

Association of Dietary Intake of Vitamin-C with Periodontitis among Elderly Population of Karachi, Pakistan

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ABSTRACT

Backgrounds: Vitamin- C plays a major role to prevent the spread of various diseases. Hence Vitamin-C is associated with periodontal disease.

Objectives: This study was conducted to evaluate the relationship between the dietary intake of Vitamin-C and periodontitis among the elderly population of Karachi, Pakistan.

Study Design: Cross-sectional study

Place and Duration of Study: The study was conducted among the elderly population of Sir Syed Hospital, Karachi from June till November 2021.

Material and Method: A total of 384 elderly patients were taken by using convenience sampling technique belonging to age group (60-85) who were admitted in the Hospital at that time. The status of periodontitis was assessed by using periodontal index. Twenty four-hour dietary intake of Vitamin-C was recorded along with other confounders such as age, gender, regarding the use of tooth brush, flossing, visits of dentist, alcohol consumption, smoking and other diseases. A multivariable logistic regression was applied.

Results: The participants who have taken dietary intake of vitamin C inadequately suffered from periodontitis by 1.16 times more than those participants who took adequate dietary intake of vitamin C (adjusted odds ratio [aOR] = 1.16, 95% confidence interval = 1.04±1.29).

Conclusion: The results of our study revealed that inadequate intake of dietary Vitamin-C was associated with the disease name periodontitis among the elderly population of Karachi. On the contrary adequate intake of dietary vitamin C has become essential to promote the periodontal health among the elderly patients.

Keywords: Ascorbic acid; Gingivitis; Periodontal disease; Periodontitis; Vitamin C

INTRODUCTION

Periodontal disease has become globally wide spread disease of today's world (1). Due to periodontitis, alveolar bone destroys the supporting teeth as a result of which there is a loss of teeth. Many other systematic diseases are associated with it such as type 2 diabetes mellitus, cardiovascular diseases, and has severe adverse effects on the health of a pregnant woman (2). Periodontal disease is a bacterial infection in which there is inflammation of periodontium leading to destruction of periodontal tissue and bone loss (3). Polymorphonuclear leukocytes (PMNs) initiate a response through various signaling mechanisms such as reactive oxygen species (ROS) which has the most cytotoxic effect on periodontium leading into periodontitis (ROS) (4, 5, 6). Hence The extreme build-up of reactive oxygen species (ROS) or reduced levels of antioxidants are also related in the development of periodontitis (7,8). Vitamin C plays a pivot role as it acts as a scavenger, antioxidant and an enzyme co-factor for periodontal health (9). It also helps in the prevention of periodontitis by inducing the differentiation of progenitor cells of periodontal ligament (10). In the recent years many studies have been conducted to evaluate the association of Vitamin-C with periodontitis. On the contrary many clinical studies have also analyzed that with the help of Vitamin-C periodontitis can be prevented. However, Review of available literature shows that knowledge regarding association of dietary

intake of vitamin-C with periodontitis among Elderly Population of Karachi, Pakistan is very scarce. The factors which impact human behavior in this country may be different from other countries. This topic has been researched in depth in other countries but more extensive researches should be carried out in Pakistan.

Objectives: The main idea of this study was to evaluate the relationship of dietary intake of Vitamin-C with periodontitis among the elderly population of Karachi, Pakistan.

MATERIAL AND METHODS

A cross sectional study was conducted among the elderly population of Karachi belonging to age group (60-85), from Sir Syed Hospital of Karachi, Pakistan from June to November 2021. Hence, convenience sampling technique was used to collect data. The sample size was calculated using Open-Epi Software. Considering default, Prevalence=50% at confidence level of 95% and bound of error of 5%. Therefore, a total of n=384 elderly population was selected. All the elderly population who had gone through periodontal examination without being edentulous and had a proper record of nutrition's were the part of the study and those who were not willing to participate were excluded from the study. Written consent was taken from all the participants who were willing to participate. Analysis of data was being done by SPSS version 23. Chi-square

test and Multiple logistic regression analysis was applied to evaluate the association of Periodontitis with dietary intake of Vitamin- C.

Assessment of periodontitis, Vitamin-C and other Confounders: For periodontitis, community periodontal index treatment need (CPITN) was used to assess the periodontal status which was developed by World Health Organization (WHO) (9). Periodontal pocket depth was measured at mesio-buccal, mid-buccal, dissto-buccal, mesio-lingual, mid lingual and disto-lingual of ten index teeth out of which two were molars in each quadrant, and central incisors (upper right and lower left). The scoring of CPITN probe was listed as 0=normal gingival, 1=bleeding on probing, 2=gingival calculus, 3=shallow periodontal pocket (3.5±5.5mm), 4=deep periodontal pocket (5.5 mm or more) . Participants with the scoring of 3 and 4 were grouped into periodontitis and non-periodontitis. For Vitamin-C 24-hour dietary intake was recorded a day before interview was conducted using questionnaire (10, 11). The Estimated Average Requirement (EAR), and the Dietary Reference Intakes (DRI), is the nutritional value to meet the nutritional requirements of half of the population selected according to specific criteria on the contrary other half of the population took insufficient Vitamin-C.

Other associated confounders along with Vitamin-C were age which included only elderly patients of age group (65-80), socioeconomic status was divided into upper,

middle and lower class, gender, smoking, alcohol consumption, being overweight, systemic diseases and oral hygiene habits such as frequency of tooth-brushing and use of floss, A questionnaire was used to ask socio-demographic and other oral hygiene variables along with clinical and laboratory procedures (12).

