

PRESERVANCE OF FUNCTIONAL CAPACITY IN OSTEOARTHRITIS KNEE IN RURAL AND SEMI-URBAN POPULATION

Banda Sreekanth Rao¹, Vutukuru Sri Ravindranath², G. V. S. Moorthy³, T. Prasad⁴

¹Assistant Professor, Department of Orthopaedics, Bhaskar Medical College Hospital, Yenkapally, Telangana, India.

²Professor, Department of Orthopaedics, Bhaskar Medical College Hospital, Yenkapally, Telangana, India.

³Professor, Department of Orthopaedics, Bhaskar Medical College Hospital, Yenkapally, Telangana, India.

⁴Professor, Department of Orthopaedics, Bhaskar Medical College Hospital, Yenkapally, Telangana, India.

ABSTRACT

BACKGROUND

Osteoarthritis (OA), also often called 'osteoarthrosis' or 'degenerative joint disease,' is the most common form of arthritis. Prevalence of OA in India is reported to be in the range of 17 - 60.6%. Knee osteoarthritis¹ (OA) is a common condition, which represents a major contribution to the burden of physical disability.² OA is one of the most prevalent chronic diseases worldwide.³ Globally, hip and knee OA is ranked as the 11th highest contributor to global disability (measured by years lived with disability) and as the 38th highest in terms of overall burden (as measured by disability-adjusted life years) in 2010.⁴ Prevalence increases with age, so that about 11% of all women over the age of 60 years have symptoms due to knee OA.

The aim of this study is to estimate the prevalence of OA knee to determine whether physical exercise, occupational modifications or NSAID medication constitutes a benefit or a risk in the development and progression of knee osteoarthritis in rural and semi-urban population.

MATERIALS AND METHODS

1. Questionnaire Development

The questionnaire was developed by the authors for the purpose of this study by using the current literature and input from content experts.

The questionnaire was reviewed by five orthopaedic surgeons and research methodologists for face and content validity.

2. Participant Screening

A total of 510 patients were screened for participation in this study, of which 110 were deemed ineligible to participate in the study.

3. Demographics

The majority of patients were females (66.9%) and lived in semi-urban locations (89.2%). Most patients made less than Rs. 200,000 annually (62.2%) and did not have health insurance (89.3%). Approximately, half of the patients had a comorbid disease at the time of the assessment (54.2%). Common comorbidities included hypertension (38.8%), diabetes (20.4%) and osteoporosis (12.8%).

RESULTS

A total of 510 patients were screened for participation in this study, of which 110 were deemed ineligible to participate in the study. The results were discussed in detail about the need for change in lifestyle, medical management and the physical methods.

CONCLUSION

Change in lifestyle, occupation and exercises helped the patients to avoid surgical intervention. Prevalence of osteoarthritis of knee was higher in females in semi-urban and rural areas than in men. This is also observed because of osteoporosis in menopause women, sedentary lifestyle, older age, less educated, and treated frequently with oral steroids.

KEY WORDS

Primary OA, Osteoporosis, Physical Methods, Steroids.

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Corresponding Author:

Dr. Vutukuru Sri Ravindranath,

Professor,

Department of Orthopaedics,

Bhaskar Medical College Hospital,

Yenkapally-500075,

Telangana,

India.

E-mail: drravivutukuru@gmail.com

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BACKGROUND

Osteoarthritis is derived from Greek words "Osteo" meaning the bone, "Ortho" meaning joints and "Itis" which means inflammation. The clinical manifestations in OA are gradual development of joint pain, swelling, instability, stiffness and loss of motion.⁵ The joints most commonly affected are the knees, hip and those of the hand and spine. OA has gradual onset and symptoms usually do not appear until around the age of 45 to 50 years. Evidences suggest that inflammation events are outcome of intervention of polymorphonuclear leucocytes that release lysosomal enzymes and oxygen free radicals. This results in increased articular cartilage destruction, joint pain, stiffness and limitation of movement. In OA subchondral osteoblasts have abnormal phenotype,

elevated alkaline phosphatase, increased release of osteocalcin, reduced parathyroid hormone and PGE2 dependent cAMP formation, elevated Urokinase plasminogen, IGF-1 and altered collagen metabolism.⁶ These disease cells produce more IL-6 and PGE-2 than normal. With improved health care facilities in developing countries, the elderly age population is also increasing. Thus, the volume of age related disease like osteoarthritis is expected to increase and shall demand health care priority. Pain and inflammations are important concerns both for patient and the doctor besides progressive nature of the disease. The main objectives in the management of OA are to reduce symptoms, minimise functional disability, limit the progression of structural changes and ultimately delay or avoid arthroplasty. "The best treatment for knee OA is prevention." It has been recently confirmed that in knee OA, mechanical stress is the most important underlying mechanism. This is in contrast to hand OA, where systemic processes appear to be most important.⁵

