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Research Paper

Prevalence of osteoarthritis according to modified ACR and EULAR-2009 among patients attending orthopaedics department in a tertiary care hospital, Puducherry

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Abstract
Osteoarthritis is one of the most common rheumatic diseases and is the leading cause of pain and disability in most countries worldwide. The present study aimed to measure the proportion of knee osteoarthritis and its risk factors among patients visiting orthopaedics department and also to compare European League Against Rheumatism 2009 (EULAR) criteria with modified American college of Rheumatology(ACR) *criteria used for clinical diagnosis of knee osteoarthritis.A facility based cross sectional study was conducted among the patients from Out-Patient Department and In-Patient Department of Orthopaedics department in a tertiary care hospital from 1st march to 31st march 2015. A total of 245 subjects were selected by systematic random sampling. The study was conducted by administering a pretested structured questionnaire with demographic details and associated risk factors. The mean of the participants was 45.36±13.59 years. The proportion of osteoarthritis was found to be 19.6% and 8.2% according to modified ACR and EULAR 2009 respectively. In this study, sstatistically significant association with modified ACR was found with age, sex, education, socio economic status, occupation, BMI, previous knee injuries, physical activity. Statistically significant association using EULAR 2009 was found with age, sex, education, occupation, previous knee injuries, physical activity, chronic diseases. This study is also highlighted the Incidence of knee OA is rising by increasing average age and decreasing socio economic status. Old age, female sex, poor education, overweight, trauma to joint due to repetiting movements in particular occupation or knee injuries and chronic diseases like diabetes & hypertension are common risk factors of knee OA. Clinicians can use the identified modifiable risk factors like overweight, previous knee injury and chronic diseases to identify patients at risk of developing or increasing knee pain and manage them accordingly. And clinicians can use modified ACR as screening test and EULAR 2009 as a diagnostic test.*

Keywords: *Osteoarthritis, Modified ACR, EULAR-2009, Rheumatic disease, Signs and Symptoms.*

Introduction

Osteoarthritis is the most common rheumatic disease and is the leading cause of pain and disability in most countries worldwide[1]. It is defined as a chronic degenerative, non-inflammatory joint disease characterised by destruction of articular cartilage and formation of new bone at the joint surface and margins[2]. The changes are due to imbalance in the equilibrium

between the breakdown and repair of joint tissue[3]. The most common symptoms of osteoarthritis include joint pain, stiffness and limitation of movements[3]. Prevalence of osteoarthritis increases with age and it is more commonly seen among females than males[1]. And there is increased incidence of knee osteoarthritis is seen who had knee injury during their young age[4]. The prevalence of osteoarthritis also increases with age[1]. It is more commonly seen among the peoples who are engaged in agriculture, manual labour, and household workers[5]. For the clinical diagnosis of osteoarthritis the modified American college of Rheumatology (ACR) criteria has been in use since 1981. In 2009, the European League Against Rheumatism (EULAR) was developed for the clinical diagnosis of osteoarthritis[5]. It is also considered as a leading cause of government health expenditure, 3.7% of total health expenditure in Australia in the year 1999, 2.5% of gross national product in US in 1992[6]. The symptoms of osteoarthritis can be improved with a wide variety of rehabilitative measures like joint specific exercise, physical fitness and physical modalities. Education and self-management are only way to prevent the overuse of the joint and to use the joint in a adequate way[7]. There is a paucity of knowledge regarding the prevalence of osteoarthritis and its risk factors especially in this part of the country, so considering its burden for the public as well as for the government this study was undertaken to highlight the importance of morbidity caused by osteoarthritis and its potentially preventable aetiology.

