Original article:

Early osteoarthritis of knee: an integrated approach to clinical assessment and management

Dr Ajay S Chandanwale[1], Dr Rahul G Puranik [2] , Dr Anil Mohan [3] , Dr Sanjay S Deo [4]

[1] Department of Orthopaedics, B.J. Government Medical College and Sassoon General Hospital, India
[2] Department of Orthopaedics, B.J. Government Medical College and Sassoon General Hospital, India
[3] Department of Orthopaedics, B.J. Government Medical College and Sassoon General Hospital, India
[4] Department of Orthopaedics, Dr. D.Y. Patil Medical College, Pune, India
Corresponding author*

ABSTRACT:

Orthodox school of thought assumes osteoarthritis (OA) knee to be an age-related degenerative disorder. However newer concept deems it to be a mechanobiological derangement of the joint. Management of early OA knee in clinical set up is limited to radiographic evaluation, lifestyle modification, physical therapy, pharmacological intervention and surgical management in the form arthroscopy or joint replacement. At present, no methods are devised or have been put forwards with the intent of identifying the disease at an early stage to arrest this derangement at an early stage or to delay the progression. This study aims to benefit patients with early OA knee by use of an integrated approach where imaging techniques are used systematically for clinical management of OA. Study also hopes to develop a protocol that can be implemented for assessment and management of early OA.

Keywords: Osteoarthritis , articular cartilage

INTRODUCTION:

Osteoarthritis (OA) of knee is a dynamic mechanobiological derangement of articular cartilage of knee leading to pain and disability of knee (2). It is a chronic degenerative disorder of multifactorial etiology characterized by loss of articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis and range of biochemical and morphological alterations of the synovial membrane and joint capsule (3). Late stage changes of OA include softening, ulceration of the articular cartilage, synovial inflammation also may occur. Patients present with symptoms of pain, particularly after prolonged activity and weight bearing; whereas stiffness is experienced after inactivity (4). Primary osteoarthritis refers to cases where the case is not clearly known. Primary osteoarthritis is mostly related to aging. It can be localized, generalized or as erosive osteoarthritis. Secondary osteoarthritis is caused by another disease or condition.

OA Knee has multiple Risk factors (5), which include age (>50 in Males and >45 in females), sex (Female > Male), BMI (>25%), History of joint injury, frequent stair climbing (15 or more flights per day), frequent lifting of heavy weights (10 kg or more), occupations involving kneeling or squatting for more than 2 hour per day, occupations with climbing for more than 1 hour per day, continuous standing for more than 2 hours per day or walking more than 3 hours per day.

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AIMS AND OBJECTIVES:

Orthodox school of thought assumes OA knee to be a age related degenerative disorder. However newer concept deems it to be a mechanobiological derangement of the joint. Management of early OA knee in clinical set up is limited to Radiographic evaluation , lifestyle modification , Physical therapy , Pharmacological intervention and Surgical management in the form arthroscopy or joint replacement. At present, no methods ae devised or have been put forwards with the intent of identifying the disease at an early stage so as to arrest this derangement at an early stage or delay progression.

This study aims to benefit patients with early OA knee by use of an integrated approach where imaging techniques are used systematically for clinical management of OA. Study also hopes to develop a protocol that can be implemented for assessment and management of early OA.

MATERIALS AND METHODS:

The present study was a longitudinal study conducted in Sassoon General Hospital, Pune, Maharashtra. All patients attending orthopedic outpatient department with complains of knee pain forms the study population.

Study Design: Prospective open label observational study

Study Location: This was a tertiary care teaching hospital-based study done in Department of Orthopedics, at Sassoon General Hospital, Pune.

Sampling Method: Convenient Sampling

Study Duration: January 2018 to June 2018.

Sample size: 70 patients.

Inclusion Criteria

1.Early OA knee – Kellgren and Lawrence (K and L) Grade 0 and 1.

2.Qualitative C- reactive Protein – Negative.

3.Erythrocyte Sedimentation Rate- <20 mm/1 hr.

4.Serum Uric Acid level < 6 mg/dl

5.Total Leucocyte count < 10000/ Cu.mm.