A recently published cross-sectional analysis found that women also experience greater knee pain than men, regardless of Kellgren-Lawrence grade.⁶ Pain, inflammatory flares, stiffness and loss of movement and function represent major symptoms of OA including knee OA, resulting in a substantial adverse impact on patient's quality of life and considerable economic burden.^{7,8,9} Secondary changes occurring in the joint with increasing age cause OA to be one of the major health problems in the elderly. In the epidemiological studies, the relationship between age and OA was found to be the most striking finding.⁷

MATERIALS AND METHODS

Design

Observational study.

Osteoarthritis of the knee is a highly prevalent condition among adults, characterised by the progressive destruction of the cartilage that lines the knee joints, the subchondral bone surfaces and synovium proliferation accompanied by pain, immobility, muscle weakness and reduction in function and the ability to perform activities of daily living. Two types of OA of the knee are recognised: the more prevalent primary OA of the knee is the result of the progressive joint cartilage destruction over time, whereas secondary OA of the knee can be caused by trauma, infections etc. In this study only first type, i.e. primary OA is taken into the study.

Objective

To estimate the prevalence of OA knee to determine whether physical exercise, occupational modifications, NSAID medication constitutes a benefit or a risk in the development and progression of knee osteoarthritis in rural and semi-urban population.

Inclusion Criteria

1. Primary OA of knees.
2. Females above the age of 40 years.
3. Males above age of 50 years.

Setting

Bhaskar Medical College, Yenkapally.

Participants

The study was conducted in rural and semi-urban population areas of Moinabad district between February 2017 and February 2018 at Bhaskar Medical College. The sample comprised of 200 males and 200 females. A semi-structured interview scheduled was used to interview the study subjects.

Main Outcome Measures

The prevalence was found to be high in females in semi-urban population associated with increased age, understanding, educational qualification, hysterectomy/ menopause, steroid injections, sedentary life, lack of exercises and duration of 10 - 20 years.

Questionnaire Development

The questionnaire was developed by the authors for the purpose of this study by using the current literature and input from content experts.

The questionnaire was reviewed by five orthopaedic surgeons and research methodologists for face and content validity.

This approach helped to ensure that all questions were worded adequately and were culturally relevant and appropriate. The questionnaire included a section that asks the patient how their knee osteoarthritis was managed in the past by medications, supplements, braces, physiotherapy etc.

Demographics

The mean age of the included patients was 58.6 years (Table 1).

The majority of patients were female (66.9%) and lived in semi-urban locations (89.2%). Most patients made less than Rs. 200,000 annually (62.2%) and did not have health insurance (89.3%). Approximately, half of the patients had a comorbid disease at the time of the assessment (54.2%). Common comorbidities included hypertension (38.8%), diabetes (20.4%) and osteoporosis (12.8%) Table 1.

Medical History of the Affected Knee

Patients presenting with knee pain had been experiencing pain for more than 1 year (50.8%) (Table 2). Two-thirds of the study participants had bilateral knee pain (66.0%). Over half of the patients (60.3%) had been previously diagnosed with knee OA by a clinician and most had received this diagnosis within the past year (60.2%). The prescription of oral medications was associated with younger age, the absence of deformities and lower K-L grades which is consistent with current treatment recommendations.⁶ Kellgren-Lawrence (K-L) grades 1 and 2 were most common with 30.0% and 28.1% of patients falling in these categories, respectively. Approximately, one-third of the patients had deformities of the knee (33%) with 34.2% of all patients having a varus deformity.

The majority of patients used medical treatments. They were non-steroidal anti-inflammatory drugs (72.0%) and topical agents (55.2%). Patients from rural area took treatment by branding (5%), local counter-irritants, massage (15%) and oral steroids (12%).

Table 1, 2 and 3 describe the patient's characteristic, disease characteristics and pain level and functional limitation respectively.

Most of the patient's occupation was agriculture. They were increased activities of squatting, sitting cross legged, climbing of trees, digging ground and wells, prolonged standing and walking long distances. Women at house-hold and agriculture work were more prone to knee arthritis associated with menopause, local massage, uneducated, reduced understanding, oral steroids and comorbid conditions like thyroid, diabetes, hypertension and osteoporosis. Semi-urbans were more prone to OA, because of sedentary lifestyle. Patients addicted to alcohol and smoking had severe OA knee.

Factors associated with Preservance of Function of Affected Knee

Patients from rural areas occupation was agriculture. On initial phase of knee arthritis they received non-pharmacological treatments like branding, massage and local counter-irritants. Remission was for short period. On relapse

responded well with NSAIDS prescribed by local practitioner and few received oral steroids.

