

Knowledge, Attitude and Practice Survey on Awareness of the Association between Diet and Dental Erosion

Research Article

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Abstract

Aim: Dental Erosion is clinically defined as the progressive and irreversible loss of dental hard tissue caused by a chemical process of acid dissolution that does not involve bacteria. Dental Erosion can have intrinsic or extrinsic causes. There is growing evidence of considerable increase in consumption of erosive drinks. This aim of this study was to assess the knowledge among the general public towards the awareness of the association between diet and dental erosion.

Materials and Methods: The present study is a cross sectional, descriptive questionnaire study conducted among the general public in Tamilnadu, India. A descriptive questionnaire survey was conducted among 325 participants regarding dental erosion and its association with diet from August to October, 2019. Data were analysed by using Statistical Package for Social Sciences (SPSS) including Mean, Standard Deviation and Chi -Square Test. (p value < 0.05).

Results: Lack of awareness of the association between diet and dental erosion was found among the General Public. Since the p-value is significant there is a correlation between most of the groups and variables in this study. The Chi-square test results showed that there was significant impact in most of the variables of this study.

Conclusion: This cross-sectional descriptive study shows a majority of the general public are associated with the consumption of potentially erosive drinks. They do not have adequate knowledge about dental erosion and its associated diet factors. Hence, establishing awareness among the general public regarding dental erosion and its association with diet is mandatory.

Keywords: Dental Erosion; Carbonated Drinks; Milk; Fruits; Juice; Diet.

Introduction

Erosive tooth wear is the chemico mechanical removal of dental hard tissues which can result in reduced aesthetics, compromised tooth structure, and loss of quality of life, possibly resulting in the need of costly restorative intervention [1, 2]. The prevalence and severity of erosive tooth wear is increasing, particularly in the younger population [3, 4]. Causal association between diet and dental erosive tooth wear progression have been established and an acidic diet is believed to be a significant aetiological agent in this increase in prevalence. It is hypothesized that frequent daily dietary acid intakes are needed for severe erosive tooth wear to occur [5, 6]. Extrinsic causes include demineralizing acidic beverages

and some medicines such as vitamin supplements. Intrinsic causes include recurring vomiting, low salivary flow which naturally results in inadequate rinsing and buffering of demineralizing acids on tooth surfaces. It is important to be able to identify the range of food, drinks and medications that have erosive potential [7, 8]. The addition of fruit or fruit flavourings to drinks has also increased which can also have equivalent erosive potential to that of carbonated drinks [9-11]. It is reasonably safe to assume that any dietary food or drink with added fruit or fruit flavouring will be acidic. While the erosive potential of specific dietary acids is important, it is essential to look at the overall pattern of consumption [12-14]. The frequency of dietary acid intake has been recognized as one of the primary risk factors for erosive tooth wear. The aim of this survey was to assess the knowledge, attitude

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Received: January 25, 2021

Accepted: February 14, 2021

Published: February 22, 2021

Citation: Keerthana T, Sindhu Ramesh. Knowledge, Attitude and Practice Survey on Awareness of the Association between Diet and Dental Erosion. *Int J Dentistry Oral Sci.* 2021;8(2):1683-1690. doi: <http://dx.doi.org/10.19070/2377-8075-21000334>

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and practice of the awareness of the association between diet and dental erosion among the general public.

Materials and Methods

An online survey was done with the structured questionnaire based on knowledge, attitude, practice among the general public regarding dental erosion and its correlation with the diet. The questionnaire had 15 questions in which 5 questions based on knowledge, 5 based on attitude, 5 questions based on practice were created. The participants were general public aged between 18-50 years. A snowball sampling method was followed for this study. The questionnaires were distributed via electronic media and responses were collected. All the participants were allowed to choose one of the given three to four choices for each item in the questionnaire. 302 responses were assessed. The advantages of online surveys are easy collection of data, cost effective and the disadvantage is repeated answers and incomplete answers. Then, it was assessed whether knowledge, attitude, practice were sufficient for dental erosion and its association with diet. Later it was compared to improve the needs of the same.

Ethical Approval

Ethical permission and approval for the project was obtained from the Institutional Review Board of Saveetha Institute of Medical and Technical Sciences, Chennai, India. (SBA/2019/23/03.)

Eligibility Criteria

General public aged between 18-50 years, Tamilnadu, India

Data Collection

This cross sectional survey was conducted among the general public from August to October of 2019. A self structured questionnaire of having 15 questions was shared online and 302 responses were obtained.

Sample Size

Total number of distributed questionnaires was 315. Out of which 10 were incomplete forms, 3 did not answer and that were excluded from the study. Hence, 302 responses were analysed.

