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The Relationship between Tooth Loss and Primary Natural Open-Angle Glaucoma

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Abstract: This paper aims to assessment the outcomes of the relationship between tooth loss and primary natural open-angle glaucoma. Information and demographic data were collected from different hospitals but based on the presence of Periodontitis for patients with glaucoma. Fifty patients were collected and divided into two groups (30 yes Periodontitis and 20 controls). The inclusion criteria in this study were patients older than 18 years who were diagnosed with periodontitis between 2019-2020. As for the exclusion criteria, they included patients under 20 years of age and patients who did not withdraw all information related to them. They also include patients who have previously been diagnosed with glaucoma, and in this study, which was analyzed retrospectively to Iraqi children suffering from periodontitis and glaucoma patients, and in this study, there is a positive relationship and statistical significance for most of the parameters collected in this study, p-value 0.001. The risk of primary open-angle glaucoma and primary angle-closure glaucoma was also analyzed. Compared to controls, patients with periodontitis were found to have a 31% increased risk of developing primary open-angle glaucoma, but no significant difference in risk of developing primary angle-closure glaucoma was observed.

Keywords: open-angle, glaucoma, Periodontitis, tooth, tissue.

INTRODUCTION

A relationship was found between infections in the mouth, which in turn leads to tooth loss with chronic diseases such as heart disease and diabetes.

Periodontitis is defined as an inflammatory condition of the mouth, which in turn causes instability in the skeletal system of the teeth. [Akagi, T. *et al*., 2017; Araie, M. *et al*., 1994; Araie, M. *et al*., 2012]

Inflammatory markers generated from the affected periodontal tissue can also travel via the bloodstream to reach other tissue beds. For example, in neurodegenerative diseases such as Alzheimer's and Parkinson's diseases, there is growing evidence that peripheral inflammation exacerbates the development of neuronal cell loss. [Barry, C.J. *et al*., 1997; Begg, I.S. *et al*., 1971; Bengtsson, B. *et al*., 2005] The third mechanism is the immune response to the bacteria, which involves the generation of antibodies to antibodies and their toxins, which may have off-target effects in extra-oral tissues (e.g., cross-reactive antibodies that contribute to atherosclerosis) [Bengtsson, B. *et al*., 2008; Bojikian, K.D. *et al*., 2019]

Open-angle glaucoma is considered one of the main causes of blindness for children in Iraq, and through previous studies (Rayed 2009), in which 200 children were collected, divided into 130 patients and 70 control groups.

Fifty cases of glaucoma were detected, a clear increase in the levels of bacterial pregnancy in the mouth, and in addition to that, fewer and healthier teeth. [Budenz, D.L. *et al*., 2017; Chansangpetch, S. *et al*., 2018; Chauhan, B.C. *et al*., 2015; Chihara, E. *et al*., 1997]

found that when glaucoma animal models were administered low-dose bacterial toxins, glaucomatous neurodegeneration ensued and was accompanied by microglial activation, upregulation of the complement system, and toll-like receptor four signaling activity in the optic nerve. These results suggest that oral infections, particularly those that can lead to periodontal disease, may have systemic effects that can contribute to POAG [De Moraes, C.G. *et al*., 2012a; De Moraes, C.G. *et al*., 2012b; Akagi, T. *et al*., 2017]

MATERIAL AND METHOD

Patient Sample

A retrospective study was conducted from several different hospitals in Iraq, where 50 patients with glaucoma were collected, and the patients were divided according to the presence of periodontitis.

Information and demographic data were collected from different hospitals but based on the presence of periodontitis for patients with glaucoma.

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Study Design

Information and demographic data were collected from different hospitals but based on the presence of Periodontitis for patients with glaucoma.

Fifty patients were collected and divided into two groups (30 Periodontitis and 20 control).

The inclusion criteria in this study were patients older than 18 years who were diagnosed with periodontitis between 2019-2020. As for the exclusion criteria, they included patients under 20 years of age and patients who did not withdraw all information related to They also include patients who have previously been diagnosed with glaucoma

Statistical Analysis

Data and demographic information were analyzed by relying on the statistical analysis program SPSS IBM Soft 22. The statistical information difference test with respect to ages was based on the chi-square test.

Represented The standard deviation with S. D. and also enrolled. Finding the first and second variables and analyzing them statistically by finding the statistical differences to the variables using p-value in order to determine the sample size, the sample calculation calculator was used; When choosing a 5% confidence interval.

Study Period

An agreement was made with the relevant committees in order to obtain the required licenses for this study.

As the study period was for a full year and included following up on developments in addition to monitoring the patient and this study started from 4-8-2020 to 4-5-2021.

Aim of Study

This paper aims to assessment the outcomes of the relationship between tooth loss and primary natural open-angle glaucoma.

