The Association between Oral Hygiene and Gastric Pathology in Patients with Dyspepsia: a Cross-Sectional Study in Southeast Iran

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ABSTRACT

BACKGROUND

Many studies have reported an association between periodontal infections and some systemic diseases such as respiratory and cardiovascular diseases. Some studies found a direct association between chronic gastritis caused by Helicobacter pylori (HP) infection and poor periodontal health.

METHODS

In a cross-sectional study from November 2014 to December 2015 in Kerman, the largest province in southeast Iran, patients with dyspepsia who were candidate for diagnostic upper gastrointestinal (GI) endoscopy were included in our study. Decayed, Missing, and Filled Teeth (DMFT) index and Loe plaque index that are two popular indexes in dental epidemiology were used to assess the oral health by a dentist before the upper GI endoscopy. According to the Loe plaque index, score: 0= no plaque, score: 1= a film of plaque attaching to the free gingival border and near area of the tooth, score: 2= moderate reposition of deposits within the gingival pocket, score :3= plenty of soft matter within the gingival pocket±on the tooth and gingival border. Scores ≤1, 2 and 3 equal to good, moderate, and poor oral hygiene, respectively. During upper GI endoscopy a total of six biopsy samples were taken from fundus, body, and antrum. A pathologist reported these samples according to Sidney's classification into superficial gastritis, atrophic gastritis, intestinal metaplasia, and dysplasia.

RESULTS

According to Sidney's classification 77 (89.5%) patients had superficial gastritis, 3 (3.5%) had atrophic gastritis, and 6 (7%) had intestinal metaplasia. HP was found in 80.2% of the gastric mucosal biopsy samples. There were not statistically significant relationship between Sidney's classification, presence of HP in gastric mucosal biopsies, and hygiene indicators ($p>0.05$). No relation was found between the DMFT index and superficial gastritis, atrophic gastritis, and intestinal metaplasia ($p>0.05$). Gastric infection with HP was found in 70%, 75%, and 100% of patients with mild, moderate, and sever DMFT index, respectively.

CONCLUSION

Our study showed that there might be a relation between poor oral hygiene and gastric precancerous lesions. In addition, HP infection in gastric histopathology might be associated with periodontal disease.

KEYWORDS: Oralhygiene, Dyspepsia, Chronic gastritis.

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INTRODUCTION

Oral health is an important component of general health.[1] Many studies have found an association between periodontal infection and some systemic

diseasessuch as some respiratory and cardiovascular diseases.[2,3] So, increasing the awareness about oral health should be one of the healthprograms in order to reduce the outcomes of systemic diseases.[4]

Some studies found a direct association between chronic gastritis caused by *Helicobacter pylori* (HP) infection and poor periodontal health. HP is an opportunist gram negative microorganism that causes some gastrointestinal (GI) diseases in humans via infected foods and water.[5] More than 50% of the general population worldwide have been infected by this organism and the prevalence of this infection in Iran seems to be 90%.[6,7] This infection is usually asymptomatic and associated with superficial gastritis, which is often reversible by appropriate anti HP treatment.But persistent infection causes chronic gastritis that can progress to atrophic gastritis, intestinal metaplasia, dysplasia, and ultimately gastric adenocarcinoma.[6,8] HP is present in saliva, tongue dorsum, and dental plaque as a natural flora.It seems that mouth cavity is a suitable reservoir for recurrence of gastric HPinfection.[9]

Poor dental and oral hygiene such as negligence in teeth brushing can be a risk factor for the presence of HP in oral cavity.[10,11] Rarely, HP in dental plaque is eliminated by anti HPeradication therapy, and this may play a role as a source for future reinfection. Therefore, eradication of HP from dental plaques and oral cavity should be an important part of the comprehensive management of HP-associated GI diseases.[12-15]

Up to now, the association between gastric pathology and oral hygiene has been reported by limited studies.[16-18] Salazar and colleagues showed that about 70% of patients with precancerous lesionsin gastric biopsy had poor oral hygiene.[16] In 2014, Boylanand co-workers in a study of 262 patients found that periodontal disease was associated with increased risk of peptic ulcer disease.[17] So, the purpose of this study was to assess the association between oral health and gastric pathology as the first study in Iran.

MATERIALS AND METHODS

Patients' population

In a cross-sectional study from November 2014 to December 2015 in Kerman, the largest province in southeast Iran, patients with dyspepsia who were candidate for diagnostic upper GI endoscopy and were referred to a gastroenterology clinic in AfzalipourHospital were included in our study. Inclusion criteria were dyspeptic patients withepigastric pain or discomfort who had history of anti-dyspeptic therapy without remission and onset of dyspepsia after 50 years old.

Exclusion criteria were: patient with history ofdiabetes mellitus, cirrhosis, renal failure, cancer, and immunosuppressive drug consumption.

Demographic data from all the patients were collected from their medical records and entered to a checklist.

