading of X-ray fingings

0. Normal
1. Possible osteophytic lipping
2. Definite osteophytes and possible joint space narrowing
3. Moderate or multiple osteophytes, definite joint space narrowing, some sclerosis and possible bony attrition.
4. Large osteophytes, marked joint space narrowing, severe sclerosis and definite bony attrition.

Presence of definite osteophytes is the recommended definition for radiographic knee OA. Patellofemoral OA, joint space narrowing alone is sufficient for the diagnosis.

Vizhinjam is a coastal village of Trivandrum district of southern Kerala. Majority of population depend on sea for their livelihood.

It was observed that majority of people from Vizhinjam who attending the pain clinic of Trivandrum Medical College were diagnosed as having Osteoarthritis knee. By this study we are trying to assess the magnitude of Osteoarthritis knee of coastal population of Vizhinjam and the risk factors associated with it.

## OBJECTIVES

- What is the prevalence of Osteoarthritis knee among people of coastal area of Vizhinjam above 20 years of age group, assessed by clinical examination and X-ray finding.
- What are the risk factors of Osteoarthritis knee among the study population.
- Is there any association between Osteoarthritis knee and BMI.

## METHODOLOGY

**STUDY DESIGN** - Cross sectional study.

**STUDY SETTING** -Coastal area of Vizhinjam Panchayat, Govt. Medical College, Trivandrum.

**STUDY POPULATION** – people residing in coastal ward of Vizhinjam Panchayat, of age group of 20 years and above, both male and female.

## INCLUSION CRITERIA

People residing in selected wards, above the age of 20 years, male and female, available during the study period and willing to give valid consent for the study.

## EXCLUSION CRITERIA

Those who are mentally challenged, Severely ill subjects, pregnant and lactating women.

## SAMPLE SIZE AND SAMPLING

Sample size was calculated using the equation $4pq/d^2$

Where p is 17% (least prevalence of Osteoarthritis from a previous study [1]) d - absolute difference (3%) So we got a sample size of **620**.

## SAMPLING TECHNIQUE

Simple random sampling

Sampling frame (electoral list of the selected coastal wards)

A computer generated random number table was used to select the desired sample size from the sampling frame.

**DATA COLLECTION**

Pretested semi structured questionnaire used for collecting data. Clinical examination, X - ray evaluation of knee and Blood test (Lipid profile).

**STATISTICAL ANALYSIS**

The gathered data entered into ms excel spread sheets and analysed using SPSS. Prevalence and other finding are described as proportions and its 95% confidence interval or means and its 95% CI appropriately.

Associations and risks were estimated using chi square test, t-test and logistic regression analysis.

**ETHICAL ISSUES**

Study started only after getting clearance from the ethical committee, Consent from local bodies, consent from the participant.

**REVIEW OF LITERATURE**

WHO estimates OA produces 10% disability above 60 years of age.

20th century definition for Osteoarthritis was hypertrophic arthritis. Recent definition for Osteoarthritis diseases are a result of both mechanical and biologic events that destabilize the normal coupling of degradation and synthesis of articular cartilage, chondrocytes and extra cellular matrix, and subchondral bone. OA diseases are manifested by morphologic, biochemical and molecular changes of both cells and matrix which lead to softening, fibrillation, ulceration, loss of articular cartilage, sclerosis and eburnation of subchondral bone, osteophytes and subchondral cysts. Clinically characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion and variable degrees of inflammation without systemic effects.

**Prevalence of OA Knee**

1% to 4% in women of age group 24 to 45 years
53% to 55% in women of age group 80 years and older
1% to 6% in men of age group 45 years and younger
22% to 33% in men of age group 80 years and older

**KNEE OSTEOARTHRITIS**

3 compartments. Medial tibiofemoral is commonly involved (75%). Lateral tibiofemoral compartment is involved in 25%. Bicompartmental tibiofemoral knee OA would suggest a previous knee trauma, infection, end stage or Rheumatoid Arthritis. Aggressive patellofemoral disease with large osteophytes may be a manifestation of primary hyperparathyroidisam.

Pain of knee OA typically occurs during weight bearing. Patellofemoral OA is aggravated by walking up and down stairs and arising from chairs. Stiffness lasting less than 30 minutes, gelling.

Bony enlargement, tenderness on palpation of the joint, crepitus, joint effusion without erythema. ROM may be normal. Popliteal cyst (Baker's cyst) Gait – slow and decrease extension knee in both swing and stance phase.

A cross sectional study conducted in the ward 16 of Ettumanoor panchayat. A total of 375 women above 40 years were included in the study. 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[1].