Materials and Methods

A facility based cross sectional study was conducted among the patients from Out-Patient Department (OPD) and In-patient Department (IPD) of orthopaedics department in a tertiary care hospital namely Indira Gandhi Medical College and Research Institute (IGMC&RI), Puducherry. The study was carried out for a total period of one month from 1st march to 31st march 2015, by administering a pretested structured questionnaire. Considering the prevalence of osteoarthritis among the adult population as 17%[5] and taking alpha error as 5% and absolute error of margins as 5%, the sample size was calculated and found to be 217. The sampling unit was taken as an individual. The study was conducted using systematic random sampling procedure by interviewing every 5th patient attending the OPD on all working days and every 5th patient admitted in IPD till the desired sample size was achieved. The patient in the age group of 18 or above was contacted through this study and proper informed consent was taken from them in their local language before preceding the interview. Those who were having above knee amputation in one or both lower limbs, hemiplegia, paraplegia, monoplegia, those who were having fractures on one or both limbs and those who were not willing to give consent are excluded from the study. The questionnaire consisted of three parts. The first part consisted of the demographic details of the subject like age, sex, education, occupation, income, socio economic status (based on BG Prasad classification)[8] and address (rural/urban).the second part consisted of risk factors like Body Mass Index (BMI), history of previous knee injury, family history of knee injury, physical activity(sedentary/ moderate/strenuous), occupational history of standing hours, diabetes mellitus, hypertension, alcohol, smoking and the third part consist of signs and symptoms like persistent knee pain, usage related pain, feeling of giving away, morning stiffness (<30min), rest and night pain, previous injuries, limitation of movements, Crepitus, bony enlargement, effusion. The BMI was calculated and classified into obese and non-obese according to World Health Organisation (WHO)[9].

According to EULAR 2009 criteria, 3 symptoms and 3signs were taken to diagnose a case of osteoarthritis, they are persistent knee pain, limited morning stiffness, limitation of function, bony enlargement, resisting movements and Crepitus. For >18 years all the signs and symptoms should present to diagnose a case, but for >45 years all the 3 symptoms with one sign is enough to diagnose a patient having osteoarthritis. According to modified

ACR:1) persistent knee pain, 2) Crepitus, 3) morning stiffness <30 min, 4) age >38 years, 5) bony enlargement on knee examination. Osteoarthritis is said to be present if (1 to 4) or (1, 2, 5) or (1, 4, 5,) are present.

The data was done using Epi-data and the data was analysed using Epi info and SPSS version 20.

Results

Demography

A total of 245 subjects participated in the study. Out of which the female comprised of 62.9 % (154) and male 37.1%(91) involved in the study as shown in Table 1. The mean of the participants was 45.36±13.59 years and majority of them are below 40 years of age 39.6 %(97). About 53.5 % (131) subjects are from urban areas and 46.5%(114) are from rural areas. Nearly 35.9 %(88) are illiterate. Majority of them were in lower middle class 47.3 %(116) according to BG Prasad scale. The distribution of occupation was farmer 17.6%(43), labour 27.8%(68), mason 5.3%(13), housewife 42%(103) and unemployed 7.3%(18). Of the total subjects 60%(147) were having below BMI <25kg/m^2 and 40%(98) above >25kg/m^2.

Table-1 Demography

Total No. of Subjects = 245		N	%
Age	<40	97	39.6
	40-50	71	28.9
	51-60	43	17.6
	61-70	25	10.2
	>71	9	3.7
Gender	Male	91	37.1
	Female	154	62.9
Address	Rural	114	46.5
	Urban	131	53.5
Education	Illiterate	88	35.9
	literate	157	64.1
Socio Economic Status	Upper Class	18	7.3
	Upper middle	46	18.8
	middle class	33	13.5
	Lower middle class	116	47.3
	Lower class	32	13.1
Occupation	Farmer	43	17.6
	Labour	68	27.8
	Mason	13	5.3
	Housewife	103	42.0
	unemployed	18	7.3
BMI	<25	147	60.0
	>25	98	40.0

Distribution of patients with risk factors

6.6% (6) of males and 14.3% (22) of females gave a positive history of previous knee injuries. Majority of the females are involved in sedentary physical activity 64.9% (100) and majority of males 62.6% (57) are involved in moderate physical activity. 19.5% (30) of females and 13.1% (12) of males gave positive history for having chronic diseases like diabetes and hypertension as shown in Table 2.

