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Immunological study of dental caries and periodontitis among patients with chronic kidney disease in Babylon province

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***Abstract*---**The study is conduct at the College of Dentistry, University of Babylon, in which 90 people participated, including 47 patients suffering from chronic kidney disease and 43 are healthy. Patient samples were collect, namely saliva. The effect of IL 17 was evident in patients with chronic kidney disease (CKD), as it was highly significant (0.001) compared to those without CKD. Inflammatory Patients with chronic kidney disease frequently experience changes in their oral health, such as periodontitis and other signs of poor oral hygiene (CKD). According to numerous studies, uremic patients have greater rates of periapical and mucosal lesions, loss of attachment, and teeth that are decaying, missing, or filled than the general population. Plaque formation by *streptococcus mutans* via synthesis specific enzyme Glucosyltransferase enzyme (Gtf) because formation glucan by fermentation of sucrose and this will be provide site of deposition on the surface of teeth and lead to dental caries which leads to the loss of teeth and this was observed in this study in patients with CKD compared to those without CKD it was highly significant (0.001).

***Keywords*---**immunological study, dental caries, periodontitis, chronic kidney disease.

Introduction

The oral tissues of CKD patients are affected and this contributes to inadequate oral health. These findings include increased levels of plaque, gingival inflammation, and an accelerated rate of calculus accumulation [2]. Loss of attachment, recesses and deep pockets seen in examined patient these problems and complications because the patient suffered from .Another diseases such as CKD, hepatitis c virus, hypertension and DM [3]. Bad oral hygiene seen in most patients and Frequently regurgitating, vomiting, and nausea brought on by uremia and medicine, as well as severe erosions on the lingual surfaces of the teeth, are all caused by dialysis nausea [4].These complications because insufficiency of IL-17 and total antioxidant capacity in saliva [10].

The Glucosyltransferase enzyme (Gtf) present in the pellicle were found to be active and capable of glucan synthesis in situ from sucrose [8], and they served as binding sites for various oral bacteria, including mutans streptococci. Additionally, Gtf added to ductal saliva (Gtf-free) is also adsorbed in active form onto hydroxyapatite (HA) surfaces. Gtfs are present in whole saliva and are incorporated into pellicle and contribute to its structure [8]. Sources Gtf can easily be measured in entire saliva from many people, especially those who have active caries [7; 6; 13]. Even in entire saliva, Gtfs are highly stable.

Methods

The study was conduct at the College of Dentistry, University of Babylon, A total of 90 samples (47 suffering from chronic kidney disease) Were selected patients from MARJAN MEDCAL CITY, Babylon province, Iraq. The samples were collected from both genders during the period from October 2021 to Feb 2022. The patients included were 27 males and 20 females ranging in age group from (20-59) years old.

Interleukin 17

According to the procedure recommended by human Interleukin 17 ELISA Kit: ELISA kit for measurement of human Interleukin 17 (Elabscience / China) Enzyme-Linked Immunosorbent Assay is what this kit is for (ELISA). Human IL-17 antibody has been pre-coated on the plate. When IL-17 from the sample is introduced, it binds to the antibodies that have been coated on the wells. The biotinylated IL-17 antibody is subsequently added, where it binds to the sample's IL-17. The biotinylated IL-17 antibody is then bound by the addition of streptavidin-HRP. Following incubation, a washing process removes any unbound streptavidin-HRP. Following the addition of the substrate solution, color changes according to the concentration of human IL-17. By adding an acidic stop solution, the process is stopped, and absorbance is measured at 450 nm.

Human UDP Glucose Ceramide Glucosyltransferase (GTF) ELISA Kit

Enzyme-Linked Immunosorbent Assay is what this kit is for (ELISA). Human Gtf enzyme antibody has been pre-coated on the plate. The sample's Gtf Enzyme is added, and it binds to the antibodies that have been coated on the wells. The

biotinylated Gtf Enzyme antibody then binds to the Gtf Enzyme in the sample after being introduced. The biotinylated Gtf Enzyme antibody is then bound by streptavidin-HRP. Following incubation, a washing process removes any unbound streptavidin-HRP. Following the addition of the substrate solution, color changes according to the concentration of human Gtf Enzyme. By adding an acidic stop solution, the process is stopped, and absorbance is measured at 450 nm.

Assay Procedure

According to the procedure recommended by Human UDP Glucose Ceramide Glucosyltransferase ELISA Kit (BT LAB/ China).

DMFT (Decayed, Missed and Filled Teeth)

The World Health Organization's approved DMFT index for measuring caries experience (clinical assessment without radiography) [1].

Results
Interleukin 17

Table (1) show that there is a highly significant differences between patient and control groups in relation to IL-17 at $p \leq 0.001$.

Table (1): Levels of IL-17 in CKD patients and Control

Study groups			IL-17 ng/L	*p-value
Patient group	N	Valid	47	0.001 H.S
		Missing	0	
	Mean		96.187	
	Std. Deviation		23.470	
	Minimum		46.927	
	Maximum		145.759	
Control group	N	Valid	43	
		Missing	0	
	Mean		60.371	
	Std. Deviation		18.262	
	Minimum		27.619	
	Maximum		94.241	

*= t- Test, N= number of sample, N.S = non significance, H.S= highly significance, P value ≤ 0.05

Periodontitis

Figure (1) show that there is highly significant differences between patient and control group in relation to Periodontitis at $p \leq 0.05$.

