

ORIGINAL ARTICLE

Osteoarthritis: Clinical and Radiological Correlation

Shilpa P Karande¹, Seema Kini^{1*}**Abstract**

Background: Osteoarthritis (OA) is a slowly progressive degenerative joint disease, characterized by pain and functional disability. Various outcome measures for radiographic and clinical OA are described in studies. A limitation of radiographic evaluation is that, except for the direct evaluation of bone, the tissues involved in the OA process are either evaluated indirectly (cartilage) or not at all (synovium). In evaluation of clinical OA, the scores for pain, stiffness and function are commonly used outcome measures. The objective of this study was to co-relate the clinical status with activity and radiological score in osteoarthritis of various joints.

Materials and Methods: A Cross-sectional study was conducted including 100 consecutive patients of osteoarthritis of various joints. A thorough clinical examination of affected joint was performed and relevant laboratory investigations and radiology of the affected joint was done in all patients. Grading of severity of osteoarthritis was assessed by following clinical indices: Knee/ Hip by Lequesne, Articular Index of Doyle for osteoarthritis and modified WOMAC index – KGMC index. Radiological indices used were: Kellgren and Lawrence global grading scheme for the severity of osteoarthritis of the knee, hip, lumbar disc degeneration and apophyseal joints of the cervical spine, Kallman grading scale for individual features of the hand and Individual radiographic features assessed in radiographs of the hip and lumbar spine.

Results: Knee joint was commonly involved (89%), followed by lumbar spine (49%). Knee joint tenderness was significantly co-relating with KGMC and radiological index. Lequesne and KGMC Indian index were co-relating positively with each other for knee joint. All clinical indices showed significant co-relation with radiological indices for knee joint. Clinical and radiological indices were also co-relating positively in cervical and lumbar spine. Visual analogue scale (VAS) co-related significantly with Lequesne and Indian KGMC index with respect to knee joint, but showed no co-relation with Doyle index. Also for hands, cervical and lumbar spine VAS and clinical indices did not co-relate.

Conclusion: KGMC index is best applicable to assess the osteoarthritis knee joint. Radiological progression in OA co-relates well with all clinical indices including KGMC index. This study highlights the usefulness of visual analogue scale and various radiological and clinical indices to assess osteoarthritis especially for knee joint.

Introduction

Osteoarthritis (OA) is the most common joint disease of mankind and is also the leading cause of chronic disability in developed countries.¹ It is a slowly progressive degenerative joint disease, characterized by pain and functional disability. The larger joints are commonly affected and specifically involvement of the hip and knee joint has a great health (care) and

economic burden. Diagnosis of OA is usually based on symptoms (clinical OA) and is confirmed by radiography.² An inconsistent association between radiographic and clinical OA hampers diagnosis however.^{3,4}

In clinical practice expression of disease varies significantly between patients, possibly implying the existence of different types of OA. Despite this inconsistency and the development of magnetic resonance

imaging, with which a relation between pain and structural damage like bone marrow lesions and bone attrition was found,^{5,6} radiographs are still the gold standard for demonstrating structural changes since image acquisition is non-invasive, cheap, fast, and generally available.^{7,8}

Various outcome measures for radiographic and clinical OA are described in studies. Common outcomes for radiographic OA are Kellgren and Lawrence grading (KL)⁹ and in recent years actual measurement of joint space width (JSW) has been increasingly applied.^{10,11} A limitation of radiographic evaluation is that, except for the direct evaluation of bone, the tissues involved in the OA process are either evaluated indirectly (cartilage) or not at all (synovium). In evaluation of clinical OA the visual analogue scale (VAS) for pain, and the Western Ontario and McMaster Universities OA Index (WOMAC)^{12,13} scores for pain, stiffness and function are validated and commonly used outcome measures.

The objective of this study was to correlate the clinical status with activity and radiological score in osteoarthritis of various joints.

Materials and Methods

A Cross-sectional study was conducted at Department of Medicine of a tertiary care hospital, Mumbai after approval from institutional ethics committee. We studied 100 consecutive patients of osteoarthritis of various joints over a period of one year either attending OPD or admitted for various reasons.

