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Evaluation Levels of Interleukin-6 in Sera of Iraqi Pregnant and Non-Pregnant Diabetic Women with Dental Caries

Dr. Husam Mohammed Saeed [*1], Dr. Raghad Noori Nawaf[*2], prof. Dr. Suzan Saadi Hussain[*3], prof. Dr. Nihad Khalawe Tektook[*4], Shaymaa Saadi Mohammed[*5]

[*1]Lecturer/Ph.D prosthodontics /College of dentistry/ Baghdad University ;

[*2]Assistant lecturer/ Department of Conservative Dentistry/ College of Dentistry/Ashur University ;

[*3]Department of Biology / College of Science/Al-Mustansiriya University

[*4]Medical Laboratory Techniques Department/ College of Medical and Health Techniques/ Middle Technical University

*[5]Assistant lecturer/ Department of Biology/ College of Science/Al-Farahidi University/ Baghdad/ Iraq

***Corresponding Author:**

Emai ID: drnihadkhalawe@gmail.com

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ABSTRACT

Background: The relationship between diabetes mellitus and oral health, particularly the prevalence of dental caries, has garnered increasing attention.Interleukin-6 (IL-6) is a pro-inflammatory cytokine that may play a pivotal role in this association.

This study aimed to estimate the serum levels of IL-6 in sera of Iraqi Pregnant and Non-Pregnant Diabetic Women with Dental Caries and compare these levels to those in healthy control.

Methods: A total of 50 Iraqi Pregnant Diabetic Women with Dental Caries and compare these levels in healthy control, diabetic patients aged 18-40 years with diagnosed dental caries (with bacteria *Streptococcus mutans* and *Streptococcus sobrinus* , *Actinomycess spp* and *lactobacillus spp*) were recruited from outpatient clinic of Al-Yarmouk Teaching Hospital between (February to October) 2024. A control group of 50 healthy individuals matched for age was also included. Serum samples were collected and analyzed for IL-6 levels using an enzyme-linked immunosorbent assay (ELISA). Results: in current study showed the Body Mass Index (BMI) Results :Results in current study showed body Mass Index (BMI) (28.4 ± 3.6) Compare to healthy control (24.9 ± 2.9), so elevated IL-6 levels in pregnant diabetic women with dental caries (18.60±5.3) compare to non-pregnant diabetic group with dental caries (13.11±3.9), p-value (< 0.001).As well as IL-6 levels between Pregnant diabetic women (17.5 ± 5.2) and healthy (15.8 ± 4.8) also levels of IL-6 non- Pregnant diabetic women(15.8 ± 4.8) and healthy (5.5 ± 1.5) , the differences in the inflammation related to diabetes with dental caries. A p-value of (< 0.01) significant difference in IL-6 levels between diabetic patients and healthy controls,also a strong positive correlation between trimester and IL-6 levels in diabetic patients with dental caries compare to healthy controls. the IL-6 levels tend to increase with age, especially in the Pregnant diabetic group with dental caries have elevated (18.7 ± 5.5) **in age group(** ≤40years). Conclusion: Elevated serum IL-6 levels in diabetic patients with dental caries suggest a potential link between systemic inflammation and oral health complications.

Keywords: *Diabetes mellitus, interleukin-6, dental caries, inflammation, oral health.*

1. INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic multisystem diseases characterized by hyperglycemia or hypoglycemia as caused by the absolute or relative insulin deficiency with many complications, especially in oral cavity, These complications as gingivitis; periodontitis; Oral bacterial and fungal ; oral mucosa lesions ; lichen planus; lichenoid reaction ; angular chelitis and traumatic ulcer, [(1,2&3)] .In addition, mucosal neuro-sensory disorders, delayed mucosal wound healing; tooth loss and dental carries found to be higher in diabetic patients compared to healthy controls[(4,5)] , so diabetic patients might have more dental caries via higher number of meals a day and poor oral hygiene [(4)].

This is due to the correlation between Diabetes mellitus type -2 and obesity. As well as the neuropathy may reducing salivary buffering capacity, that causing increases the risk of dental caries via dry mouth(4&6) .these complication higher incidence of dental caries among diabetic patients which cause producing inflammatory mediators, particularly interleukin-6 (IL-6), the measuring IL-6 levels in sera of diabetic patients with dental caries may offer important insights into their inflammatory status and the potential impact of inflammation on the progression of both diabetes and dental caries .

Aim of the current study: To evaluation the levels of IL-6 levels in sera pregnant women with dental caries, and study the correlation between IL-6 levels and dental caries in pregnant and non-pregnant diabetic Iraqi women, .

2. PATIENTS AND METHODS

Patients: This study included pregnant diabetic patients diagnosed with dental caries, recruited from the outpatient clinic of Al Yarmouk Teaching Hospital between (February to October) 2024. The criteria for inclusion were: (1) individuals aged 18 to 40 years, and (2) a confirmed diagnosis of diabetes mellitus, whether type 1 or type 2., and (3) the presence of at least one dental caries (with bacteria Streptococcus mutans and Streptococcus sobrinus , Actinomycess spp and lactobacillus spp) Patients with acute infections, autoimmune diseases, or those receiving anti-inflammatory medications were excluded to minimize confounding factors.