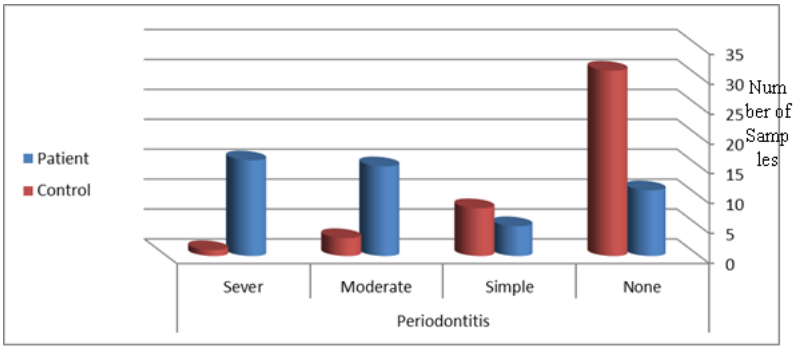

Figure (1) Distribution of periodontitis

Glucosyltransferase Enzyme (GTF)

Results of table (2) show that there is a highly- significant differences between patient and control group in relation to GTF at $p \leq 0.001$.

Table (2): Levels of GTF in CKD patients and Control

Study groups			Gtf ng/ml	*p-value
Patient group	N	Valid	47	0.001 H.S
		Missing	0	
	Mean		12.4823	
	Std. Deviation		2.73039	
	Minimum		4.50	
	Maximum		18.59	
Control group	N	Valid	43	
		Missing	0	
	Mean		5.4886	
	Std. Deviation		1.85383	
	Minimum		2.53	
	Maximum		9.87	
*unit of measurement is pg/mmol *= t- Test, N= number of sample, N.S = non significance, H.S= highly significance, P value ≤ 0.05				

DMFT (Decayed, missed and filled)

Table (3) show that there is an extremely significant differences between patient and control group in relation to DMFT at $p \leq 0.05$.

Table (3): DMFT in CKD patients and Control

Study groups			DMFT	*p-value
Patient group	N	Valid	47	0.0001 H.S
		Missing	0	
	Mean		15.531	

	Std. Deviation		5.282	
	Minimum		10	
	Maximum		31	
Control group	N	Valid	43	
		Missing	0	
	Mean		3.511	
	Std. Deviation		1.619	
	Minimum		1	
	Maximum		6	
*= t- Test, N= number of sample, N.S = non significance, H.S= highly significance, P value ≤ 0.05				

Figure (2) show patient in Marjan teaching hospital, suffering from CKD and HCV these diseases lead to oral complications such as gingivitis, calculus formation and periodontitis:

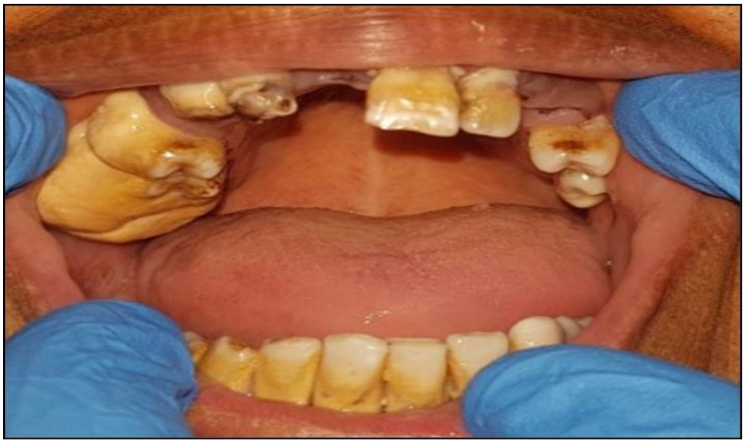

Figure (2) for patient in Marjan teaching hospital

Discussion

Loss of attachment, recesses and deep pockets seen in examined patient this agreement with [3; 12]. It's no secret that uremia and medication-induced vomiting and nausea cause frequent regurgitation and vomiting in patients with kidney disease, and this is reflected in their oral hygiene as well as in the severe erosions on the lingual surfaces of their teeth and this result agree with [4]. Prior research has mostly concentrated on IL-17 when examining the clinical correlations between salivary levels of cytokines from the IL-17 family and periodontitis. According to these research, this publication indicates that IL-17 levels in the serum, saliva, and GCF are raised in people with periodontitis and are correlated with age and other clinical parameters of the condition [14]. Elevation of GTF enzyme in CKD patient this result explain the dental caries and plaque formation this agreement with this articles. The development of a pellicle on the tooth's surface is the first sign of plaque formation [5; 9; 11]. Even though it is obvious that the salivary pellicle has l0ittle to no mammalian components, it is sometimes referred to as salivary pellicle.

Conclusion

Patients with chronic renal disease frequently exhibit abnormalities of the oral cavity, including periodontitis and other indicators of poor oral health (CKD). In comparison to the general population, uremic patients exhibited higher rates of dental decay, tooth loss, and tooth fillings, as well as loss of attachment, periapical infections, and mucosal infections. Age-related periodontitis, other dental and oral pathologic problems, severe comorbidities including diabetes, concurrent drug use, and a state of immunologic dysfunction may cause teeth to become loose. Patients with CKD who have poor dental health are more likely to experience more severe effects.

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