Patients treated at our centre had longer duration of remission as they received NSAIDS, vitamins, chondroprotectives, calcium supplements, carbonate and citrate and osteoporosis medicine. Comorbid conditions were treated by respective specialist, physiotherapy electrotherapy, wax, exercises, postures, use of splints, ambulatory aids and gait training. The needy were given intra-articular steroid and viscosupplements. Osteoarthritis awareness counselling scheduled for patients helped them. Patients deferred surgery. 90% of patients were not having insurance policy, annual economy was 50,000 to 200,000. Patients found practising physiotherapy, usage of splints, ambulatory aids, change of occupation, avoiding stressful activities, modification of activities of daily living like avoiding squatting or cross-legged sitting helped in preserving the joint function. Exercise is also beneficial as shown in a recently published randomised controlled trial in women with OA of the knee.¹⁰

Table 1

Patient's Characteristic n=400	Rural		Semi-Urban	
	Male n=80	Female n=111	Male n=84	Female n=125
Age (yrs.)	55.6 ± 11.6	52 ± 10.5	53.4 ± 11.1	51.5 ± 10.3
Body mass index (kg/m ²)	24.5 ± 3.4	25.6 ± 3.6	26.2 ± 3.5	27.4 ± 3.2
Income/Annum- No income	03(3.6)	30(27.02)	0	98(78.4)
Income/Annum (Rs < 50,000)	40(50)	76(41.4)	22(26.2)	20(16)
Income/Annum 50,001-100,000	29(36.2)	04(3.6)	54(64.2)	05(04)
Income/Annum 100,000-200,000	11(13.75)	0	10(11.9)	02(1.6)
Health Insurance None	80(100)	111(100)	40(47.6)	100(80)
Private	0	0	30(35.7)	10(8)
Government	0	0	14(16.6)	15(12)
Comorbidity				
None	20	30	20	30
Hypertension	35	40	38	42
Diabetes	15	19	20	32
Osteoporosis	10	30	11	40
Heart	3	4	4	5
Lung	4	1	3	3
Neurological	2	2	4	6
Thyroid disorder	2	9	3	15
Kidney	5	2	5	4
Infection	2	1	0	0
Cancer	2	8	1	5
Coagulopathy	0	0	0	0
Liver	10	5	10	12
Addictions- Tobacco	20	12	30	05
Smoking	18	2	20	2
Alcohol	32	18	22	10
Other joints with OA- No other OA	50	40	40	52
Lower back	20	60	35	46
Hand	05	12	08	14
Hip	02	03	06	04

Values are presented as mean ± standard deviation or number (%).

Table 2. Disease Characters

n=400 Duration of Knee Pain (yrs.)	Rural		Semi-Urban	
	Male n=80	Female n=111	Male n=84	Female n=125
Affected knee				
< 1	55	75	59	82
1-5	15	20	15	31
6-10	06	10	07	06
> 11	04	06	03	06
Left	35	60	30	40
Right	30	35	40	45
Bilateral	15	16	14	30
Diagnosed with knee OA				
Yes	65	89	70	105
No	15	22	14	20
Time since OA diagnosis (yrs.) Kellgren-Lawrence grade				
< 1	22	29	24	40
1-5	40	43	45	52
6-10	08	20	08	25
> 11	10	12	05	18
Kellgren-Lawrence grade				
0	05	09	05	15
1	45	56	44	52
2	20	32	24	40
3	07	10	07	13
4	03	04	02	05
Deformity				
No visible deformity	30	45	29	45
Varus	43	55	46	63
Valgus	02	03	01	02
Knee effusion	05	08	08	15
Previous Medication				
NSAID	70	80	84	125
COX-2	20	15	45	92
Topical agent	15	22	45	84
None	10	0	0	0
Corticosteroid	30	40	24	45
Osteoporosis medication	25	24	26	40
Chondroprotectives	0	0	25	40
Calcium supplements	75	102	84	111
Vitamins	70	105	84	125
Other				
Previous Physical Treatment				
Physiotherapy	40	25	60	65
Ice or heat	60	55	65	90
Exercise	40	30	35	60
None	0	0	0	0

Relaxation technique				
Splint	02	03	12	18
Diet	10	13	18	30
Yoga	02	0	05	14
Arthroscopy	0	0	0	02
Massage	50	65	20	28
Local irritants application	40	55	23	34

OA: Osteoarthritis, NSAID: Non-steroidal anti-inflammatory drug, COX-2: Cyclooxygenase inhibitors values are presented as number (%).