Study conducted in the province of Alberta, Canada objectives were to investigate the prevalence of self reported knee and hip osteoarthritis (OA) stratified by age and sex and to examine the association of modifiable factors with knee and hip OA prevalence. The study was conducted using randomly sampled data gathered from four communities in the province of Alberta, Canada. A large adult population sample (N = 4733) of individuals ≥18 years were selected. Health related information was collected through telephone interviews and community measurement clinics for which a sub-sample (N = 1808) attended. Participants self-reported OA during telephone interviews. Clinic interviews further assessed if the diagnosis was made by a health care professional. Statistical analyses compared prevalence of OA between sexes and across age categories. Associations between modifiable factors for OA and the prevalence of knee and hip OA were assessed using binary logistic regression modelling. The study showed overall prevalence of self-reported OA in the total sample was 14.8 %, where 10.5 % of individuals reported having knee OA and 8.5 % reported having hip OA. Differences in prevalence were found for males and females across age categories for both knee and hip OA. In terms of modifiable factors, being obese (BMI >30 kg/m2) was significantly associated with the prevalence of knee (OR: 4.37; 95 % CI: 2.08,9.20) and hip (OR: 2.52; 95 % CI: 1.17,5.43) OA. Individuals who stand or walk a lot, but do not carry or lift things during their occupational activities were 2.0 times less likely to have hip OA (OR: 0.50; 95 % CI: 0.26,0.96). Individuals who usually lift or carry light loads or have to climb stairs or hills were 2.2 times less likely to have hip OA (OR: 0.45; 95 % CI: 0.21,0.95). The odds of having hip OA were 1.9 times lower in individuals consuming recommended or higher vitamin C intake (OR: 0.52; 95 % CI: 0.29,0.96). Significant differences in prevalence were found for both males and females across age categories[2].

A community based cross sectional study to find out the prevalence of primary knee OA in India which has a population of 1.252 billion. The study was done across five sites in India. Each site was further divided into big city, small city, town, and village. The total sample size was 5000 subjects. Tools consisted of a structured questionnaire and plain skiagrams for confirmation of OA. Diagnosis was done using Kellgren and Lawrence scale for osteoarthritis.

Overall prevalence of knee OA was found to be 28.7%. The associated factors were found to be female gender (prevalence of 31.6%) ($P = 0.007$), obesity ($P = 0.04$), age ($P = 0.001$) and sedentary work ($P = 0.001$)[3].

Knee involvement occurs less frequently than hand OA, although similarly it is more common in women, with female-to-male ratios varying between 1.5:1 and 4:1. Prevalence rates for knee OA, based on population studies in the USA, are comparable to those in Europe. These studies report that severe radiographic changes affect 1% of people aged 25 –34 and this figure increases to nearly 50% in those 75 years and above. Among participants aged over 45 years in the Framingham Study, the prevalence of radiographic knee OA was 19.2% and, in those over 80 years, the figure rose to 43.7%. According to data produced by the Dutch Institute for Public Health, the prevalence of knee OA in those aged 55 and above was 15.6% in men and 30.5% in women. The prevalence of symptomatic knee OA is significantly lower: just 12.1% in NHANES III and 16.3% in participants aged 55– 64 of Johnston County Osteoarthritis Project.15 Geographical variation in OA epidemiology also exists. Studies from China, which used similar methods and definitions to the Framingham Study, found that the prevalence of bilateral knee OA and lateral compartment disease were two to three times higher in Chinese cohorts compared with estimates from the Framingham OA study. Data on clinically diagnosed knee OA in the Community Oriented Program for Control of Rheumatic Disorders (COPCORD) studies in the Asian region showed that the prevalence within this area ranged from 1.4% in urban Filipinos to 19.3% in rural communities in Iran. Part of the reason for this difference could have been the physical and socioeconomic environment. The COPCORD studies conducted in India, Bangladesh and Pakistan looked specifically into differences between rural and urban populations. In India the crude prevalence of clinically diagnosed knee OA was higher in the urban (5.5%) than those in the rural community (3.3%). After adjusting for age and sex distribution, the prevalence was higher in rural communities. Furthermore, in China,

men aged 60 and above from a rural community demonstrated approximately double the prevalence of symptomatic knee OA when compared with their urban counterparts [6].

Osteoarthritis (OA) is the most common joint disorder in the United States. Symptomatic knee OA occurs in 10% men and 13% in women aged 60 years or older. The number of people affected with symptomatic OA is likely to increase due to the aging of the population and the obesity epidemic. OA has a multi-factorial aetiology and can be considered the product of an interplay between systemic and local factors. Old age, female gender, overweight and obesity, knee injury, repetitive use of joints, bone density, muscle weakness, and joint laxity all play roles in the development of joint osteoarthritis, particularly in the weight-bearing joints. Modifying these factors may reduce the risk of osteoarthritis and prevent subsequent pain and disability [7].

Osteoarthritis is a complex, multifactorial disease, and there is still much to learn regarding mechanisms underlying incidence and progression. However, there are several known modifiable and preventable risk factors, including obesity and joint injury; efforts to mitigate these risks can help to lessen the impact of osteoarthritis [8].

## OBSERVATION

In this study, 0ut of 620 persons evaluated, 216 (39.7%) had OA knee. Majority had OA both knees (232/620), 10 had OA right knee and 4 had OA left knee only.

Mean age of study population was 48.39, with standard deviation of 14.965. Minimum age 20 years and maximum age 88.Males 151 and females 469.

