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## The Relation between Diabetes Mellitus Type Two and Osteoarthritis in Iraqi Women

Soaad abdullah akaash<sup>1\*</sup>, Rehab Jasim Mohammed<sup>2</sup>, Atheer Hameid Odda<sup>3</sup>

<sup>1,2</sup> Department of Chemistry, College of Education for Pure Sciences, University of Kerbala

<sup>3</sup> Department of Bio Chemistry, College of Medicin, University of Kerbala

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### ABSTRACT

Diabetes mellitus type two and osteoarthritis are the most common diseases in Iraq in particular and in the world in general. There are many factors that lead to infection with these two diseases, which are considered the problem of the times. The obesity and aging are the main causes of these two diseases in addition to many other causes such as a wrong lifestyle, lack of exercise, etc. Some tests related to the two diseases were measured to determine the extent of the relationship between them, as fasting blood sugar and hemoglobin A1C for diabetes mellitus. Concerning osteoarthritis, serum calcium, vitamin D3, parathyroid hormone, high sensitivity C-reactive protein, serum albumin and alkaline phosphatase had been measured. The present work was carried out at Diabetic type two and osteoarthritis patients in orthopedic clinic in AL-IMAM AL- Hassan Hospital in holy Karbala city (50 women aged 40-70 years) and 40 women apparently healthy as a control group. The results showed that there is a significant difference between patients group and controls group in alkaline phosphatase, parathyroid hormone and high sensitivity C-reactive protein ( $p < 0.05$ ). There are noteworthy differences in Alb and calcium ( $p < 0.01$ ), Alb and negatively important with PTH ( $P < 0.05$ ). Significant differences in high sensitivity C-reactive protein and phosphorus ( $P < 0.05$ ).

### 1. INTRODUCTION

Osteoarthritis (OA) and diabetes mellitus (DM) afflict approximately 1 billion individuals globally [1], Type 2 diabetes mellitus (T2DM) is characterized by hyperglycemia and abnormal insulin secretion. Osteoarthritis (OA) is a prevalent degenerative joint disease in clinical practice, presenting with joint pain, limited function and a certain disability rate. It has been observed that there exists a substantial correlation between T2DM and OA, with the incidence of OA being notably higher in the T2DM group compared with the non-T2DM group [2]

14.3 million individuals in the 45–64 age range, and 12.0 million individuals over the age of 65. In a similar vein, 14% of adults over 25 and 37% of adults over 60 have radiographically diagnosed knee OA.[3] T2DM is a prevalent and intricate ailment that has both hereditary and environmental risk factors, such as unhealthy lifestyle choices that lead to obesity and overweight. The incidence of the condition increases dramatically

with age. Among people over 65, T2DM affects nearly 10% of the population [4]

Diabetes type I T2DM is a prevalent, complex condition that has a genetic cause. Type 2 diabetes (T2DM) is a prevalent and intricate ailment that has both hereditary and environmental risk factors, such as unhealthy lifestyle selections that lead to obesity and overweight. The incidence of the condition increases dramatically with age, with over 10% of people over 65 suffering from type 2 diabetes. [5] The condition is caused by a deficiency in insulin production by pancreatic beta-cells, as well as cellular insulin resistance, which is seen mostly in skeletal muscles and the liver, but sometimes in other tissues [6]. Prolonged hyperglycemia, both fasting and postprandial, causes oxidative stress, and low-grade inflammation, as well as damage to the arteries, mostly in the heart, kidneys, eyes, and nerves and in other tissues. [7]

Osteoarthritis normally progresses slowly. It influences all of the joint's components, including the synovium, ligaments, articular cartilage, and subchondral bone. The synovial joints sustain damage from mechanical, inflammatory, and metabolic causes during the course of osteoarthritis [8]. Degenerative alterations in the articular cartilage are a defining characteristic of

\*Corresponding Author Institutional Email: [soaad.akaash@s.uokerbala.edu.iq](mailto:soaad.akaash@s.uokerbala.edu.iq) (Soad abdullah akaash)

osteoarthritis. During the early stages of the disease, the amount of water in the cartilage increases and the number of proteoglycans decreases. Furthermore, there is a decrease in the formation of newly deposited collagen type 2 and an increase in its breakdown, which weakens the collagen network. The amplification of cartilage apoptosis is also connected with a decrease in the population of functionally active chondrocytes. [9] The aforementioned modifications result in a decrease in the cartilage's elasticity and compressive strength. Deeper layers of articular cartilage include chondrocytes that proliferate in response to degenerative processes, producing new collagen and proteoglycans that start the healing process [10].

