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Prevalence of cardiovascular risk factors and diseases in patients with osteoarthritis of knee attending orthopaedic out-patient department of a tertiary care hospital

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ABSTRACT

Background: Osteoarthritis (OA) and cardio-vascular diseases (CVD) share similar risk factors. Since OA may increase the risk of CVD through several mechanisms, this study was taken up to find the prevalence of cardiovascular risk factors and diseases in patients with OA knee. We also assessed the relationship between cardiovascular risk factors and the socio-demographic characteristics of the participants.

Methods: This cross-sectional study was conducted during August 2018 to January 2019 in an Orthopaedic Outpatient Department of a tertiary care hospital in a metropolitan city. Sample size was 384. Patients above the age of 45 years who were radiologically diagnosed to be OA knee grade 2 and above were included. Questionnaire was used to collect data. Lipid profile and blood sugar were done. Perceived stress scale-10 was used for calculating stress level.

Results: Physical inactivity was the most prevalent risk factor (79.68%) followed by tobacco consumption (69.27%), obesity (64.84%), unhealthy diet (56.77%), positive family history (48.43%), dyslipidaemia (48.17%), diabetes (38.54%), hypertension (27.60%), smoking, mental stress and excessive alcohol intake. Prevalence of CVDs like heart failure, heart attack, stroke and other cerebral atherosclerotic conditions were 5.98%. Prevalence among male and female was 6.16% and 5.88% respectively.

Conclusions: Risk factors for cardiovascular diseases are common in patients of Osteoarthritis Knee. Physical inactivity is the most common risk factor followed by tobacco consumption, obesity and unhealthy diet. Prevalence of CVDs were 5.98%.

Keywords: Cardiovascular disease, Osteoarthritis knee, Physical inactivity, Risk factor

INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of morbidity and mortality in the world. According to WHO, 17.9 million people die of CVD every year which includes 31% of deaths worldwide.² Osteoarthritis (OA) of knee is the most common arthritis and leading cause of disability causing joint pain, functional disability and an impaired quality of life.3

Osteoarthritis (OA) increases the risk of CVD in multiple ways. Both OA and CVD share similar risk factors like decreased physical activity, hypertension, obesity, depression. Also, OA has chronic low-grade inflammation which is potential risk factor for CVD. The modifications of extracellular matrix typical of OA could further increase the risk of CVD. 3-5 Direct ischemic effects on the bone are known to reduce the cartilage nutrition and cause bone infarcts which is characteristic of advanced OA.^{6,7} In obesity, the inflammatory enzymes released by adipose tissues induce insulin resistance, systemic inflammation, endothelial dysfunction causing atherosclerosis and an increased CVD risk. Obesity also reduces physical activity which further has impact on cardiovascular system.^{8,9}

The inter-relationship between OA and CVD has not been studied in depth but, few studies report increased odds ratios of CVD among OA cases. ¹⁰⁻¹² Some studies have also reported that compared with the general population, patients with OA have increased mortality caused by CVD, diabetes mellitus. ^{13,14}

Since OA may increase the risk of CVD through several mechanisms, this study was taken up to find the prevalence of cardiovascular risk factors and diseases in patients with OA knee. We also assessed the relationship between cardiovascular risk factors and the sociodemographic characteristics of the participants.

METHODS

This is a hospital based cross-sectional study conducted during August 2018 to January 2019. The study setting is an Orthopaedic Out-patient Department of a tertiary care hospital in Mumbai. The average patient load per day is 250-300 patients. At 95% Confidence interval, using the formula, $n=(Z_{1-\alpha/2})^2 \times P (1-P)/d^2$ with P=0.50 and d=0.05, we obtained a minimum sample size of 384. 15 Patients above the age of 45 years who were radiologically diagnosed to be osteoarthritis of knee (OA knee) grade 2 and above according to Kellgren and Lawrence System i.e. presence of definite osteophytes and possible joint space narrowing on antero-posterior weight bearing on radiograph were included in the study. 16 Simple random sampling was done to recruit 384 consenting patients. Ethical approval was obtained from Institutional Ethics Committee.

