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## Osteoarthritis in association with diabetes mellitus: A pilot study

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### Abstract

The main objective of study includes to evaluate association of osteoarthritis in patients with DM and to suggest health care professionals that a part from FBS,GRBS,HBA1C lab tests in Diabetic patients ESR, CRP levels should be performed to prevent further occurrence of musculo-skeletal disorders.our study involves 154 subjects out of which 76 subjects are diabetic and 80 are non-diabetic among which participants are assessed using ACR diagnosing criteria of OA along with risk factor consideration in which diabetic subjects are more prone for occurrence of osteoarthritis in

comparison to non-diabetic individuals. All participants are examined by taking socio-demographics, health-related behaviour, diagnosing criteria along with risk factor consideration. Finally to recapitulate the study we strongly state that that OA is associated with DM and the mechanism is proved by our study and we suggest that in DM apart from examining glucose level CRP, ESR, RHEUMATOID FACTOR should be evaluated as DM patients are also more prone to musculo skeletal disorder. Pre assessment can be done.

**Keywords:** OA[osteoarthritis], DM[diabetes], CRP[ c-reactive protein], ESR[ erythrocyte sedimentation rate],ACR[ American college of rheumatology]

### Introduction

Osteoarthritis is a joint disease that mostly affects middle aged to elder people involving cartilage, joint lining, ligament and both <sup>[1]</sup>. In simple terms osteoarthritis is characterized by degeneration of cartilage[ wear and tear in joints]. Diabetes mellitus is defined as condition in which the body ability to produce insulin is impaired. Hands and knees are the most common joints affected by OA <sup>[2]</sup>. Previous studies have suggested that DM patients are at higher risk of developing rheumatic disorders, some have reported a correlation of OA with longer DM duration and poor glycemic control <sup>[3]</sup>. DM causes hyperglycemia leads to deposition of advanced glycation end products and effects on cartilage is seen. Hyperglycemia leads to peripheral neuropathy and muscle weakness leads to joint instability <sup>[3]</sup>.

Osteoarthritis is the second most common rheumatologic problem and it is the most frequent joint disease with a prevalence of 22% to 39% in India <sup>[5]</sup>. Symptomatic knee OA occurs in 10% men and 13% in women aged 60 years or more. India is facing an epidemic of diabetes. At present, confirmed diabetes patients in India are 67 million <sup>[6]</sup>. Symptoms of osteoarthritis include Knee pain sudden onset, after vigorous work, subsided by rest], Less than 30 minutes of morning stiffness, Crepitus, Bony tenderness, Bony enlargement, Absence of palpable warmth. Symptomatic examination, X-RAY, MRI are most commonly used for diagnosing osteoarthritis. Common treatment includes NAIDS, analgesics and intra-articular injections <sup>[10]</sup>.

### Methodology

#### Study population

A prospective observational study was performed in adult diabetic and non-diabetic subjects from southern part of india. Diabetic were >22yrs old having symptoms of diabetes along with plasma glucose> 200mg/dl and fasting glucose > 126mg/dl. The Exclusion criteria includes Those who are not willing to participate in our study and people Below 22yrs of age[ As per National Diabetes data group classification] whereas the Inclusion criteria for study includes Those who are willing to participate in our study, Patients diagnosed with DM along with co morbidities, Patients without DM, All age group >21 yrs of age and Both gender people are included. Non- diabetic subjects are those who are not diagnosed with diabetes along with co morbidities. An informed consent form was obtained from all individuals participated in our study. A complete examination was performed to each participant.

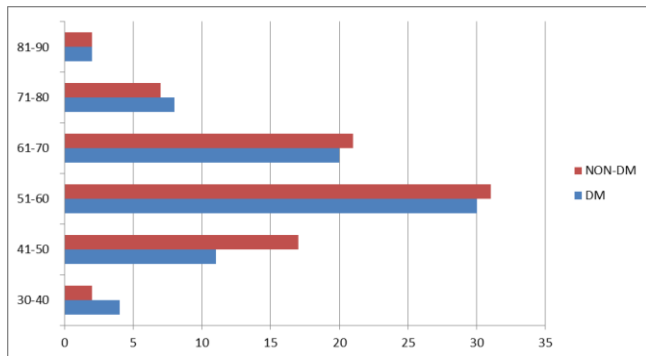
**Variables**

Osteoarthritis was ascertained as per American college of Rheumatology criteria. ACR criteria for diagnosing OA includes Knee pain[ sudden onset, after vigorous work, subsided by rest] >50yrs of age, Less than 30 minutes of morning stiffness, Crepitus, Bony tenderness, Bony enlargement and Absence of palpable warmth and the risk factors associated with OA includes Advanced age, obesity, Frequent knee bending activity, Climbing more stairs most of days, Deep knee bending 30 minutes or more atleast on day in past 30 days and Lifting objects weighing more than 25 pounds atleast one day in past 30 days.