RESULTS

The results of our study revealed that the prevalence of periodontitis was 52.0% among elderly male population belonging to lower class, those who had low intake of vitamin-C, regular alcohol drinkers and smokers, poor oral hygiene, over-weight, diabetic, rise in cholesterol and blood pressure. (table-1). The result revealed that dietary intake of Vitamin-C was significantly associated with periodontitis. Those participants who took less Vitamin-C had periodontitis by 1.16 times as compared to those participants who took sufficient Vitamin-C. Further, the results of our study revealed that gender, socio-economic status, oral hygiene habits, alcohol consumption, smoking and diabetes mellitus had significant association with periodontitis. In Pakistan most of the population only visits dentists at the time of need. The results also revealed that those patients who visits the dental clinic usually have more periodontitis as compared to those who does not visit regularly.

Table 1: Demographic characteristics of participants along with periodontal status (N= 384).

Variables		N	Periodontitis		P-value
Age group	(60-85)	384	Yes	No	
Sex	Male	192	100	92	<0.001
	Female	192	72	120	
Monthly household income	Low	162	130	32	<0.001
	Middle	125	90	35	
	High	97	54	43	
Frequency of tooth brushing	Once	67	42	25	<0.001
	Twice	46	24	22	
	Thrice	26	14	12	
	Never	245	198	47	
Use of floss	No	372	361	11	<0.001
	Yes	12	2	10	
Dental visits	Monthly	362	189	173	<0.001
	Quarterly	8	6	2	
	Yearly	12	8	4	
	Never	2	1	1	
Alcohol consumption	Frequently	242	212	30	<0.001
	Rarely	142	115	27	
Smoking	Yes	286	200	86	<0.001
	No	98	65	33	
Obesity	Over-weight	256	130	126	<0.001
	Normal	89	65	24	
	Under-weight	39	25	14	
Dietary intake Vitamin-C (EAR)	Adequate	290	246	44	<0.05
	Inadequate	94	62	32	
Diabetes	Yes	298	198	100	<0.001
	No	86	56	30	
Hypertension	Yes	320	245	75	<0.001
	No	64	35	29	
Hypercholesterolemia	Yes	254	215	39	<0.001
	No	130	98	32	

Table 2: Adjusted association of dietary intake of vitamin C with periodontitis (N = 384).

Variables		Odd-ratio
Sex	Male	1.67
	Female	0.86
Monthly household income	Low	1.17
	Middle	0.45
	high	0.87

Frequency of tooth brushing	Once	1.31
	Twice	0.12
	Thrice	0.82
	Never	0.98
Use of floss	No	2.13
	Yes	0.12
Dental visits	Monthly	1.60
	Quarterly	0.15
	Yearly	0.48
	Never	0.37
Alcohol consumption	Frequently	1.64
	Rarely	0.89
Smoking	Yes	2.77
	No	0.91
Obesity	Over-weight	2.56
	Under-weight	0.34
	Normal	0.63
Dietary Vitamin-C (EAR)	Adequate	1.16
	Inadequate	0.34
Diabetes	Yes	1.18
	No	0.35
Hypertension	Yes	1.04
	No	0.03
Hypercholesterolemia	Yes	1.04
	No	0.25

DISCUSSION

This study evaluated the association of Vitamin-C with periodontitis among the elderly population of Karachi. The data of our study revealed that dietary intake of Vitamin-C defined by EAR had an association with periodontitis among the elderly population after controlling the potential confounders. With the help of EAR daily intake of Vitamin-C can be evaluated. The data of our study showed that elderly population belonging to age group (60-85) had a significant association of Vitamin-C with periodontitis which is similar to a study conducted in Japan by N.Amarasena et al., which also showed that Vitamin C has a significant relationship with periodontitis among elderly population (13). As we are familiar that periodontitis is a chronic condition associated with number of factors. Many previous studies have shown that younger population belonging to age group below 30 has low risk of periodontitis as compared to elderly population. As the older individuals have to go through more extractions due to periodontitis as compared to younger individuals. The results of our study further revealed that periodontitis was common among males which is similar to many studies which has shown that males are more prone to periodontitis as compared to females because of other associated risk factors (14,15). Hence Oxidative stress plays an important role in the development of periodontitis and other systematic disease such as diabetes (16, 17). Vitamin-C intake in diabetic patients has direct impact. Hence, intake of Vitamin-C in diabetic adults have direct impact on progressive periodontitis. The results of our study further revealed that Vitamin-C had an association with periodontitis among those people who belong to lower income class, smoker, diabetic, hypertensive and obese individuals. Hence alcohol consumers (18, 8), regular smokers (20), hypertensive (21) and diabetic individuals (22) are all the associated factors of periodontitis and also common among those people who had Vitamin-C deficiency. Usually diabetic patients with inadequate Vitamin-C intake are usually more susceptible to oxidative stress which plays a major role in the development of periodontitis. There are

various biological phenomenons which have explained the impact of Vitamin-C on periodontitis. Firstly, Vitamin-C act as an antioxidant and scavenger (7) then it act also act as a co-factor (11) and helps in osteogenic differentiation of ligaments of periodontium (8). The main limitation of this study is that it has only included the elderly population of Karachi so future studies can be designed to make results more generalizable. Further CPITN probe should be used to examine the clinical attachment loss for valid classification of periodontitis. This data did not address seasonal change in the dietary intake and other supplements.

CONCLUSION

The results of our study have revealed that intake of dietary Vitamin-C has a significant relation with periodontitis and adequate intake of Vitamin-C is essential for the health of periodontium of elderly population of Karachi, Pakistan

Conflict of interest: There is no conflict of interest

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