**2. PATIENTS AND METHODS**

This study was carried out at Diabetic type two and osteoarthritis patients in Clinic of orthopedic specialist in AL-IMAM Al- Hassan Hospital in holy Kerbala city (50 women aged 40-70 years) and 40 women apparently healthy as a control group to find the relation between certain variables including (age, hemoglobin A1c (HbA1c), blood glucose, alkaline phosphatase (ALP), albumin (Alb), calcium(Ca), parathyroid hormone (PTH), high sensitive c-reactive protein HsCRP, BMI and vitamin D3 in serum.

During period of data collection, patients were interviewed by questionnaire from those visited the joint consultation clinic. the questionnaire included number, age, weight, length, duration of diabetes, treatment of diabetes, treatment of osteoarthritis, other diseases and other treatments. An immunoassay method was used for quantification of HbA1C, vitamin D3, HsCRP and PTH while ALP, FBS, Alb and phosphorus are quantified by colorimetric method.

**3. THE RESULTS AND DISCUSSION**

This study covered (50 women) who suffer from diabetes mellitus type two and osteoarthritis diseases as patients group and (40 women) apparently healthy as control group aged (40-70) years. The dependent variable for this study was the type of group while the independent variables of this study were including (age, BMI, HbA1c, blood glucose, ALP, Alb, Ca, PTH, HsCRP, phosphorus, and vitamin D3). Statistical analysis was carried out using SPSS version 26. Analysis of variance (T test) was utilized to compare means between two groups.

**TABLE 1.** Descriptive table

Subject	Type of group	No	Mean ±SD	Range	P-value
Age	Control	40	50.8750±8.60586	70-40	p>0.05
	Patient	50	53.3600±8.02740	70-40	
BMI	Control	40	26.8197 ±3.37477	33.320.8	p>0.05
	Patient	50	29.7014±5.90892	46.676.8	

This study has revealed that there are no noteworthy differences between control group and patient group in age and BMI as stated in table (1)

**TABLE 2.** Serum level of HbA1C and glucose in patients with diabetes and osteoarthritis diseases .

Subject	Type of group	No	Mean ±SD	Range	cP-value
HbA1C	Control	40	5.0875±0.69363	3-6	P<0.05
	Patient	50	9.78±1.99786	13-6.5	
Glu	Control	40	101.5250±12.84022	122-70	P<0.05
	Patient	50	212.16±78.78293	488-129	

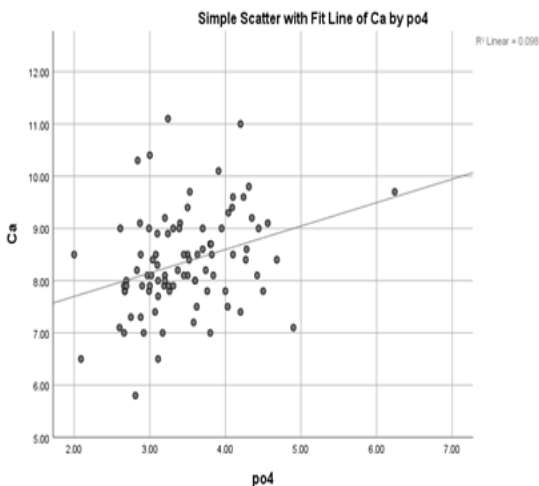
Table (2) showed that there is a significant difference (p<0.05) between patient group and control group in HbA1C and glucose. Chronic hyperglycemia is a hallmark of diabetes, which can lead to long-term problems. [11] The levels of HbA1c and FBS are highly linked because glycated hemoglobin is a measure of integrated glycaemia over the course of a red blood cell's 120-day life. [12] HbA1c is a useful tool for long-term diabetes care and monitoring since it is a trustworthy indicator of chronic glycaemia and has a strong correlation with the risk of developing the disease. [13,14]