Majority were BPL – 445, APL – 175, Alcoholic – 114/620, Smoker – 20/620, Pan chewing – 201/620, Majority sleep on the floor – 389/620, Majority had no formal education – 362/620, Systemic Hypertension – 138/620, Diabetes Mellitus – 80/620, COPD – 103/620, CAD – 8/620, Stroke – 5/620, Out of 620, 134 were catchers of fish by profession, 107 were fish vendors and 379 house wives.

Out of 151 males, 50 (33.1%) have OA knee, and out of 469 females, 196 (41.8%) have OA knee. Though there was an observable difference, that is not statistically significant (chi square test p value = 0.058). 34.3% of APL and 41.8% of BPL have OA knee (chi square test p value <0.001). 35.1% of alcoholic and 40.7% of non alcoholic have OA knee. 45% of smokers and 39.5% of non smokers have OA knee. 51.7% of pan chewers and 33.9% of non pan chewers have OA knee.

| Factors | Univariate analysis | Logistic regression |
|---|---|---|
| Higher Age | P <0.001 | P < 0.001 |
| Female Gender | P <0.058 | |
| Low Socio economic status | P <0.001 | |
| Occupation | P <0.001 | |
| Hypertension | P <0.001 | |
| Diabetes | P <0.001 | |
| COPD | P <0.001 | |
| CAD | P <0.040 | |
| BMI | P <0.001 | P < 0.001 |
| Terrain around the house | P <0.001 | P = 0.001 |
| History of Walking on sand | P <0.001 | P = 0.005 |
| History of squatting | P <0.001 | P = 0.002 |
| History of LBA | P <0.001 | |

Regarding Terrain, stairs – 53.6% have OA knee, loose sand – 50% have OA knee, irregular terrain – 41.5% have OA knee and firm land – 29.9% have OA knee. OA knee is more in the low socio economic status. In thatched house, 45.8% and terraced house, 29.8% were having OA knee.

Relation with parity – OA knee have a direct relationship with parity. No children ( 6.3% have OA knee), 1 child (24%), 2 children (30.2%), 3 children (36.6%), 4 children (39.8%), 5 children (66.1%), 6 children (60.7%), 7 children (56.3%), 8 children (81.8%), 9 children (60%) and those with 10 to 13 children, 100% OA knee.

Education status – prevalence of OA knee is high in those without formal education. No formal education – 53.3% have OA knee, Upto UP – 28.9% , SSLC – 12.1%, Plus 2 – 8.8%, Degree and above – 16.7%, Professional – none have OA knee

### Association with specific diseases

Systemic hypertension - 65.2% of hypertensive persons have OA knee, DM – 57.5%, COPD – 59.2%, CAD – 5%, Stroke – 80%

### Relationship with spending leisure time –

Watching TV – 38.9% have OA knee, Playing cards – 55.6% have OA knee, Sleeping – 48.6% have OA knee, Chatting with friends – 25% have OA knee, Praying with kneeling – 50% have OA knee, Playing games – none have OA knee, Making net – none have OA knee, Reading – none have OA knee

### Relationship with walking on sand

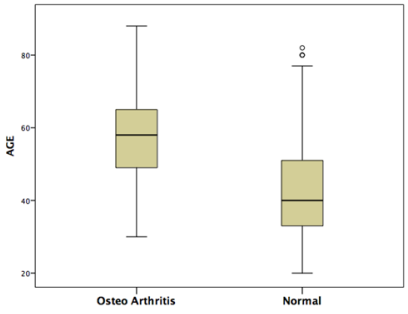
53.6% of those who walks on loose sand of the studied population have OA knee, compared to 32.5% of non loose sand walkers.

### Relationship with squatting

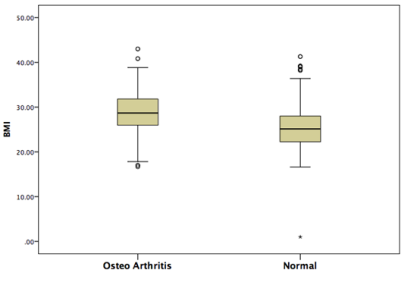
48.8% of studied population who squat for a long time have OA knee.

Type of toilet used – OA knee is more in those using Western type toilet, 43.9% rather than Indian type toilet, 39.4%.

**Occupation** – 63.6% of fish vendors, 35.1% of fish catchers, and 34.6% of house wives have OA knee.




Mean age of people with osteoarthritis is 57.32 years (sd 12.5). Those without osteoarthritis, it is 42.52 years (sd 13.46). The observed difference is statistically significant (P < 0.001).




Mean BMI of people with osteoarthritis is 28.98 (sd 4.7). Those without osteoarthritis, it is 25.59 (sd 4.96). The observed difference is statistically significant (P < 0.001).

## CONCLUSION

Overall prevalence of Osteoarthritis knee in the coastal population of Vizhinjam is 39.7. This is a higher value when compared to studies from other places.

Age, BMI, nature of terrain surroundings the house, walking on loose sand and squatting for longer time were found to be significantly

associated with osteoarthritis knee in the study population.

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