Variables evaluated for all study participants includes socio-demographic details like age, gender, level of education on disease. Health related behavior like smoking/alcohol habits and physical activity along with co morbidities like Hypertension, Dyslipidemia, Obesity, Rheumatoid arthritis, SLE, Gout, Fibromyalgia, chronic back pain, hypothyroidism, depression, osteoporosis, CAD/CVA whereas for DM patients- Disease duration, DM complications[ renal disease, neurologic complications, CVD complications and Pharmacotherapy includes use of insulin, oral DM medications was ascertained.

**Results**

**Participants Characteristics:** In a total of 200 population 44 people are not interested to participate in our study whereas 156 subjects expressed their willness to participate in our study among which 76 subjects are diabetic and 80 subjects are non-diabetic. Among subjects age group between 50-70 are more in number when compared to other age groups.



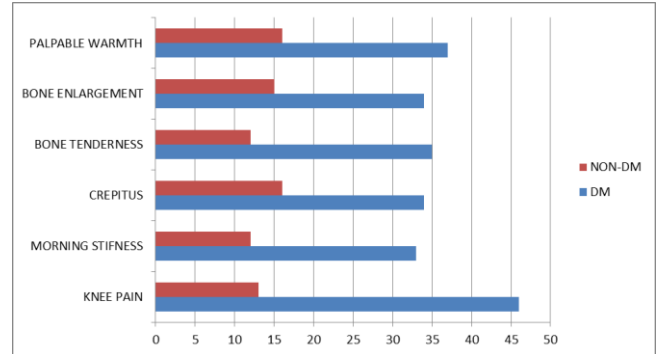
**Fig 1:** Shows age group distribution among diabetic and non-diabetic subjects in which 50-70 age group are more in number than other age groups. DM[ diabetic], NON-DM[ non-diabetic].

DM patients are more likely to have knowledge regarding disease than NON-DM patients whereas among DM patients 65.78% of them are administering oral drugs, whereas 34.1% of DM patients are using INSULIN therapy and 46.05% of DM patients are smokers and alcoholics and 30% of NON-DM patients are having smoking and alcohol habit and 27.5% of NON-DM subjects are having exercise habit whereas 40.07% of DM subjects do physical activity daily.

**Association of osteoarthritis with diabetes mellitus**

From our study diabetic patients are more in number diagnosed with osteoarthritis when compared with non-diabetic subjects. Among 76 subjects with DM 28 have no knee pain and 46 subjects are suffering from knee pain[60.5%] and whereas in 80 non-diabetics only 13 participants are suffering from knee pain[16.25%] and

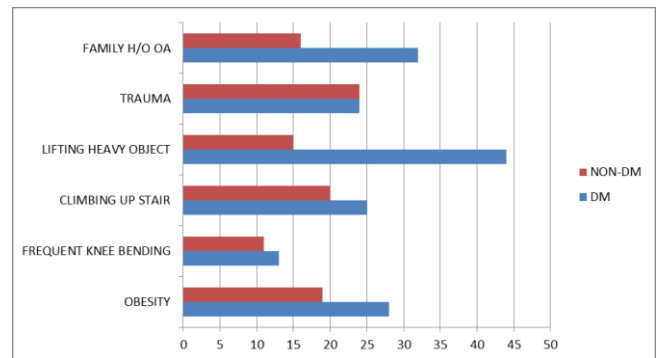
morning stiffness is seen in 43.42% of diabetics and only 15% of non-diabetic subjects. Crepitus is observed in 44.73% of diabetic subjects and 20% of non-diabetics. Bone tenderness is experienced by 46.05% of diabetics and 15% of non-diabetic subjects. Bone enlargement is seen in 44.7% of diabetics and 15% of non-diabetic individual and finally absence of palpable warmth is observed in 48.68% of diabetic patients and 20% in non-diabetic subjects.