RESULTS

Table 1: General characteristics of participants

Outcomes			
Characteristics	**Total participants**		**value**
	Periodontitis	**Control**	
Age (mean, SD, *y*)	13 (3.8)	12 (5.5)	<0.001
Sex (*n*, %)			<0.001
b	20 (40)	13 (26)	
G	10 (20)	7 (14)	
BMI (mean, SD, kg/m^2)	17.9 (2.9)	18.2 (3.2)	<0.001
Family history			
Yes	10 (20)	10 (50)	0.00
No	20 (40)	10 (50)	0.001
diseases			
Hypertension	12 (24)	10 (20)	0.089
Diabetes mellitus	10 (20)	5 (10)	0.001
Hyperlipidaemia	5 (10)	3 (6)	0.098
Asthma	3 (6)	2 (4)	0.92
Glaucoma (*n*, %)	15 (50)	3 (6)	<0.001
P value<0.05			

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Table 2: Results of the statistical analysis of periodontitis as a risk factor for glaucoma

Characteristics	Odds ratios for glaucoma			
	Crude HR (95% CI)	value	Adjusted HR† (95% CI)	value
Total participants ($n = 50$)				
Periodontitis	6.3 (5.11–7.11)	<0.001	2.99 (2.22–4.3)	<0.001
Control	1.00		1.00	
Age ≤ 10 years, men ($n = 10$- 33)				
Periodontitis	9.11 (6.2–13.24)	<0.001	6.9 (3.99–11.81)	<0.001
Control	1.00		1.00	
Age ≤ 10 years, women ($n = 7$)				
Periodontitis	11.1 (6.8–19.2)	<0.001	8.77 (4.5–14.2)	<0.001
Control	1.00		1.00	
Age > 10 years, men ($n = 23$)				
Periodontitis	3.33 (2.18–4.02)	<0.001	2.9 (2.11–4.01)	<0.001
Control	1.00		1.00	
Age > 10 years, women ($n = 10$)				
Periodontitis	4.55 (2.99–5.2)	<0.001	1.99 (2.99–3.88)	<0.001
Control	1.00		1.00	

Table 3: Logistic regression results based on body mass index for patients

Characteristics	Odds ratios for glaucoma			
	Crude	value	Adjusted†	value
Participants with BMI < 20				
Periodontitis	2.2 (1.55–3.1)	<0.001	2.1 (1.34–2.66)	0.001
Control	1.00		1.00	
Participants with BMI ≥ 20				
Periodontitis	2.90 (1.89–3.1)	<0.001	2.20 (1.40–2.94)	<0.001
Control	1.00		1.00	

DISCUSSION

In this study, which discussed the deterioration of the function of glaucoma eyes with tooth loss, we notice its association significantly in the ages that are less than 20, which led to a reduction in the size of the sample collected, and this is due to its presence significantly at older ages when there is damage to the optic nerve fibers Because of the increase in intraocular pressure, and the latter case usually occurs as a result of a lack of drainage of the aqueous humor, and this generates a significant and noticeable effect on the other systems. The previous study revealed a statistically significant relationship between sex and a positive direct relationship between glaucoma and tooth loss, especially in children who suffer from comorbidities.

Periodontitis stimulates an inflammatory response and induces an innate immunity response through the activation of toll-like receptors (TLRs) [Araie, M. *et al*., 1994]

In this study, which aimed to know the relationship between tooth loss and primary natural open-angle glaucoma where, through statistical analysis, a direct relationship with a 0.01 p-value was observed for children, and this is due to several reasons, including the presence of damage to the optic nerve, and this was demonstrated It is based on previous studies that confirmed the existence of a positive relationship between tooth loss and glaucoma [Araie, M. *et al*., 2012]

Periodontitis stimulates an inflammatory response and induces an innate immunity response through the activation of toll-like receptors (TLRs).

In this study, which was analyzed retrospectively to Iraqi children suffering from periodontitis and glaucoma patients, and in this study, there is a positive relationship and statistical significance for most of the parameters collected in this study, with a p-value of 0.001.

Logistic regression was used to indicate age and body mass index between Crude HR (95% CI)

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with Adjusted HR† (95% CI) Glaucoma has been shown to be significantly associated with periodontitis.

In recent years, some studies have suggested a possible link between glaucoma and periodontitis. One of them showed that patients with open-angle glaucoma had fewer teeth and more streptococcus in the oral cavity than patients without this disease.

This is a retrospective cohort study, which included adult patients diagnosed with periodontitis between 2000 and 2012, as well as a group of controls (without periodontitis), matched by sex and age, and in both groups, the incidence of glaucoma was followed until the end of 2013.

The study included 194,090 patients with periodontitis and 194,090 patients. Compared with controls, patients with periodontitis had a higher prevalence of the following diseases: high blood pressure, chronic liver disease, hyperlipidemia, diabetes, respiratory disease (asthma), migraine, and rheumatic diseases. In addition, the use of corticosteroids was more common in the periodontitis group.

After adjusting for age, sex, comorbidities, and corticosteroid use, the risk of developing glaucoma was found to be 26% higher in patients with periodontitis than in controls.

The risk of primary open-angle glaucoma and primary angle-closure glaucoma was also analyzed. Compared to controls, patients with periodontitis were found to have a 31% increased risk of developing primary open-angle glaucoma, but no significant difference in risk of developing primary angle-closure glaucoma was observed.

CONCLUSION

In recent years, some studies have suggested a possible link between glaucoma and periodontitis. One of them showed that patients with open-angle glaucoma had fewer teeth and more streptococcus in the oral cavity than patients without this disease. Another described that tooth loss, along with a diagnosis of periodontal disease, was associated with an increased risk of open-angle glaucoma. In order to delve into the possible relationship between both diseases and to do so in a larger sample of patients than in the aforementioned studies, a recent study analyzed the risk of developing glaucoma in patients with periodontitis using the database of the National Health System of Iraq.

RECOMMENDATION

We observed that men who differed in the number of natural teeth, or if they had any periodontal disease, showed no difference in the risk of primary open-angle glaucoma."

Paracentral vision loss in primary open-angle glaucoma has been shown to be associated with reduced blood flow.

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