Statistical Analysis

After data entry in the excel sheet, SPSS software was used to analyze the data. The descriptive statistics were used to determine the frequencies and percentage of the responses given by the participants. Correlation analysis was performed to find the association between diet and dental erosion. Chi Square test was performed to determine the association between the knowledge about dental erosion and its correlation with diet.

Results and Discussion

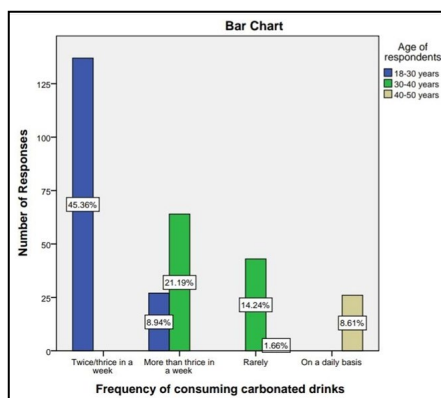
Majority of the general public consume highly acidic beverages causing erosive tooth wear. Lack of awareness of the association between diet and dental erosion was found among the general public. Since, the p-value is significant there is an association between most of the groups and variables in this study.

Majority of the percentage of respondents (45.36%) consume carbonated drinks twice/thrice in a week as represented in graph 1. There is a growing evidence of a considerable increase in consumption of potentially erosive drinks among the youth population. Soft drinks - carbonated and non carbonated drinks could cause damage to the teeth for two reasons such as low pH and high titratable acidity [15, 16].

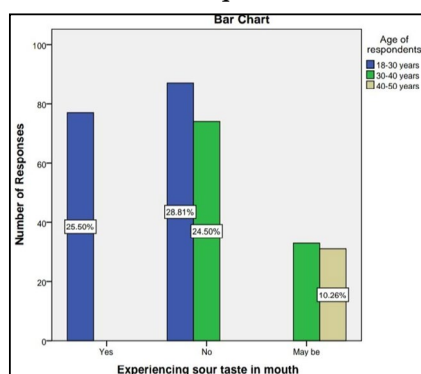
In this study, 30.6% of the respondents did not experience the sour taste in the mouth as represented in graph 2. Majority of the respondents (42.5%) have experienced regurgitation as represented in graph 3 and 34.7% of the respondents consuming acidic beverages have experienced heartburn frequently as represented in graph 4. Approximately 34.5% of the respondents reported that they have heard about dental erosion and 32.1% of the respondents do not know the causes of dental erosion as represented in graph 5,6. This indicates the inadequate knowledge and awareness among the general public regarding the association between diet and dental erosion.

And also the sugars in the drinks are metabolized by plaque microorganisms to generate organic acids that cause demineralization [17, 18]. Erosion is due to the loss of the outermost surface of enamel and occurs when the surface pH falls below 5.5. For instance, the mean pH of soft drinks samples was 2.30, while the

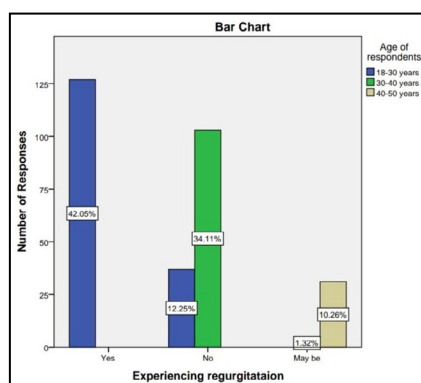
Graph 1. Bar chart showing association between respondents and responses, X axis represents the frequency of consumption of carbonated drinks among the respondents and Y axis the age group of respondents. Majority of the percentage of respondents consume carbonated drinks twice/thrice in a week(Blue color). Chi square test (2.214) was done and association was found to be not statistically significant. Pearson's Chi square P value of 0.21 > 0.05.



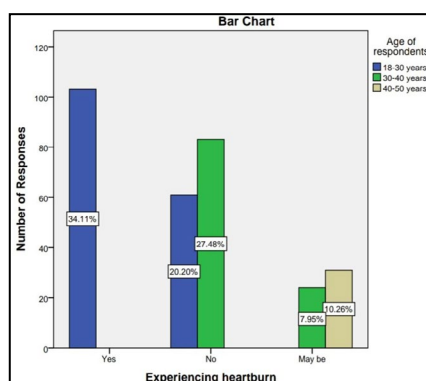
Graph 2. Bar chart showing association between respondents and responses, X axis represents the experience of sour taste in the mouth among the respondents and Y axis the age group of respondents. Majority of the respondents do not experience the sour taste in the mouth (blue color). Chi square test (1.014) was done and association was found to be statistically significant. Pearson's Chi square P value of $0.01 < 0.05$.