Decayed, Missing, and Filled Teeth (DMFT) index and Loe plaque index that are two popular indexes in dental epidemiology were used to assessthe oral health by a dentist before the upper GI endoscopy.In order to determine DMFT index,the examination method was based on WHO criteria.That is,the patient sits in dental unitand by flat dental mirror and ordering light he/she is assessed for number of extracted teeth due to decayrestored teeth and decayed teeth. Dental plaque measuring index used in this research was Loa index. According to the Loe plaque index, score 0=no plaque,score: 1=a film of plaque attaching to the free gingival border and near area of the tooth,score 2=moderate reposition of deposits within the gingival pocket,score 3=plenty of soft matter within the gingival pocket±on the tooth and gingival border. Scores ≤1, 2, and 3 equal to good, moderate, and poor oral hygiene, respectively.[19]

We used SiC index for dividing patients into two groups according to their DMFT. For this purpose we chose the one third of the population with the highest DMFT values.The SiC Index is the one third of the study group with the highest DMFT score [20] and the other two third have mild to moderate DMFT.

During upper GI endoscopy a total of six biopsy samples were taken from fundus, body, and antrum.After tissue processing a pathologist who was notaware about the patients' oral health,reported these samples according to Sidney's classification into superficial gastritis, atrophic gastritis, intestinal metaplasia, and dysplasia.

Statistical analysis

Chi-square and t tests were used for statisticalanalysis. SPSS software version 20 was used for data analysis. *p*value <0.05 was considered as statistically significant.

Ethics:

The protocol of our study was approved by EthicsCommittee of Kerman University of Medical Sciences. All the participants signed a consent form and their data were kept secret.

RESULTS

86 patients with dyspepsia consisted of 34 (39.5%) women and 52 (60.5%) men were included in our study. The mean age of the patients was 40.32 years. The youngest and the oldest patients were 20 and 63 years old, respectively.

The patients were evaluated considering their education:7% were illiterate,27.9% were at primary school level,26.7% had high school diploma, and 38.4%had higher education. The demographic information about sex and education are shown in table 1.

The characteristics of the patients including: hygiene indicators (the number of teeth brushing per day, flossing, and visiting the dentist), DMFT and,Loe plaque index are summarized in tables 2, and 3.

According to Sidney's classification 77 (89.5%) patients had superficial gastritis, 3 (3.5%) had atrophic gastritis, and 6 (7%) had intestinal metaplasia. HP was found in 80.2% of the gastric mucosal biopsy samples. There were not statistically significant relationship between Sidney's classification, presence of HP in gastric mucosal biopsies, and hygiene indicators ($p>0.05$).The relationship between gastritis degree andexistence of HP,and also the relationship between DMFT, Plaque index, and HP colonization amount are summarized in tables 4, and 5, respectively.

There were not statistically significant associations between Loe plaque index and superficial gastritis and intestinal metaplasia ($p=0.825$). In contrary, there was a statistically significant relationship between Loe plaque index, and the presence of atrophic gastritis in gastric mucosal biopsies ($p=0.001$, table 3). Also, the relation between Loe plaque index and finding of HP in gastric mucosal biopsies was statistically significant (p.value <0.05). HP was found in 66%, 82.6%, and 100% of the patients with good, moderate, and poor Loe plaque index, respectively.

No relation was found between the DMFT index and superficialgastritis,atrophic gastritis, and intestinal

Table 1: Demographic data

Variables		Frequency (percent)
Sex	Male	52(60.5)
	Female	34(39.5)
Education	Illiterate	6(7)
	Primary school	24(27.9)
	High school	23(26.7)
	Higher Education	32(38.4)
Age mean (standadrd deviation)	40(13.2)	

Table 2: Frequency of oral hygiene indices

Variables		Frequency (percent)
Tooth brushing times per day	No brushing	15(17.4)
	Irregular	25(29.06)
	Once	30(34.9)
	Twice	16(18.6)
Dental floss usage	Yes	16(18.6)
	No	70(81.4)
Last visiting a dentist	Never	8(9.3)
	6 month ago	27(31.4)
	A year ago	20(23.3)
	More than one year ago	31(36)

Table 3: Frequency of dental &gingival indices

DMFT index	SIC	20(23.3)
	Other 2/3	66(76.7)
Loe index	Good	39(45.3)
	Moderate	23(26.7)
	Poor	24(27.9)

metaplasia ($p>0.05$).

Gastric infection with HP was found in70%,75%, and100% of the patients with mild,moderate, and sever DMFT index, respectively.

There was nostatistically meaningful difference based on education between the illiterate individuals, primary school level,high school diploma, and higher education regarding the various degrees of HP.Also the difference between the frequency of HP degrees in stomach was not meaningful based on age and sex ($p>0.05$).