A pre-validated semi- structured questionnaire was used to collect data regarding socio-demographic profile, risk factors for CVD and self-reported existing CVD. Body mass index (BMI) and blood pressure (BP) were recorded. Lipid profile and blood sugar examination were done. Perceived stress scale-10 (PSS-10) was used for calculating stress level. Proven risk factors like positive family history of heart disease, tobacco consumption, smoking, excessive alcohol intake i.e. ≥14 units a week, unhealthy dietary habits rich in saturated fats, high salt and sugar, junk food consumption and low fruit servings were assessed. Physical inactivity or insufficiently active was taken as doing no/ very little physical activity or doing some physical activity but less than 150 minutes of moderate intensity physical activity or 60 minutes of vigorous-intensity physical activity a week at work, at home, for transport or in discretionary time respectively. 17 Systolic BP ≥130 mmHg and diastolic BP ≥80 mmHg was considered hypertensive. BMI >25 was considered obese. Total cholesterol ≥200 mg/dl, HDL ≤35 mg/dl, triglycerides ≥150 mg/dl were cut-offs considered for dyslipidaemia. Fasting glucose ≥126 mg/dl and 2-hour plasma glucose ≥200 mg/dl were cut-offs used for diabetes. Moderate to high on PSS-10 were labelled as mentally stressed.

Data entry was done in Microsoft Excel 2018 and analysed using SPSS version 21.0.

RESULTS

This hospital based cross- sectional study conducted in 384 patients with OA knee yielded the following results. The socio-demographic profile of the patients is depicted in Table 1. All women participants in the study had attained menopause.

Table 1: Socio-demographic profile of patients with OA knee (n=384).

Characteristics		Male (n ₁ =146, 38.02%)	Female (n ₂ =238, 61.9%)	Total (n=384, 100%) N (%)		
Age group (in	45-55	13	98	111 (28.9)		
	55-65	69	108	177 (46.09)		
years)	>65	64	32	96 (25.0)		
Dlagaef	Urban	45	55	100 (26.04)		
Place of residence	Sub-urban	73	146	219 (57.03)		
residence	Rural	28	37	65 (16.92)		
Marital Status	Married	138	237	375 (97.65)		
	Widow	8	1	9 (2.34)		
Occupation	Unemployed/retired	99	178	277 (72.13)		
	Manual labours	21	52	73 (19.01)		
	Driving	8	0	8 (2.08)		
	Clerical work	18	8	26 (6.77)		
G	Lower	19	32	51 (13.28)		
Socio-economic status (Modified BG Prasad scale 2018)	Lower middle	59	77	136 (35.41)		
	Middle	39	63	102 (26.56)		
	Upper middle	21	51	72 (18.75)		
	Upper	8	15	23 (5.98)		

Table 2: Assessment of risk factors for cardiovascular diseases in patients with OA knee.

	Male (n ₁ = 14	46, 100%)	Female (n ₂ =	238, 100%)	Total (n=384,		
Risk factors	Yes	No	Yes	No	100%)	P value	
	N (%)	N (%)	N (%)	N (%)	N (%)		
Positive family history	81 (55.47)	65 (44.52)	105 (44.11)	133 (55.88)	186 (48.43)	0.03	
Unhealthy diet	61 (41.78)	85 (58.21)	157 (65.96)	81 (34.03)	218 (56.77)	0.000005	
Physical inactivity	117 (80.13)	29 (19.86)	189 (79.41)	49 (20.58)	306 (79.68)	0.96	
Hypertension	45 (30.82)	101 (69.17)	61 (25.63)	177 (74.36)	106 (27.60)	0.32	
Obesity	87 (59.58)	59 (40.41)	162(68.06)	76 (31.93)	249 (64.84)	0.1	
Tobacco consumption	99 (67.80)	47 (32.19)	167 (70.16)	71 (29.83)	266 (69.27)	0.7	
Smoking	53 (36.30)	93 (63.69)	4 (1.68)	234 (98.31)	57 (14.84)	0.0000	
Excessive alcohol intake	29 (19.86)	117 (80.13)	0 (0)	238 (100)	29 (7.55)	0.0000	
Dyslipidaemia	43 (29.45)	103 (70.54)	142 (59.66)	96 (40.33)	185 (48.17)	0.0000	
Diabetes	47 (32.19)	99 (67.80)	101 (42.43)	137 (57.56)	148 (38.54)	0.058	
Mental stress	18 (12.32)	128 (87.67)	34 (14.28)	204 (85.71)	52 (13.54)	0.69	

†Test applied: Chi – square, Fischer -Exact (where value in a cell is <5) ‡ P<0.05 are considered significant.