Table-2 Distribution of Patients with Risk factors

Risk factors	**Male (91)**		**Female (154)**	
	No	**%**	**No**	**%**
Previous Knee Injury	6	6.6	22	14.3
Family History	6	6.6	13	8.4
Physical Activity Sedentary	16	17.6	100	64.9
Moderate	57	62.6	37	24.0
Strenuous	18	19.8	17	11.0
H/O Repetitive knee Bending	15	16.5	21	13.6
Chronic Disease	12	13.1	30	19.5
Alcohol	30	33.0	1	0.6
Smoking	19	20.9	1	0.6

Signs and Symptoms

out of 245, 33.1 % (81) of subjects had right sided persistent knee pain and 28.6% (70) had right sided usage related pain , on left side 26.1%(64) had persistent knee pain and 23.3% (57) had usage related pain. 20.4 %(50) of subjects had Crepitus in right knee and 17.6%(43) had Crepitus in left knee. 24.5%(60) had right sided morning stiffness and 19.6%(48) had left sided morning stiffness as shown in Table 3.

Table-3 Distribution of Patients with Signs & Symptoms

Symptoms	**Right Knee n=245**		**Left Knee n=245**	
	No.	**%**	**No.**	**%**
Persistent Knee pain	81	33.1	64	26.1
Usage Related pain	70	28.6	57	23.3
Morning Stiffness <30mm	60	24.5	48	19.6
Rest (Night pain)	53	21.6	45	18.4
Limitation of movements	32	13.1	24	9.8
Signs Crepitus	50	20.4	43	17.6
Bony enlargement	13	5.3	11	4.9
Restriction of movements	19	7.60	20	8.2
Effusion	32	13.10	27	11.0
Tenderness	3	1.20	8	3.3

Prevalence of osteoarthritis

Using modified ACR criteria the prevalence of osteoarthritis was found to be 19.6%. Only 5.2% of the people who are less than 40 years are having osteoarthritis. Statistically significant association was found with age (chi^2 for linear trends, p<0.001), sex (chi^2 test; p value=0.023), education (p value<0.001), socio economic status (chi^2 for linear trend=0.004), occupation (p value=0.0198, dof=4), BMI (p=0.010), previous knee injuries (chi^2; p= 0.005), physical activity (chi^2; p=0.025) as shown in Table 4.

Table-4 Factors Associated with Osteoarthritis Knee according to modified ACR Criteria

Associated Factors		Frequency		P value
		No	%	
Age	<40	5	5.2	Chi^2 for linear trends, p< 0.001
	40-50	15	21.1	
	51-60	14	32.6	
	61-70	10	40.0	
	>70	4	44.4	
Sex	Female	37	24.0	Chi^2 test p value =0.023
	Male	11	12.1	
Education	Illiterate	29	32.9	P value <0.001
	Literate	19	12.1	
Socio Economic Status	Upper Class	1	5.3	Chi^2 for linear trend = 0.004
	Upper middle	7	15.2	
	middle class	4	12.1	
	Lower middle class	24	20.7	
	Lower class	12	38.7	
Occupation	Former	12	27.9	P=0.0198(dof =4)
	Labour	5	13.5	
	Mason	1	7.7	
	Housewife	26	25.2	
	Others	0	0.0	
	unemployed	4	22.2	
BMI	<25	21	14.3	p=0.010
	>25	27	27.5	
History of Previous Knee Injury		11	39.3	Chi^2 p = 0.005
Physical Activity	Sedentary	26	22.4	Chi^2 p = 0.025
	Moderate	11	11.7	
	Strenuous	11	31.4	
Chronic Diseases	None	36	17.7	Chi^2 p = 0.183
	diabetes mellitus	8	33.3	
	hypertension	4	22.2	

Using EULAR-2009, the prevalence of osteoarthritis was found to be 8.2%. statistically significant association was found with age(chi2 linear trend, p<0.001), sex (chi2; p value=0.032), education (chi2; p value= 0.046). occupation (chi2 p=0.0076, dof=2), previous knee injuries (fishers exact test; p value=0.062), physical activity (p=0.017), chronic diseases (chi2; p < 0.001) as shown in Table 5.