A control group of healthy individuals without diabetes or dental caries was also recruited from the same clinic. The control group was matched for age to the diabetic patients to ensure comparability.

Sample Collection: Blood samples were obtained from all participants in the morning following an overnight fast. Serum was separated through centrifugation at 3000 RPM for 10 minutes and stored at -80°C until analysis.

IL-6 Measurement: The serum levels of IL-6 were measured using an enzyme-linked immunosorbent assay (ELISA), adhering to the manufacturer's guidelines. And detection the value of IL-6 by used Standard curve .

Data Analysis: Descriptive statistics were used to summarize demographic data. By normal distribution,and used Pearson's coefficient , so Comparisons between pregnant diabetic patients and healthy controls regarding IL-6 levels were performed using independent t-tests.A p-value of less than 0.05 was deemed statistically significant. All analyses were performed using SAS version 10.

Ethical Considerations: This study was approved by the Institutional Review Board of Al-Yarmouk Teaching Hospital, and informed consent was secured from all participants prior to their participation.

3. RESULTS

Results in table (1) showed the d**emographic Characteristic** and lifestyle factors between pregnant and non pregnant diabetic patients with dental caries , body Mass Index (BMI) (28.4 ± 3.6) Compare to healthy control (24.9 ± 2.9), so all for age , duration of diabetes , education level , smoking status, and family history provide insights into the background and health behaviors of each group.

Table(1): Demographic characteristic and family history of diabetes for diabetic patients with dental caries and healthy controls

Demographic Characteristic	Diabetic Patients	Healthy Controls
	(Mean ± SD)	
Age (years)	34.3 ± 8.1	32.7 ± 7.5
Body Mass Index (BMI)	28.4 ± 3.6	24.9 ± 2.9
Duration of Diabetes (years)	8.2 ± 5.1	N/A
Education Level		
High School	30%	40%
College	50%	40%
Graduate	20%	20%
Smoking Status		
Current	20%	10%

Former	30%	15%
Never	50%	75%
Family History of Diabetes		
Yes	60%	No
No	40%	No

Results in table (2) showed the IL-6 levels elevated in pregnant diabetic women with dental caries (18.60±5.3) compare to non-pregnant diabetic group with dental caries (13.11±3.9)compare to healthy control **(**8.21±2.01) , p-value (< 0.001)**.**

Table (2): level of IL-6 in sera of Diabetic patients with dental caries and healthy controls.

Study group	**No. of Participants**	**Level of IL-6 (pg/mL)**	**Statistical Significance (p-value)**
		Mean± S.D	
Diabetic Patients with dental caries	25	18.60±5.3	< 0.001
Non- Diabetic Patients with dental caries	25	13.11±3.9	
Healthy Controls	25	8.21±2.01	

Results in table-3 showed IL-6 levels between Pregnant diabetic women(17.5 ± 5.2) and healthy (15.8 ± 4.8) also levels of IL-6 non- Pregnant diabetic women(15.8 ± 4.8) and healthy (5.5 ± 1.5) , the differences in the inflammation related to diabetes with dental caries. A p-value of (< 0.01) signifies a statistically significant difference in IL-6 levels between diabetic patients and healthy controls

Table-3: levels of interleukin-6 (IL-6) in serum among diabetic pregnant women with dental caries and healthy controls

Group study	**Diabetic Patients**	**Healthy Controls**	**p-value**
	Levels of IL-6 (Mean ± SD) (pg/mL)		
Pregnant diabetic women	17.5 ± 5.2	6.0 ± 1.7	< 0.01
Non-Pregnant diabetic women	15.8 ± 4.8	5.5 ± 1.5	< 0.01

Results in table -4 showed a strong positive correlation between trimester and IL-6 levels in diabetic patients with dental caries compare to healthy controls.

Table-4: Correlation of Trimester Groups and IL-6 Levels in Pregnant and Non- Pregnant Diabetic Patients with Dental Caries

Trimester Group	**Levels of IL-6 (pg/mL)**			
	Pregnant Diabetic Patients with Dental Caries	**Non-Pregnant Diabetic Patients with Dental Caries**	**Healthy Control**	**Correlation Coefficient (r)**
First Trimester	15.5	12.8	6.3	0.66
Second Trimester	18.9	15.1	7.5	0.70
Third Trimester	22.4	19.3	8.6	0.75

Table -5 showed the IL-6 levels tend to increase with age, especially in the Pregnant diabetic group with dental caries have elevated (18.7 ± 5.5) **in age group(**≤ 38years) **followed** (17.8± 4.3) **in age groups**(**28**-37)**years compared to non-** Pregnant Diabetic Patients and **healthy individuals.**

Table-5:Correlation between age groups and levels of interleukin-6 (IL-6) in serum among pregnant and non-pregnant women diabetic patients with dental caries and healthy controls