**Fig 2:** depicts the graphical of diagnosing criteria differentiation in both DM and NON-DM subjects.

**Risk factors association in both dm and non-dm subjects**

The risk factors associated with osteoarthritis includes obesity, frequent knee bending, climbing upstairs, lifting heavy objects, history of trauma and family history of OA. Each subject involved in study are allowed to give the information regarding the exposure to risk factors, occupational history and the response is noted. Among which DM subjects are more prone in exposure to risk factors when compared with non-dm individuals.



**Fig 3:** depicts the association of risk factors in both DM and NON-DM subjects, shows that DM subjects are more prone in exposure to risk factor when compared with non-dm individuals.

**Discussion**

The study examined the association of osteoarthritis with diabetes. The results showed that DM patients are more associated in occurrence of osteoarthritis when compared to NON-DM subjects. The association was ascertained with help of using variables like socio-demographics, health related behavior and criteria for diagnosing OA along with association of risk factors involved in study participation. Female gender are at high risk of occurrence of OA when compared to male gender. Several studies stated that prevalence of OA in patients with DM are more when compared to NON-DM individuals. Diabetes mellitus is a metabolic disorder characterized by high glucose levels as a result of insulin deficiency [6]. Disorders that effect glucose

metabolism may favour the progression of OA [8]. Alteration of rheumatoid factor and inflammatory markers like ESR, CRP is mostly seen in diabetic patients. The pathogenesis involved in occurrence of OA in diabetic patients might be the negative impact of diabetes on joints could be explain by the induction of oxidative stress and pro-inflammatory cytokines but also by advanced age products accumulation in joint tissues exposed to chronic high glucose concentration. Insulin resistance might also impair joint tissue because of a local insulin resistance of diabetic synovial membrane but also by the systemic low grade inflammation state related to obesity and insulin resistant state [13]. Age is one of the well established factor associated both with DM and OA. Risk factors of OA involvement Is more among DM subjects when compared to NON-DM [15]. Hence from our study we proclaim that OA is associated with DM and the mechanism is proved by our study and we suggest that in DM apart from examining glucose level CRP,ESR, RHEUMATOID FACTOR should be evaluated as DM patients are also more prone to musculo skeletal disorder. Pre assessment can be done. However the limitation of our study is that we did not take X-RAY in to consideration which is the standard diagnostic procedure for confirmation of OA [16].

### Conclusion

Finally to recapitulate the study we strongly state that that OA is associated with DM and the mechanism is proved by our study and we suggest that in DM apart from examining glucose level CRP,ESR,RHEUMATOID FACTOR should be evaluated as DM patients are also more prone to musculo skeletal disorder. Pre assessment can be done.

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**Conflict of Intrest:** The authors declare no conflict of interest.

