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Risk of diabetes among patients with osteoarthritis

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***Abstract*---**Research Background: Diabetes mellitus (DM) and osteoarthritis (OA) are common diseases that are predicted to increase in prevalence in the US and worldwide. Although a higher prevalence of osteoarthritis (OA) has been reported among diabetes mellitus (DM) patients, discrepancy and limitations of observational studies have precluded a decisive association. Objective: The objective of this study was to investigate the relationship between osteoarthritis (OA) and the incidence of diabetes mellitus (DM). Methods: Study were conducted on Osteoarthritis subjects from both sex's male and female from different age group during January 2020 to January 2022, at NIMS Super specialty Hospital Shobha Nagar,Jaipur (Rajasthan) India. OA of areas were finding out using the American College of Rheumatology classification criteria. Sociodemographic characteristics, health-related behaviors, comorbidities and DM clinical manifestations and laboratory parameters were determined. Result: We were included 90 osteoarthritis patients in this study from both sex's males (53.33%) and females (46.66%). Out of 90 patients, majority of the subject belongs to the age group 41 to 60 years of age (48.88%). From total 90 patients, 71 (78.88%) had normal blood glucose level while 11 (12.22%) had increase blood glucose level and 8 (8.88%) had highly increased blood glucose level which is more than 200 mg/dl. In our study, it was observed that the level of blood glucose were significantly

high. Conclusion: Osteoarthritis was associated with increased risk of DM, including both type (T1DM and T2DM). Osteoarthritis and type 2 diabetes mellitus (T2DM) often co-exist in elder population.

Keywords---arthritis, osteoarthritis (OA), rheumatoid arthritis (RA), diabetes, WHO, metabolic disorders, musculoskeletal disorders, risk factor.

Introduction

Osteoarthritis (OA) is the most common[1] and in western populations it is one of the most frequent causes of pain, loss of function and disability in adults.[2] Osteoarthritis occurs commonly in the hand, foot, knee and hip, but rarely in the ankle, wrist, elbow, and shoulder.[3] The prevalence, progression, and severity of the symptoms of Osteoarthritis can be affected by multiple factors such as comorbidities, lifestyle, diet, age, gender, genetics, muscle weakness and obesity.[4,5] Radiographic evidence of OA occurs in the majority of people by 65 years of age and in about 80% of those aged over 75 years.[6] Recent studies have suggested phenotypically subcategorizing Osteoarthritis to better understand the pathogenesis and causes related to OA. These subtypes like age-related, post-traumatic event-related and metabolic syndrome-related categories. By breaking OA down into categories, we can further evaluate how other preexisting conditions and differences in lifestyle can affect the progression of OA. This issue is especially relevant given the rise in the prevalence of metabolic syndrome-related OA. The comorbidities and risk factors in OA pathogenesis share common features with those seen in type 2 diabetes mellitus (DM).[7] A cross-sectional study conducted by the US Third National Health and Nutrition Examination Survey (NHANES III) has verified a higher prevalence of DM in persons with OA when compared to the general population.[8] Furthermore, it was reported that Diabetes Mellitus plays a unique role of its own in the progression and pathogenesis of OA.[9] Hyperglycemia has been linked to a distinct mechanism in the development and progression of OA, including the production of advanced glycation end products (AGEs), oxidative stress, and dys regulation of articular cartilage metabolism.[10] Diabetes mellitus (DM) is a chronic metabolic abnormalities characterized by hyperglycemia, which results from the inability of the body to produce or use insulin.[11] DM, resulting from impaired insulin production and insulin resistance is defined as Type 1 (T1DM) and Type 2 (T2DM) respectively.[12] However, some studies showed that no significant association between OA and T2D.[13,14,15] But other study says diabetes mellitus (DM) and osteoarthritis (OA) are common diseases that are predicted to increase in prevalence in the US and worldwide.[16] The establishment of a link between OA and T2DM raises the question of whether DM has an impact on the pathophysiology of OA beyond what can be explained, including the mechanical impact of overweight/obesity (which frequently accompanies T2DM) on OA. Further investigate into the link between pain in erosive hand OA and diabetes (in type 2 but also type 1, which could be linked to low-grade inflammation due to metabolic syndrome) is needed.

Materials and Methods

Study was conducted on 90 osteoarthritis patients during January 2020 to January 2022; all cases were attended in NIMS Super-Specialty Hospital, Sobha Nagar, Jaipur, Rajasthan after the ethical approval to conduct this study which was granted by institutional ethics committee, National Institute of medical sciences & research, Jaipur. The following laboratory parameters including CBC, ESR, PBF, CRP and Random blood sugar test were performed in hospital laboratory. Full medical history and clinical examination were done for all patients. The data were collected through direct interview and using prepared questionnaire. An informed consent was obtained for all individuals willing to participate. We select Criteria for Diabetes according to world health organization.[17]

Statistics

The results of subjects are framed in Excel sheet, put into in a table, evaluated with percentage. The data analysis was done by using SPSS (Statistical Package for the Social Sciences).