Table 3: Association of risk factors of cardiovascular disease with age, place of residence and marital status.

Risk factors	Age group (in years)		Davahaa	Place of residence			P value	Marital status		Dualua	
	45- 55	55- 65	>65	P value	Urban	Sub- urban	Rural		Married	Widow	P value
Positive family history	62	81	43	0.176952	35	119	32	0.005803	179	7	0.074702
Unhealthy diet	91	101	26	< 0.00001	59	141	18	< 0.00001	210	8	0.049045
Physical inactivity	83	157	66	0.000148	89	194	23	< 0.00001	302	4	0.00783
Hypertension	18	52	36	0.002258	20	74	12	0.007427	99	7	0.000656
Obesity	47	156	46	< 0.00001	57	168	24	< 0.00001	242	7	0.410864
Tobacco consumption	81	95	90	<0.00001	98	109	59	<0.00001	257	9	0.0621
Smoking	23	14	20	0.00194	13	18	26	< 0.00001	48	9	0.00000
Excessive alcohol intake	13	9	7	0.116278	5	14	10	0.029216	24	5	0.0001
Dyslipidaemia	39	93	53	0.004485	56	71	56	< 0.00001	120	6	0.028606
Diabetes	19	95	34	< 0.00001	37	100	11	0.00015	142	6	0.079376
Mental Stress	19	24	9	0.267724	17	23	12	0.129165	45	7	< 0.00001

†Test applied: Chi – square, Fischer -Exact (where value in a cell is <5) ‡ P value <0.05 are considered significant.

Risk factors for CVD

On assessing the risk factors for CVD, we found that, physical inactivity was the most prevalent risk factor (79.68%) followed by tobacco consumption (69.27%), obesity (64.84%), unhealthy diet (56.77%), positive family history (48.43%), dyslipidaemia (48.17%), diabetes (38.54%), hypertension (27.60%), smoking (14.84%), mental stress (13.54%) and excessive alcohol intake (7.55%). Out of these risk factors, there is significant difference ($p \le 0.05$) in the distribution of the risk factors like positive family history, smoking and excessive alcohol intake which are more common in males and dyslipidaemia, unhealthy diet and diabetes which are common among females (Table 2).

Association of each cardiovascular risk factor with socio demographic characters like age group, marital status, place of residence, occupation and socioeconomic status were seen. Distribution of risk factors like unhealthy diet, hypertension, obesity, tobacco consumption, smoking, dyslipidaemia and diabetes significantly varied across age groups (all p \leq 0.05). Distribution of risk factors like physical inactivity, unhealthy diet, positive family history, hypertension, obesity, tobacco consumption, smoking, dyslipidaemia and diabetes significantly varied depending upon place of residence (all p \leq 0.05). Physical inactivity, hypertension, smoking, excessive alcohol intake and mental stress were significantly higher among widows than married (all p \leq 0.05). Detailed results are depicted in Table 3.

Distribution of risk factors like physical inactivity, unhealthy diet, positive family history, obesity, tobacco consumption, smoking, excessive alcohol intake and dyslipidaemia significantly varied depending upon occupation of the patients (all $p \le 0.05$). Distribution of

risk factors like physical inactivity, positive family history, obesity, tobacco consumption, smoking, dyslipidaemia and diabetes significantly varied depending upon socioeconomic status of the patients (all p \leq 0.05). Detailed results are depicted in Table 4.

Table 4: Association of risk factors of cardiovascular disease with occupation and socio-economic disease.