**TABLE 3.** Serum level of phosphorus, alkaline phosphatase, albumin, calcium, PTH, HsCRP and D3 in patients with diabetes mellitus type two and osteoarthritis diseases

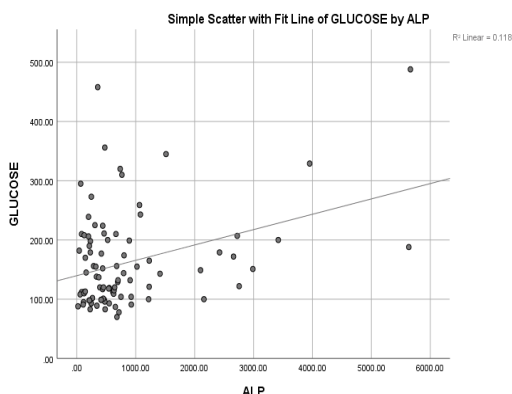
Sub ject	Type of group	No	Mean ±SD	Range	P- valu e
Pi	Control	40	3.2905±0.62352	4.5-2	p>0.05
	Patient	50	3.6016±0.667793	6.24-2.66	
AL P	Control	40	535.65±52.403893	2755-20	P<0.05
	Patient	50	1088.18±131270355	5662-41	
Alb	Control	40	3.9373±0.37254	4.7-2.99	p>0.05
	Patient	50	3.8860±0.41355	4.5-2.4	
Ca	Control	40	8.3375±0.93745	11-6.5	p>0.05
	Patient	50	8.368±0.711	11.1-5.8	
PT H	Control	40	33.625±14.68269	72.1-11	P<0.05
	Patient	50	28.7278±12.78352	56.9-10	
HsC RP	Control	40	3.3330±2.25606	13-0.61	P<0.05
	Patient	50	13.717±16.51294	62.41-0.5	
D3	Control	40	12.5915±4.58294	25.21-6.27	p>0.05
	Patient	50	15.05±7.10373	62.41-7.11	

There is a significant difference between patient group and control group in ALP, ( $p < 0.05$ ) The level of the hepatic alkaline phosphatase increases significantly in diabetics. Number of studies have revealed that ALP is correlated with glucose metabolism, insulin resistance, and metabolic syndrome due to its role as a hepatobiliary marker [15]. There is a significant difference between patient group and control group in PTH ( $p < 0.05$ )

type 2 diabetes causes decreased bone turnover and decreased bone resorption, which is linked to a decrease in the level of parathyroid hormone [16,17]. There is an important dissimilarity between patient group and control group in HsCRP ( $p < 0.05$ ) Previous studies have shown that BMI, comorbidities (diabetes mellitus, osteoarthritis severity, muscle strength changes, and female endocrine instability, atherosclerosis, obesity the patients increase the HsCRP level [18].



**Figure 1.** Correlation between calcium and phosphorus



**Figure 2.** Correlation between Glucose and ALP

#### 4. CONCLUSIONS

Type 2 diabetes has been found to indirectly affect the bones and joints, i.e. osteoarthritis, in women after the age of forty. Through this study, it is found that there are many components that change due to diabetes, and their variation is evidence of the presence of arthritis in the same patient.

1- increase ALP in diabetes patients which is also noticed in arthritis patients bon diseases.

2-It has been observed that the level of parathyroid hormone decreases in patients, and this does not agree with many studies that confirm the increase of this hormone in diabetics.

3-Results show that Albumin is negatively significant with PTH and significant differences exist in HsCRP and phosphorus.