Table 4: The relationship between digree of gastritis and *H.pylori*

	H.pylori					
	No	**Mild**	**Moderate**	**Sever**	**Total**	**P value**
Superficial gastritis	17(21.5)	24(30.4)	28(35.4)	10(12.7)	79	
Intestinal metaplasia	0(0)	0(0)	3(50)	3(50)	6	0.088
Gastric atrophy	0(0)	1(100)	0(0)	0(0)	1	

Table 5: The relationship between DMFT and Plaque indexes with gastric *H.pylori* grades

		H.pylori				
		Absent (no *H.pylori*)	**Mild**	**Moderate**	**Sever**	**P value**
DMFT	Mild to moderate	17(100)	25(100)	16(51.6)	8(61.5)	0.001
	sever	0(0)	0(0)	15(48.4)	5(38.5)	
Plaque Index	good	13(76.5)	17(68)	7(22.6)	2(15.4)	0.001
	moderate	4(23.5)	8(32)	9(29)	2(15.4)	
	bad	0(0)	0(0)	15(48.4)	9(69.2)	

DISCUSSION

The aim of our study was to assess the association between oral health and gastric pathology. Due to the best of our knowledge, up to now, there was no research from Iran in this regard in the literature.

Our study showed that there was a direct relationship between the presence of HP in the stomach and unsatisfactory dental and gingival indices. Our data are consistent with the literature that suggests oral cavity and oral plaque may be a reservoir for HP leading to the recurrence of gastric infection.[9-15] in 2014, Wang and colleaguesreported that simultaneous treatment of periodontal disease and oral HP could increase the success rate of the eradication of the gastric HP infection from 61.33% to 82.26%.[21] In addition, Zaricand co-workers indicated that 77.3% of the patients treated with combined periodontal disease and anti-HP triple therapy showed successful eradication of gastric HPcompared with 47.6% who underwent triple therapy alone.[22]

There were an association between the unpleasant Loe plaque index and atrophic gastritis in our study. Atrophic gastritis is the main precursor lesion of gastric cancer, and HP infection is the most important cause of atrophic gastritis.[26] Periodontal disease is associated with alteration in oral microbiome.[17] Many studies have shown higher levels of HP in periodontitis status than in normal periodontal condition.[25-27] On the other hand periodontal pathogens and disease are associated with high levels of inflammatory cytokinesthat lead to induction of systemic chronic inflammation.[18]

Alasqah research indicated that in patients with chronic periodontitis,the prevalence of HP existence in stomach was higher than patients without periodontitis.[23] Beliand colleagues in their study on 124 patients with or without gastric HP infection,reported meaningful relationship between HP infection and patients'periodental status,but there was no meaningful relationship between the number of teeth and HP infection.[24] In contrast, Berroteranand co-workers found no relationship between HP infection and periodontal disease (Loe and Sillness indices), dental caries, and dental hygiene.[25] In this research,it was specified that periodontal diseases and DMFT indexhad meaningful relationship with gastric HP infection.Some studies have declared that shift in oral flora and systemic inflammation can affect some organs such as stomach, and pancreas [28] and result in tumor development and growth.[16]

Boylanand colleagues indicated that risk of peptic ulcerincreased with the presence of periodontal disease.[18] Salazar and co-workers found that among patients with higher grades of periodontal disease, periodontal pathogens that measured in plaque were related to gastric precancerous lesions attendance.[16]

Our study didnot show a relation between the DMFT index and gastric histopathology.It seems that the speed of bacterial colonization effect on teeth is much slower

than periodontium. So it seems that, like periodontal conditions, the tooth condition cannot be associated with gastric pathology. Limited studies reported a positive association between poor DMFT index and the risk of gastric adenocarcinoma.[30-33] Shakeri and co-workers in a study of 309 patients with gastric adenocarcinoma found a significant association between tooth loss and poor DMFT score,and the risk of gastric cancer. In addition apparent association was found only for gastric cardia cancer, for those subjects who brushed their teeth less than daily.[31] In a prospective study in China, tooth loss, increased the risk of developing esophageal and gastric cancers.[32] On the contrary, Salazar and colleagues didnot find such a relation in a study of 41 patients with gastric precancerous lesions including intestinal metaplasia or chronic atrophic gastritis.[18] There was no meaningful relationship when evaluating the relationship between histopathological findings of gastric mucosa and oral hygiene indices including the times of brushing the teeth,using floss,and the last time visiting by the dentist.In Salazar's study,the patients without precancerous lesions of the stomach used more floss,but there was no such relationship when using toothbrush and times of using it.[18]

Tooth loss can be the outcome of many factors such as periodontal disease, caries, trauma, some systemic diseases, or low socioeconomic status, so For study about tooth loss such factors should be carefully considered.

Low sample size is the major limitation of our study and we suggest a larger study for better assessment of the association between periodontal disease and GI pathology.This research is one of the few studies that assess the association between oral health and gastric pathology.

In conclusion,our study showed that there might be a relation between poor oral hygiene andgastric precancerous lesions. In addition,HP in gastric histopathology was associated with periodontal disease.Because the HP in the mouth can transfer into stomach and even causes repeated gastric infection after treatments and removal. So periodontal treatments along with the treatment protocols of HP infection should be considered.

CONFLICT OF INTEREST

The authors declare no conflict of interest related to this work.

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