Inclusion Criteria

1. Primary osteoarthritis of various joints in either sex.
2. Those who gave informed consent.

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Table 1: Distribution of patients according to joint involvement

Joints	No. of patients	%
Knee	89	89%
Lumbar spine	49	49%
Cervical spine	31	31%
Hands	26	26%
Ankle	16	16%
Hip	7	7%
Elbow	6	6%
Shoulder	9	9%

Table 2: Co-relation of knee joint swelling and tenderness with other parameters

Parameters	Swelling*		Tenderness*	
	r-value	p-value	r-value	p-value
VAS	0.204	0.055	0.173	0.105
Lequesne Index	0.109	0.311	0.134	0.209
KGMC Index	0.05	0.644	0.35*	0.0008
Doyle Index	-0.092	0.394	0.054	0.614
Radiological index	0.103	0.335	0.286	0.0067

*Swelling vs Tenderness: r- 0.21; p- 0.049

Exclusion Criteria

1. Patients with secondary osteoarthritis due to trauma, RA, congenital or developmental defect, metabolic, endocrine, inflammatory neuropathic and endemic diseases.
2. Patients less than 12 years of age.

A thorough clinical examination of affected joint was performed and relevant laboratory investigation like ESR, CRP, IgM rheumatoid factor and radiology of the affected joint was done in all patients, which is the standard of care. Grading of severity of osteoarthritis was assessed by following indices:

Clinical Indices

1. Knee / Hip by Lequesne et al.¹⁴⁻¹⁶

Index Score	Handicap
0	None
1 – 4	Mild
5 – 7	Moderate
8 – 10	Severe
11 – 13	Very severe
> = 14	Extremely severe

2. Articular Index of Doyle et al. for Osteoarthritis (the higher the score the worse the osteoarthritis)¹⁷
3. Modified WOMAC index – KGMC index¹⁸

Radiological Indices

1. Kellgren and Lawrence global grading scheme for the severity

Table 3: Co-relation between clinical and radiological indices for knee joint

Knee indices	r-value	p-value
Lequesne I. and KGMC I.	0.436	< 0.001
Lequesne I. and Doyle I.	0.14	0.192
Lequesne I. and Radiological index	0.429	< 0.001
KGMC I. and Doyle I.	0.171	0.109
Doyle I. and Radiological index	0.259	0.0165

Table 4: Co-relation of hand, cervical and lumbar spine features with other parameters

Joint	Parameters	r-value	p-value
Hand	Swelling vs Tenderness	0.004	0.983
	Swelling vs Clinical Index	-0.13	0.536
Cervical Spine	MR vs Clinical Index	0.193	0.294
	MR vs Radiological Index	0.0735	0.694
	Clinical vs Radiological Index	0.651	< 0.0001
Lumbar Spine	MR vs Tenderness	0.61	< 0.001
	MR vs Clinical Index	0.206	0.1554
	MR vs Radiological Index	0.112	0.443
	Clinical vs Radiological Index	0.6076	< 0.0001

MR - Movement Restriction

1. of osteoarthritis of the knee, hip, lumbar disc degeneration and apophyseal joints of the cervical spine.¹⁹
2. Kallman grading scale for individual features of the hand.¹⁹
3. Individual radiographic features assessed in radiographs of the hip and lumbar spine.²⁰

Statistical Analysis of data was done by using SPSS software ver. 21. The association of clinico-radiological association was assessed by unpaired 't' test, chi square test and Pearson's co-efficient of correlation.

Results

Out of 100 patients of osteoarthritis, 73% were females and rest were males with mean age of 54.2 and 57.3 years respectively. Knee joint was commonly involved (89%) followed by lumbar spine (49%), cervical spine (31%) and hand (26%) (Table 1).

Knee joint swelling and tenderness had significant positive co-relation with each other. However no co-relation was observed between swelling and VAS,

Table 5: VAS and clinical indices

Knee	r-value	p-value
VAS and Lequesne I.	0.4708	< 0.001
VAS and KGMC I.	0.2569	0.0151
VAS and Doyle I.	0.1794	0.0924
Hand		
VAS and Clinical index	0.1407	0.493
Cervical spine		
VAS and Clinical index	0.1547	0.9342
Lumbar spine		
VAS and Clinical Index	0.1820	0.2108

clinical indices (Lequesne, KGMC, Doyle) and radiological index. Knee joint tenderness was significantly co-relating with KGMC and radiological index while no co-relations was observed between tenderness and VAS, Lequesne and Doyle index (Table 2).