Age Group (Years)	IL-6 Levels (pg/mL) (Mean IL-6 ± SD)			Correlation Coefficient r
	Pregnant Diabetic Patients with Dental Caries	Non-Pregnant Diabetic Patients with Dental Caries	Healthy Controls	
18-27	14.2± 3.2	12.5±2.2	5.0 ± 1.5	0.68
28-37	17.8± 4.3	15.3 ± 5.5	4.8 ± 1.2	0.72
≤38	18.7 ± 5.5	15.2 ±3.1	6.2 ± 2.0	0.77

4. DISCUSSION

Comparison of demographic and lifestyle factors between pregnant and non pregnant diabetic patients with dental caries , body Mass Index (BMI) (28.4 ± 3.6) Compare to healthy control (24.9 ± 2.9), also all for education level , smoking status, and family history provide insights into the background and health behaviors of each group. In diabetic patients, important risk factors including socioeconomic status ; poor dietary control; age and xerostomia (feeling of dry mouth during meals) causing increased risk for oral health illness [(7&8)].

In human the Interleukin 6 (IL-6) is play important role as anti-inflammatory and pro-inflammatory[(9,10)] , that elevated levels in pregnant diabetic women with dental caries (18.60±5.3) to non-pregnant diabetic group with dental caries (13.11±3.9) compare to healthy control (8.21±2.01) , p-value (< 0.001).this results consisted with Sanz *etal.*,2013 and Stevens *etal.*,2019 who showed significantly higher level of interleukin-6 in preterm-delivery than full-term delivery pregnant groups with gingivitis comparing with healthy control group indicates that periodontal disease-induced production cytokines as IL-6 in the periodontal pocket may increasing in blood concentration[(11&12)] , as well as current study showed a strong positive correlation between trimester and IL-6 levels in diabetic patients with dental caries compare to healthy controls.A study conducted by Sanz *etal.*,2013 & Stevens *etal.*, 2019 showed that high level of **IL-6 in diabetic patient with chronic periodontitis (16.22)[(11&12)].**

Conclusion: Current study conclude elevated IL-6 levels in sera of diabetic pregnant women with dental caries compare to non-pregnant.

REFERENCES

[1] Sandberg GE, Sundberg HE, Fjellstrom CA, Wikblad KF. Type 2 diabetes and oral health: a comparison between diabetic and non-diabetic subjects. Diabetes Res Clin Pract. 2000;50:27-34. doi:10.1016/s0168-8227(00)00159-5.

[2] Chomkhakhai U, Thanakun S, Khovidhunkit SP, Khovidhunkit W, Thaweboon S. Oral health in Thai patients with metabolic syndrome. Diabetes Metab Syndr. 2009;3:192-7.

[3] Guggenheimer J, et al. Insulin-dependent diabetes mellitus and oral soft tissue pathologies. II. Prevalence and characteristics of Candida and candidal lesions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2000;89:570-6. doi:10.1067/moe.2000.104477.

[4] Lamster IB, Lalla E, Borgnakke WS, Taylor GW. The relationship between oral health and diabetes mellitus. J Am Dent Assoc. 2008;139:19-24. doi:10.14219/jada.archive.2008.0363.

[5] Saini R, Al-Maweri SA, Saini D, et al. Oral mucosal lesions in non-oral habit diabetic patients and association of diabetes mellitus with oral precancerous lesions. Diabetes Res Clin Pract. 2010;89:320-6. doi:10.1016/j.diabres.2010.04.016.

[6] *Al-maskari AY, Al-maskari MY, Al-sudairy S. Oral manifestations and complications of diabetes mellitus: a review. Sultan Qaboos Univ Med J. 2011;11:179–186.*

[7] Khahro MM, Shaikh Q, Baloch M, et al. Frequency of dental caries among patients with type-II diabetes mellitus. Prof Med J. 2019;26(6):865-9. doi:10.29309/TPMJ/2019.26.06.2579.

[8] Seethalakshmi C, Jagat Reddy RC, Asifa N, Prabhu S. Correlation of salivary pH, incidence of dental caries

and periodontal status in diabetes mellitus patients: a cross-sectional study. J Clin Diagn Res. 2016;10(3):ZC12-4. doi:10.7860/JCDR/2016/16310.7351.

[9] Mohammed Al-Warmeziary MA, Hussain SS, Tektook N. Correlation between sera levels of interleukins (IL-6, IL-17, and IL-23) with virulence genes detected in carbapenem-resistant E. coli. Indian J Forensic Med Toxicol. 2020;14(2).

[10] Tektook N, Waheeb AA, Al-Byti AM. Level of interleukin-6 and interleukin-1β associated with bacterial burn infections in patients at Al-Kindy Hospital. Indian J Forensic Med Toxicol. 2019;13(4).

[11] Sanz M, Kornman K. Periodontitis and adverse pregnancy outcomes: consensus report of the Joint EFP/AAP Workshop on Periodontitis and Systemic Diseases. J Clin Periodontol. 2013 Apr;40 Suppl 14:S164-9. https://doi.org/10.1111/jcpe.1208320.

[12] Stevens VL, Hoover E, Wang Y, Zanetti KA. Pre-analytical factors that affect metabolite stability in human urine, plasma, and serum: a review. Metabolites. 2019 Jul 25;9(8):156. https://doi.org/10.3390/metabo908015621.