### References

1. Louati K, Vidal C, Berenbaum F, Sellam J. Association between diabetes mellitus and osteoarthritis: systematic literature review and meta-analysis. *RMD open*. 2015; 1(1):e000077.
2. Eymard F, Parsons C, Edwards MH, Petit-Dop F, Reginster JY, Bruyère O, *et al*. Diabetes is a risk factor for knee osteoarthritis progression. *Osteoarthritis and cartilage*. 2015; 23(6):851-9.
3. Alenazi AM, Alshehri MM, Alothman S, Alqahtani BA, Rucker J, Sharma N, Segal NA, Bindawas SM, Kluding PM. The Association of Diabetes with knee pain severity and distribution in people with knee osteoarthritis using data from the osteoarthritis Initiative. *Scientific reports*. 2020; 10(1):1-8.
4. Stürmer T, Brenner H, Brenner RE, Günther KP. Non-insulin dependent diabetes mellitus (NIDDM) and patterns of osteoarthritis: the Ulm osteoarthritis study. *Scandinavian journal of rheumatology*. 2001; 30(3):169-71.
5. Courties A, Sellam J. Osteoarthritis and type 2 diabetes mellitus: what are the links?. *Diabetes research and clinical practice*. 2016; 122:198-206.
6. Courties A, Sellam J. Osteoarthritis and type 2 diabetes mellitus: what are the links?. *Diabetes research and clinical practice*. 2016; 122:198-206.
7. Frey MI, Barrett-Connor E, Sledge PA, Schneider DL, Weisman MH. The effect of noninsulin dependent diabetes mellitus on the prevalence of clinical osteoarthritis. A population based study. *The Journal of rheumatology*. 1996; 23(4):716-22.
8. Frey MI, Barrett-Connor E, Sledge PA, Schneider DL, Weisman MH. The effect of noninsulin dependent diabetes mellitus on the prevalence of clinical osteoarthritis. A population based study. *The Journal of rheumatology*. 1996; 23(4):716-22.
9. Venkatachalam J, Natesan M, Eswaran M, Johnson AK, Bharath V, Singh Z. Prevalence of osteoarthritis of knee joint among adult population in a rural area of Kanchipuram District, Tamil Nadu. *Indian journal of public health*. 2018; 62(2):117.
10. Berenbaum F. Diabetes-induced osteoarthritis: from a new paradigm to a new phenotype. *Postgraduate medical journal*. 2012; 88(1038):240-2.
11. King KB, Rosenthal AK. The adverse effects of diabetes on osteoarthritis: update on clinical evidence and molecular mechanisms. *Osteoarthritis and cartilage*. 2015; 23(6):841-50.
12. Stürmer T, Brenner H, Brenner RE, Günther KP. Non-insulin dependent diabetes mellitus (NIDDM) and patterns of osteoarthritis: the Ulm osteoarthritis study. *Scandinavian journal of rheumatology*. 2001; 30(3):169-71.
13. Eymard F, Parsons C, Edwards MH, Petit-Dop F, Reginster JY, Bruyère O, Rchette P, Cooper C, Chevalier X. Diabetes is a risk factor for knee osteoarthritis progression. *Osteoarthritis and cartilage*. 2015; 23(6):851-9.
14. Alenazi AM, Alothman S, Alshehri MM, Rucker J, Waitman LR, Wick J, Sharma NK, Kluding PM. The prevalence of type 2 diabetes and associated risk factors with generalized osteoarthritis: a retrospective study using ICD codes for clinical data repository system. *Clinical rheumatology*. 2019; 38(12):3539-47
15. Alenazi AM, Alshehri MM, Alothman S, Alqahtani BA, Rucker J, Sharma N, Segal NA, Bindawas SM, Kluding PM. The Association of Diabetes with knee pain severity and distribution in people with knee osteoarthritis using data from the osteoarthritis Initiative. *Scientific reports*. 2020; 10(1):1-8.
16. Dubey NK, Ningrum DN, Dubey R, Deng YH, Li YC, Wang PD, Wang JR, Syed-Abdul S, Deng WP. Correlation between diabetes mellitus and knee osteoarthritis: a dry-to-wet lab approach. *International journal of molecular sciences*. 2018; 19(10):3021.
17. Cannata F, Vadalà G, Ambrosio L, Napoli N, Papalia R, Denaro V, Pozzilli P. Osteoarthritis and type 2 diabetes: From pathogenetic factors to therapeutic intervention. *Diabetes/metabolism research and reviews*. 2020; 36(3):e3254.
18. Felson DT. The epidemiology of knee osteoarthritis: results from the Framingham Osteoarthritis Study. In *Seminars in arthritis and rheumatism*. 1990; 3:42-50. WB Saunders.
19. Frey N, Hügle T, Jick SS, Meier CR, Spoendlin J. Type II diabetes mellitus and incident osteoarthritis of the hand: a population-based case-control analysis. *Osteoarthritis and cartilage*. 2016; 24(9):1535-40.

20. Mathew AJ, Nair JB, Pillai SS. Rheumatic-musculoskeletal manifestations in type 2 diabetes mellitus patients in south India. *International journal of rheumatic diseases*. 2011; 14(1):55-60.
21. Kendzerska T, King LK, Lipscombe L, Croxford R, Stanaitis I, Hawker GA. The impact of hip and knee osteoarthritis on the subsequent risk of incident diabetes: a population-based cohort study. *Diabetologia*. 2018; 61(11):2290-9.
22. Onur T, Wu R, Metz L, Dang A. Characterisation of osteoarthritis in a small animal model of type 2 diabetes mellitus. *Bone & joint research*. 2014; 3(6):203-11.
23. Juel NG, Brox JI, Hellund JC, Holte KB, Berg TJ. The prevalence of radiological glenohumeral osteoarthritis in long-term type 1 diabetes: the Dialong shoulder study. *Scandinavian journal of rheumatology*. 2018; 47(4):325-30.