	Occupation				Socio-economic status						
Risk factors	Unemployed/ Retired	Manual Iabours	Driving	Clerical work	P value	Lower	Lower middle	Middle	Upper middle	Upper	P value
Positive family history	118	46	5	17	0.003481	17	83	49	19	18	< 0.00001
Unhealthy diet	144	51	8	15	0.009471	33	74	56	46	9	0.187169
Physical inactivity	239	43	3	21	< 0.00001	30	128	89	41	18	< 0.00001
Hypertension	78	13	4	11	0.038978	12	33	32	17	12	0.051214
Obesity	197	33	6	13	0.000169	20	102	79	32	16	< 0.00001
Tobacco consumption	200	39	8	19	< 0.00001	41	89	85	49	2	< 0.00001
Smoking	32	10	8	7	< 0.00001	16	13	11	11	6	0.001432
Excessive alcohol intake	20	3	5	1	< 0.00001	2	9	6	9	3	0.281363
Dyslipidaemia	158	14	4	9	< 0.00001	14	66	65	27	13	0.000153
Diabetes	109	22	5	12	0.184828	13	44	56	24	11	0.000767
Mental Stress	38	9	1	4	0.980448	7	19	11	11	4	0.884362

†Test applied: Chi – square, Fischer -Exact (where value in a cell is <5); ‡ P value <0.05 are considered significant.

CVD prevalence

Prevalence of self-reported presence of any cardiovascular condition like heart failure, heart attack, stroke and other cerebral atherosclerotic conditions were 5.98% (23 participants). Prevalence among male and female was 6.16% and 5.88% respectively.

DISCUSSION

In this cross-sectional study we found the presence of risk factors for CVDs among OA knee patients such as physical inactivity, tobacco consumption, obesity, unhealthy diet, positive family history, dyslipidaemia, diabetes, hypertension, smoking, mental stress and excessive alcohol intake. Several studies have shown increased prevalence of CVD risk factors and CVD in patients with OA. ^{10,11,13,14,18,19}

We found that physical inactivity was the most common risk factor for CVDs in patients with OA knee. People with osteoarthritis experience a range of barriers to engaging in physical activity, including higher levels of pain, increased BMI and lower levels of function. Studies indicate that physical activity should be given a higher priority in the management of OA throughout the duration of the condition to not only manage osteoarthritis symptoms but also to maintain cardiovascular health. ²⁰⁻²²

In our study positive family history, smoking and excessive alcohol intake was more common among males and dyslipidaemia, unhealthy diet and diabetes among females. In a study by Veronese et al, they found men with OA knee to be more obese, smokers and diabetic and women more physically inactive.²³

We found prevalence of CVDs to be 5.98% in our study. Few studies have reported that patients with OA knee are at increased risk of death due to CVDs. ^{13,19} A systematic review concluded that people with osteoarthritis have significantly higher prevalence of CVDs and were at twice risk of having heart failure or ischaemic heart disease compared with people without osteoarthritis. ²⁴ Whereas, Hoeven et al in a study of 4,868 patients found no significant association between OA knee and CVD in people over 55 years. The difference in clinic-radiological criteria used can be the reason for these findings. ²⁵ A study also reported that only symptomatic OA is associated with a higher risk of CVDs and not necessarily all radiographic OA. ²³

We found prevalence of CVDs slightly higher in males in contrast to many studies which show higher prevalence in females. This is possibly due to the fact that women take more NSAIDs which have an unfavourable CVD profile and there is extracellular remodelling after menopause.²⁵⁻

CONCLUSION

Risk factors for cardiovascular diseases are common in patients of osteoarthritis knee. Physical inactivity is the most common risk factor followed by tobacco consumption, obesity and unhealthy diet. Other prevalent risk factors are dyslipidaemia, diabetes, hypertension, smoking, mental stress and excessive alcohol intake. Prevalence self-reported of presence of cardiovascular condition like heart failure, heart attack. stroke and other cerebral atherosclerotic conditions were 5.98%. Increased prevalence of CVD in osteoarthritis has an impact on treatment options and outcomes for patients. Patients with comorbid diseases are not suitable candidates for surgery thus decreasing the options available to treat and prevent progression of osteoarthritis.

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