Characteristic Patients n=400	Rural		Semi-Urban	
	Male n=80	Female n=111	Male n= 84	Female n=125
Walking long distance	76	98	68	95
Transitioning from seated to standing	20	31	28	38
Transitioning from squatting to standing	35	42	50	80
Cross-legged sitting	25	44	56	80
Squatting	20	18	48	78
Standing	18	22	35	20
Sitting	2	5	10	22
Walking short distance	4	13	16	30
Sleeping	2	4	3	4
Lying down	5	7	6	12
Avoid using stairs because of knee pain	20	35	40	70
Knee stiffness when waking in the morning	3	05	12	38
Knee pain limits daily activity	10	15	22	42
Braces/ Splints	02	03	12	18
Ambulatory aid				
None	68	86	77	102
Cane	15	22	05	16
Walker	1	2	1	4
Crutch	0	1	1	2
Wheelchair	0	0	0	1

Table 3. Level of Pain and Functional Limitation

Values are presented as number (%).

RESULTS

Participant Screening

A total of 510 patients were screened for participation in this study, of which 110 were deemed ineligible to participate in the study. The reasons for ineligibility included previous history of total knee arthroplasty in the affected knee (20 patients), fracture of the tibial plateau, proximal tibia, femoral condyle, distal 3rd femur and patella (40 patients), septic infected knee (05 patients), cellulitis leg (03 patients), rheumatoid arthritis (40) and below knee amputation (02 patients). Ultimately, 400 patients met the eligibility criteria and participated in this study.

DISCUSSION

Our study findings are suggestive that symptoms of arthritis appear earlier in the patients. There is a period of remission. During that period of arthritis, they would have learnt about the different modalities of treatment they responded well with. When they had remission of knee arthritis, they followed similar treatment they had earlier. Few responded with short period of remission, most of the patients changed the modalities of treatment they were following earlier, found that they had longer period of remission with physical

therapy, pain medication, calcium supplements, osteoporosis medication, changes in lifestyle, daily activities, change in occupation, use of assisted ambulation helped them to the extent that longer period of remission was satisfactory for them to say no to surgical procedures. Few patients had associated arthritis of hip, back and hand.

This revelations during study made us feel more responsible towards the social community to impart knowledge to them by awareness programmes.

Heavy weight and obesity are well-known risk factors for OA, since they increase mechanical stress and induce systemic effects (eg, via adipokines and/or hyperglycaemia) involved in OA pathogenesis. It has been recently confirmed that in knee OA, mechanical stress is the most important underlying mechanism. This is in contrast to hand OA, where systemic processes appear to be most important. OA risk increases almost exponentially according to the increase in Body Mass Index (BMI).

Patients from rural areas occupation was agriculture. On initial phase of knee arthritis they received non-pharmacological treatment like branding, massage and local counter-irritants. Remission was for short period. On relapse responded well with NSAIDS prescribed by local practitioner and few received oral steroids. Patients in India are being seen by a specialist and are receiving medical care in the early stages of OA, which goes against the common

perception that patients in India do not receive medical treatment for early stage OA and thus eventually present with advanced stages of OA.¹¹

Patients treated at our centre had longer duration of remission as they received NSAIDS, vitamins, chondroprotectives, calcium supplements, carbonate and citrate and osteoporosis medicine. Comorbid conditions were treated by respective specialist, physiotherapy electrotherapy, wax, exercises, postures, use of splints, ambulatory aids, gait training and the needy were given intra-articular steroid and viscosupplements. Osteoarthritis awareness counselling scheduled for patients helped them. Patients deferred surgery. 90% of patients were not having insurance policy, annual economy was 50,000 to 200,000. Patients found practising physiotherapy, usage of splints, ambulatory aids, change of occupation, avoiding stressful activities, modification of activities of daily living like avoiding squatting or cross-legged sitting helped in preserving the joint function. Exercise is also beneficial as shown in a recently published randomised controlled trial in women with OA of the knee.¹⁰ We believe that putting as much effort into OA research as was seen in recent years in RA research may yield significant progress in improving quality of life for many patients with OA.

CONCLUSION

The prevalence of OA knee was found to be 19% in rural area and 21% in semi-urban area in Moinabad district. Prevalence of osteoarthritis of knee was higher in females in semi-urban and rural areas than in men. This is also observed because of osteoporosis in menopause women, sedentary lifestyle, older age, less educated, and treated frequently with oral steroids. Change in lifestyle, occupation and exercises helped the patients to avoid surgical intervention. Patients in India are usually treated by a specialist and are receiving medical care in the early stages of OA, which goes against the common perception that patients in India do not receive medical treatment for early stage OA and thus eventually present with advanced stages of OA.¹¹

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