Results

In this present study total 90 patients with osteoarthritis were included and all the investigation performed individually. Out of 90 patients, 48 (53.33%) were males and 42 (46.66%) were females with different age groups (Table no. 1). Group1 were include age between 21 to 40 years, group 2 include age between 41 to 60 years, group 3 include age 61 t0 80 years and group 4 include age more than 80 years respectively. Group 1 having 14 (15.55%) patients, group 2 having 44 (48.88%) patients, group 3 having 31 (34.44%) patients and group 4 having 1 (1.11%) patient (Table no.2). According to this study majority of the patients belong to the age group 2 (41 to 60 years). Graph No. 2 represent the level of blood glucose in the patients. Out of 90 patients, 71 (78.88%) had normal blood glucose level, 11 (12.22%) had increase blood glucose level and 8 (8.88%) had more than 200 mg/dl. In our study, it was observed that the level of blood glucose level were considerably high.

Table no 1: Sex distribution in osteoarthritis patients

Sex Distribution		
	No. Of patients	Percentages
Male	48	53.33%
Female	42	46.66%
Total	90	100%

Table no 2: Age distribution osteoarthritis patients

Age Distribution			
Age group	Years	No. Of patients	Percentages
Group 1	21-40 years	14	15.55

Group 2	41-60 years	44	48.88%
Group 3	61-80 years	31	34.44%
Group 4	More than 80	1	1.11%
Total No. OF Patients		90	100%

Table no 3: Distribution of Blood Sugar level in osteoarthritis patients

Blood Sugar level	No. of patients	Percentage (%)
Normal (70-140 mg/dl)	71	78.88%
Decrease (Below 70 mg/dl)	NIL	NIL
Increase (more than 140 -200 mg/dl)	11	12.22%
More than 200 mg/dl	8	8.88%
Total no. of patients	90	100%

Discussion

OA is a heterogeneous disorder that can be divided as an age-related, metabolic and post-traumatic, representing thus the three main phenotypes of the disease. Recent studies have suggested that metabolic factors (obesity, diabetes, hypertension and dyslipidemia) and their clustering in metabolic syndrome might be involved in the pathophysiology of osteoarthritis (OA). Diabetes defined by the World Health Organization (WHO), the measurement of fasting plasma glucose; 2-hour (2-h) post-load plasma glucose after a 75 g oral glucose tolerance test (OGTT); HbA1c; and a random blood glucose in the presence of signs and symptoms of diabetes. People with fasting plasma glucose (FBG) values of ≥ 7.0 mmol/L (126 mg/dl), 2-h post-load plasma glucose ≥ 11.1 mmol/L (200 mg/dl), HbA1c ≥ 6.5% (48 mmol/mol); or a random blood glucose ≥ 11.1 mmol/L (200 mg/ dl).[18]

We were included 90 osteoarthritis patients in this study from both sex's males the majority of the patients were males (53.33%) and remaining females (46.66%). In this study we were select different age groups including 20 to more than 80 years of age. Majority of the subjects belongs to the age group 41 to 60 years of age (48.88%). Mariely Nieves-Plaza et al found similar result.[19] Another study Chandra Prakash Pal et al found that the high prevalence more than +70 years of age (54.1%).[20] Aiyong Cui et al found that higher prevalence in women than in men at the age of 70 years.[21] From total 90 patients, 71 (78.88%) had normal blood glucose level, 11 (12.22%) had increase blood glucose level and 8 (8.88%) had highly increased blood glucose level which is more than 200 mg/dl. In our study, it was observed that the level of blood glucose level were significantly high. Other study shows associations between OA and DM; K.B. King et al stated that etiology and clinical manifestations of OA are complex, and currently we know little about how the multiple mechanisms altered in DM may affect OA that originates from different causes.[22] F. Eymard et al found Type 2 diabetes (6.6%) and it was a predictor of joint space reduction in men with established knee OA.[23] According to Mariely DM patients be more likely to have Osteoarthritis of hands or knees than non-diabetic. In this study females were at greater risk for OA.[19]

Similar studies also found the significance relationship between Osteoarthritis and Diabetes Mellitus.[24,25,26,27,28,29,30]

Conclusion

This study highlights a high frequency of OA in patients with DM and an association between both diseases, representing a further step towards the individualization of DM-related OA within a metabolic OA phenotype. To understand the mechanisms through which DM contributes to OA, further work is clearly necessary. Future studies of DM-influenced mechanisms may shed light on the general mechanisms of OA pathogenesis and result in more specific and effective therapies for all OA patients.

Conflict Of Interest: None

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