#### 5. REFERENCES

1. Priyanka Tanwar, Mamta Naagar, and Manish Kumar Maity, "Relationship between Type 2 Diabetes Mellitus and Osteoarthritis," International Research Journal of Pharmacy and Medical Sciences (IRJPMs), Volume 6, Issue 2, pp. 59-70, 2023.
2. Perveen S. ital. A hybrid approach for modeling type 2 diabetes mellitus progression. Front Genet10: 1076 (2019).
3. Benjamin Abramoff Franklin E Caldera. Osteoarthritis: Pathology, Diagnosis, and Treatment Options. Epub (2019).
4. Sun, P.et al. diabetes Atlas: global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045 Diabetes Res. Clin. Pract., 183 (2021), article 109119, [10.1016/j.diabres..109119](https://doi.org/10.1016/j.diabres.2021.109119) [Google Scholar](#) L. =---=( 2021)
5. Ismail, H. Materwala, J. Al Kaabi, Association of risk factors with type 2 diabetes: a systematic review Comput. Struct. Biotechnol. J., 19 pp. 1759-1785(2021)
6. Zhang et al. "Fasting blood glucose levels in patients with different types of diseases" Progress in molecular biology and translational science (2019).
7. Shih et al.Cheng-Chung "Recent targets of osteoarthritis research" Best Practice & Research Clinical Rheumatology (2023)
8. Kamps, et al. Comorbidity in incident osteoarthritis cases and matched controls using electronic health record data, Arthritis Research and Therapy (2023).
9. Rios Arce, et al. Interactions between diabetes mellitus and osteoarthritis: from animal studies to clinical data Journal of Bone and Mineral Research Plus (2022) .
10. Cui A, et al. Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population based Studies. E Clinical Medicine)29 30:100587(2020). [Google Scholar](#) World Cat
11. Ram, ital. Variation in the relationship between fasting glucose and HbA1c: implications for the diagnosis of diabetes in different age and ethnic groups BMJ Open Diabetes Research and Care (2024).
12. Klonoff,David,C,Hemoglobinopathies and hmoglobin A1c in diabetes mellitus SAGE Publications Sage CA: Los Angeles, CA (2020).
13. David C.ital. Hemoglobinopathies and Hemoglobin A1c in Diabetes Mellitus First published online March 22, (2019)
14. Brown, et al. C-Reactive Protein Levels Correlate with Measures of Dysglycemia and Gut Microbiome Profiles Current Microbiology (2024).

15. Janina Vavanikunnel.et al. . Bone Turnover in type 2 Diabetes-the Role of PTH Volume 111, pages 587–596, (2022)
16. Masahiro Yamamoto,et al. Decreased PTH Levels Accompanied by Low Bone Formation Are Associated with Vertebral Fractures in Postmenopausal Women with Type 2 Diabetes Clin Endocrinol Metab 97: 1277–1284, (2012)
17. Li Cao, et al. Preoperative idiopathic CRP and ESR elevation increase the risk of PJI within 90-day after primary total knee arthroplasty in patients with osteoarthritis posted 09 Mar, (2022)
18. Brichacek A L, Brown CM. Alkaline phosphatase: a potential biomarker for stroke and implications for treatment. Metab Brain Dis. Feb;34(1):3-19. (2019)

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### Arabic Abstract

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يعتبر مرض السكري من النوع الثاني والتهاب المفاصل العظمي من أكثر لأمراض شيوعا في العراق بشكل خاص وفي العالم بشكل عام، وهناك العديد من العوامل التي تؤدي إلى الإصابة بهذين المرضين اللذين يعتبران مشكلة العصر. السمنة والشيخوخة هي الأسباب الرئيسية لهذين المرضين بالإضافة إلى العديد من الأسباب الأخرى مثل نمط الحياة الخاطيء، وعدم ممارسة الرياضة، وما إلى ذلك من الأسباب الكثيرة. لقد تم قياس بعض الاختبارات المتعلقة بالمرضى لتحديد مدى العلاقة بينهما، حيث تم قياس نسبة السكر في الدم والسكر التراكمي لمرض السكري بينما تم قياس بروتين عالي الحساسية واليوميون والفوسفاتيز القلوي. لمجموعة من النساء تضمنت المجموعة الأولى 50 امرأة مجموعة المرضى و40 امرأة كمجموعة اصحاء تتراوح اعمارهن من (40-70) وقد أظهرت النتائج وجود فرق معنوي بين مجموعة المرضى ومجموعة التحكم في الفوسفاتيز القلوي وهرمون الغدة الدرقية والبروتين التفاعلي C عالي الحساسية. (p<0.05) هناك اختلافات كبيرة في Alb والكالسيوم (p<0.01)، Alb وذات دلالة سلبية مع PTH (P<0.05) فروق ذات دلالة إحصائية في البروتين التفاعلي عالي الحساسية والفوسفور. (P<0.05)

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