Table-5 Factors Associated with Osteoarthritis of Knee joint according to EULAR 2009

Associated Factors		Frequency		P value
		No	%	
Age	<40	1	1.0	Chi^2 linear trend, p< 0.001
	40-50	2	2.8	
	51-60	11	25.6	
	61-70	5	20.0	
	>70	1	11.1	
Sex	Female	17	11.0	Chi^2 p value =0.032
	Male	3	3.3	
Education	Illiterate	13	14.8	Chi^2 P value =0.046
	Literate	7	4.4	
Socio Economic Status	Upper Class	0	0.0	Chi^2 linear trend = 0.06
	Upper middle	2	4.3	
	middle class	2	6.1	
	Lower middle class	13	11.2	
	Lower class	3	9.7	
Occupation	Farmer	3	6.9	Chi^2 P=0.0076 dof=2
	Labour	0	0.0	
	Mason	0	0.0	
	Housewife	15	14.6	
	Others	0	0.0	
	unemployed	2	11.1	
BMI	<25	8	5.9	p=0.056
	>25	12	12.2	
History of Previous Knee Injury		5	17.8	Fisher's Exact test P value =0.062
Physical Activity	Sedentary	15	12.9	Chi^2 p = 0.017
	Moderate	2	2.1	
	Strenuous	3	8.6	
Chronic Diseases	None	10	4.9	Chi^2 p < 0.001
	diabetes mellitus	7	29.2	
	hypertension	3	16.7	

From the above Tables it is found that 48(19.6%) subjects were found to be having osteoarthritis by using modified ACR criteria, and only 20(8.2%) were found to be having osteoarthritis knee by EULAR 2009 as listed in Table-6.

Table-6 Comparison of ACR with EULAR 2009			
	ACR +ve	**ACR-ve**	
EULAR +ve	20	0	20
EULAR-ve	28	167	225
	48	**197**	**245**

Discussion

In the present study the proportion of osteoarthritis was found to be 19.6% according to modified ACR and 8.2% according to EULAR-2009. The prevalence of osteoarthritis found by modified ACR criteria is found to be higher than EULAR 2009 criteria. In a study at rural areas of Bangalore by Ajit NE the prevalence of osteoarthritis was found to be 17%[5]. another study by chopra et al., the prevalence in rural bhigwan was 5.8%[10], whereas the study in urban pune by joshi et al., prevalence was found to be 6.46%[11]. on comparing the two criteria for the diagnosis of osteoarthritis the EULAR 2009 is considered as a best and easy method for the diagnosis of osteoarthritis by clinical means on comparing with modified ACR criteria. Because EULAR-2009 is easier to follow, it needs the 6 criteria, for the diagnosis of osteoarthritis not use of combinations as in modified ACR. But many cases which are missed by EULAR-2009 criteria are picked up by modified ACR. The EULAR-2009 criteria was created on evidenced based review from 1950 to 2008 and based on expert consensus from different countries. The specificity of EULAR 2009 was found to be 99%[12] when all the 6 criteria were positive. And the specificity and sensitivity of modified ACR was found to be 86% and 91%[13].

In this current study, by modified ACR criteria we found a strong association with age, gender, education, socio economic status, occupation, BMI, history of previous knee injuries and physical activity but with EULAR-2009 we found association with age, sex, education, occupation, history of previous knee injuries and physical activity. Similarly like this study, there is a significant association between osteoarthritis and increasing in age done by Li YP et al[14],. A study by srikanth VK et al., show a significant association between sex and osteoarthritis and shows females were developing osteoarthritis more common than males[15]. Another study by Muthuri SG et al., shows higher risk of developing osteoarthritis in patients who had previous knee injuries as like this study[16] .a study by Spector TD et al., shows strong association between obesity and osteoarthritis[17]. Roswsignol M et al., shows an association between occupation and the development of osteoarthritis in their study[18].

Modified ACR show a significant association with socio economic status and BMI which the EULAR-2009 didn't show. And there is a significant association of chronic diseases with EULAR-2009 where the modified ACR didn't have. We didn't find a significant association with family history, alcohol, smoking, history of repetitive knee bending and between rural/urban areas.

Conclusion

According to modified ACR Criteria the prevalence of osteoarthritis was found to be 19.6% and 8.2% as per EULAR 2009. The factors associated with osteoarthritis are advancing age, gender, education, occupation, previous knee injuries and physical activity. If the modifiable factors are addressed at an earlier age through appropriate health education methods, the morbidity and economic burden could be averted.

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