3.4 Exclusion Criteria –

1.Advanced OA knee with Kellgren And Lawrence (K and L) > Grade 2

2.Joints pain due to Rheumatological or Systemic diseases

3.Malalignment of Weight Bearing Axis

4.Internal Knee derangement causing knee pain

Procedure methodology

Informed written consent in language understood by the patient was taken. Personal data, clinical findings, radiological findings, biochemical reports and related medical records of all patients were obtained. A pre-tested semi structured questionnaire was administered to all patients. Questionnaire was divided broadly in to two parts. The first part included socio-demographic details.

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The second part consisted of the possible risk factors for developing OA of the knee such as age, gender, occupation, family history of OA, physical activity, history of injury to the knee etc. X-ray, weight and height measurement along with all necessary investigations according to standard protocol were done. On basic evaluation, patients having symptoms suggestive of OA Knee were sent for X rays. On X ray, Grade 2 patients were excluded from the study and Grade 0 and Grade 1 patients were taken in the study. Baseline biochemical parameters of these patients was recorded, and patients were followed up after 3 and 6 months. Simultaneously, patients were started on medication and physiotherapy

Statistical analysis

Statistical analysis was conducted by using Medcalc software. An unpaired t test was used to test the null hypothesis. The procedure calculates the difference between the observed means in two independent samples. A significance value (P-value) and 95% Confidence Interval (CI) of the difference is reported. The P-value is the probability of obtaining the observed difference between the samples if the null hypothesis were true. The null hypothesis is the hypothesis that the difference is 0. P value less than 0.05 is considered significant.

OBSERVATIONS AND RESULTS:

After analyzing a total of 70 patients in the study, it was observed that there was almost and equal prevalence of males and females in the study. Majority of the patients were below the age of 60 years (55.72%). Most of the patients included in the study were found to be in the middle and lower classes (50%).

TABLE 1: BASELINE ANALYSIS OF STUDY POPULATION

Age Group	**Number**	**%**
≤40	8	11.43
41-45	6	8.57
46-50	9	12.86
51-55	7	10.00
56-60	9	12.86
61-65	12	17.14
66-70	8	11.43
71-75	9	12.86
76-80	2	2.86
Gender		
Males	34	48.57
Females	36	51.43

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Socioeconomic Status		
Lower Class	35	50.00
Middle Class	33	47.14
Upper Class	2	2.86

	Mean Age (Years)	*Standard Deviation*
Overall Study Population	56.66	± 12.84
Males	60.82	± 12.84
Females	52.72	± 12.74

Evaluation of relation of posture and habits with Osteoarthritis revealed that there was a high incidence of stair climbing (58.57%) and habitual squatting (47.14%). Frequent weight lifting (44.29%) and habitual squatting (47.14%) was also seen in high percentages

TABLE 2: RELATION OF POSTURE AND HABITS WITH OSTEOARTHRITIS

Particulars	**Number**	**%**
Occupational hazards	31	44.29
Stair Climbing	41	58.57
Habitual squatting	33	47.14
Frequent Weight Lifting	31	44.29

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Family history of OA Knee was frequently associated with the observed patients. Diabetes Mellitus turned out to be the most common (17.14%) co-morbidty associated with Osteoarthritis. Hypertension also found to be seen in a majority of patients

TABLE 3: RISK FACTORS ASSOCIATED WITH OSTEOARTHRITIS

Particulars	Number	%
Diabetes Mellitus	12	17.14
Hypertension	5	7.14
Previously operated	3	4.29
History of injury to knee	6	8.57
Family history of Osteoarthritis	16	22.86

Routine analgesics and physiotherapy was started for these patients, diagnosed with early OA knee. These patients were routinely followed up on a out patient basis, and a re-evaluation was done at 3 and 6 months of follow up. This was done by means of calculating the baseline and follow up values of ACR Score [6], LEFS Score [7], VAS Score [8], K and L score [10] and presence of ability to sit cross legged. It was noticed that there was a definite improvement in all criteria and all assessment modalities at the end of both 3 months and 6 months, owing to early diagnosis and initiation of physiotherapy at an early stage.