Knee joint's clinical and radiological indices co-relation showed that, Lequesne and KGMC Indian index were co-relating positively with each other but Lequesne and Doyle index in this study were not co-relating. Lequesne, KGMC and Doyle's Index, all showed significant co-relation with radiological indices suggesting that clinical and radiological indices for knee joint co-relate with each other (Table 3).

On observing co-relation of hand, cervical and lumbar spine, we found that clinical and radiological indices were co-relating positively in cervical and lumbar spine. Movement restriction and tenderness were also co-relating with each other in lumbar spine (Table 4).

When severity of illness by visual analogue scale as assessed by the patients and other clinical indices were co-related with each other, results obtained suggested that for knee joints visual analogue scale and clinical indices (Lequesne and KGMC) were co-related positively, however visual analogue scale and Doyle index did not co-relate. For hands, cervical spine and lumbar spine visual analogue scale and clinical indices did not co-relate (Table 5).

Discussion

Several studies have been conducted all over the world to note various parameters of OA with special emphasis on the knee joint as it is the most commonly involved joint. Present study is an attempt to find out the co-relation between clinical and radiological indices in osteoarthritis of

various joints.

Hundred patients of primary osteoarthritis following up in rheumatology and medical OPD of a tertiary care hospital were studied. Most commonly involved joint was knee joint (89%). Both Indian and Western literature shows that knee is the most commonly affected joint in mono or pauciarticular pattern.²¹ The results are also attributed to habit of squatting in Indian population during day to day activity. The second common involvement was lumbar spine (49%) which can be attributed to lifting heavy weights on heads, manual labor which is common in Indian population. Spine osteoarthritis is seen in areas of maximum spinal motion in middle aged and elderly best manifested by pain on bending backwards. In the present study, hand affection was seen in 26% patients. In Indian scenario of vibratory tools in industries, and other occupations attributes to hand involvement as osteoarthritis. Hip joint involvement was seen in 7% patients. In India, hip joint involvement was found in one study in Karnataka described as Handigodu disease.²² Hip joint involvement is not commonly seen in India as compared with Western countries which are still unexplained.

In present study, we tried to co-relate various disease parameters viz. visual analogue scale, clinical profile, clinical indices and radiological indices with each other for various joints to find out their reliability in assessing the status of osteoarthritis. In case of osteoarthritis of knee cases the association between swelling and tenderness was significant. Knee joint tenderness co-relates with KGMC clinical index and radiological index suggesting that tenderness can be a reliable indicator of knee osteoarthritis. Knee joint clinical indices like Lequesne co-relate with Indian KGMC index and radiological index positively, however, the same is not true for Doyle's index, suggesting that Indian KGMC index for assessing severity of knee osteoarthritis is reliable.¹⁸ Worldwide WOMAC scale is being use to assess knee joint osteoarthritis, but, we did not find it applicable in Indian population. KGMC

scale is modified WOMAC scale which is best applicable in Indian scenario. The positive co-relation between KGMC scale and radiological indices further validates the reliability of KGMC score that it can be used to assess the progression of osteoarthritis of knee. Doyle index was not co-relating with KGMC and Lequesne, thus should not be advocated in Indian population.

In the present study, hand osteoarthritis and clinical indices didn't not co-relate with each other. Doyle's clinical and radiological indices of cervical and lumbar spine co-relates well with each other and can thus be taken as a good marker for assessment of clinico-radiological presentation in patients. Movement restriction and tenderness were also co-relating well with each other in lumbar spine.

Visual analogue scale (VAS) as given by patients at the time of presentations in outpatients department when co-related with clinical indices suggested that it had a good co-relation in knee joint only. VAS co-related significantly with Lequesne and Indian KGMC index with respect to knee joint, but showed no co-relation with Doyle index. Also for hands, cervical and lumbar spine, VAS and clinical indices did not co-relate. Hence there is a need to study the clinical indices for other joints like hands, wrist, cervical and lumbar spine in Indian population.

Conclusion

We thus conclude that KGMC index is best applicable to assess the osteoarthritis knee joint followed by Lequesne index while Doyle index is not suited. Radiological progression in OA co-relates well with all clinical indices including KGMC index. This study highlights the usefulness of visual analogue scale and various radiological and clinical indices to assess osteoarthritis especially for knee joint.

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