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TABLE 4: IMPROVEMENTS SEEN IN 3 AND 6 MONTHS OF FOLLOW UP

Particulars	Baseline Value	Value after 3 Months of Follow Up	Value after 6 Months of Follow Up
ACR Score (Mean value)	1.8	1.24	0.94
LEFS Score (Mean value)	39.29	48.21	54.5
VAS Score (Mean value)	3.14	2	1.27
K and L Score (Mean value)	2.64	2.6	1.78
Patients crossing legs Number (%)	18 (25.71%)	17 (24.29%)	14 (20%)

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TABLE 5: Comparisons of Means of scores between 3 Months with Baseline and 6 Months with Baseline using Paired T test.

Particulars	Baseline Value (Mean)	SD	Value after 3 Months of Follow Up(Mean)	SD	% Change from Baseline in 3 Months	P value	Value after 6 Months of Follow Up (Mean)	SD	% Change from Baseline in 6 Months	P value
Mean ACR Score	1.8	0.52	1.24	0.53	31.11	< .00001	0.94	0.72	47.78	< .00001
LEFS Score	39.29	9.14	48.21	9.20	-22.70	< .00001	54.5	9.02	-38.71	< .00001
VAS Score	3.14	0.49	2	0.52	36.31	< .00001	1.27	0.52	59.55	< .00001
K and L Score	2.64	1.33	2.6	1.19	1.52	0.3208	1.78	0.77	32.58	< .00001

TABLE 6: BASELINE ANALYSIS OF TREATMENTS BEING TAKEN

TREATMENT	NUMBER	%
ANALGESICS	57	81.43
PHYSIOTHERAPY	56	80

DISCUSSION:

With the aim of developing an effective tool for early diagnosis and intervention of Osteoarthritis of Knee Joint, we interviewed 70 patients who had findings suggestive of early OA knee on X Ray. These patients had their baseline biochemical parameters taken and then were routinely followed up on OPD basis for analgesics and physiotherapy.

It was observed that, quite a few patients who were of the elderly age group also presented primarily with early OA Knee changes. In a study done in Jammu and Kashmir, one third of the population above the age of 65 was found to have Osteoarthritis (10). An increase in incidence of OA Knee is seen with increasing age (11).

An almost equal prevalence was observed between both the genders. Most studies however have shown that Females are more predisposing to the disease than males(4,5,11,12). This is, owing to the fact, that females have a higher and earlier onset of Osteoporosis (13) and in general are more susceptible to low serum calcium and vitamin D levels than males (14). Since our study only included only patients with early OA Knee changes, it can be postulated that incidence of early OA knee might be the same in both the sexes. However owing to higher susceptibility in females, the progression of the disease in females is faster, owing to a higher prevalence of late stage OA Knee overall.

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A high incidence was noted in the middle and lower socioeconomic groups, due to the fact that people in these groups usually engage in activities that require labor and exert more mechanical stress to the knee joint(2).

Further stressing on the involvement of mechanical stress on the knee joint is the fact that the study showed higher incidence of OA Knee in patients engaging in frequent stair climbing and those who engage in habitual squatting. Altered knee biomechanics as a result of previous trauma to the knee or any previous operative procedure on the knee also seems to play a role, since both were seen to be associated with a risk of developing OA Knee in our study.

An evaluation of the associated co morbidities, can lead us to the conclusion that there is a strong link between Diabetes Mellitus and OA Knee. This can be accounted to the fact that both in general are associated with an increase in BMI (16). There lacks a definitive evidence that one can lead to the other and vice versa. Hypertension also seems to be associated with quite a few patients, but this as well can be designated to the fact that increasing age is a risk factor for both entities (17,18). There lacks definitive evidence to show a one to one correlation between the two.

The evident improvement in values of the VAS, ACR, LEFS (6,7,8,9) and other scores in the study population can help us conclude that there is definite role of early diagnosis and intervention in these patients. Role of early physiotherapy has been reinstated in this study as has been multiple times earlier (19, 20,21,22).

Thus, it is essential to have an integrated approach in the management of OA Knee by means of clinical evaluation, radiological evaluation and biochemical studies, such that there is an early diagnosis and early intervention, which can significantly reduce the morbidities caused due to Osteoarthritis of Knee.

CONCLUSION:

Early diagnosis of Osteoarthritis of knee joint with simple questionnaire and X Ray evaluation can help initiate early intervention in the form of analgesics and physiotherapy, which can significantly reduce the progression and the morbidity of Osteoarthritis.

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