Graph 3. Bar chart showing association between respondents and responses, X axis represents the experience of regurgitation in the mouth among the respondents and Y axis the age group of respondents. Majority of the respondents have experienced regurgitation (blue color). Chi square test (2.017) was done and association was found to be statistically significant. Pearson's Chi square P value of $0.02 < 0.05$.



Graph 4. Bar chart showing association between respondents and responses, X axis represents the experience of heartburn among the respondents and Y axis the age group of respondents. Majority of the respondents have experienced heartburn (blue color). Chi square test (3.014) was done and association was found to be statistically significant. Pearson's Chi square P value of $0.03 < 0.05$.



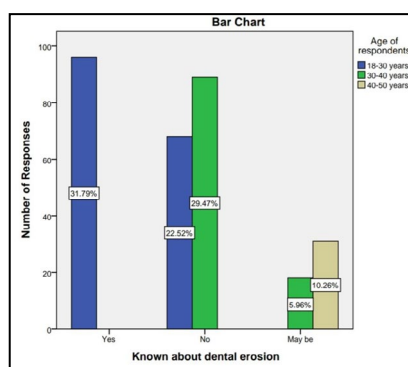
mean calcium and fluoride ion concentration were 0.58 and 0.066 respectively [19, 20]. The low pH as well as the low calcium and fluoride ion concentration indicate the high erosive potential. Not only soft drinks but also the citrus fruits play a major risk factor in dental erosive tooth wear [21, 22].

Chewing vitamin C tablets were significantly associated with the development of tooth wear. Vitamin C (Ascorbic acid) has low pH and high titratable capacity which serves as a risk factor in erosive tooth wear [23, 24]. Based on the origin of the erosion causing acids, a distinction between endogenous and exogenous erosion is made [25]. Intrinsic erosion most commonly affects

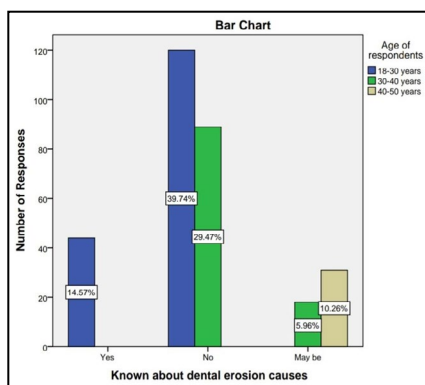
the palatal and occlusal tooth surfaces, While extrinsic erosion is initially localized on the labial surfaces of anterior teeth [26, 27].

Erosion in the initial stage appears as a smooth silky shiny surface, resulting in the concavities of smooth surfaces or cupping of the cusps. The acid exposure leads to the dissolution of inorganic dental hard tissue, which results in a rough surface similar to an etching pattern in conservative and endodontic procedures [28-46]. As a result, the microhardness of the superficial layer and thus the mechanical resistance is reduced [47, 48]. With the further progression, the extensive loss of the tooth substance occurs. Dentin demineralization leads to the exposure of organic matrix

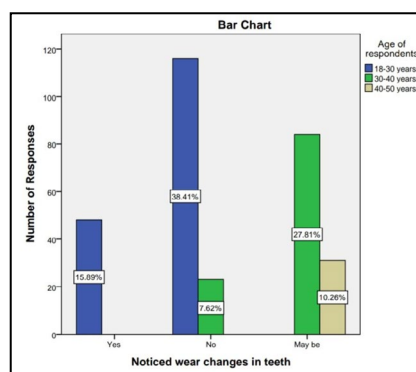
Graph 5. Bar chart showing association between respondents and responses, X axis represents the knowledge regarding dental erosion among the respondents and Y axis the age group of respondents. Majority of the respondents have heard the term dental erosion (blue color). Chi square test (2.024) was done and association was found to be statistically significant. Pearson's Chi square P value of 0.02 < 0.05.



Graph 6. Bar chart showing association between respondents and responses, X axis represents the knowledge regarding the causes of dental erosion among the respondents and Y axis the age group of respondents. Majority of the respondents do not have adequate knowledge regarding the causes of dental erosion (blue color). Chi square test (1.018) was done and association was found to be statistically significant. Pearson's Chi square P value of 0.01 < 0.05.



Graph 7. Bar chart showing association between respondents and responses, X axis represents the wear changes noted by the respondents and Y axis the age group of respondents. Majority of the respondents have not noticed the wear changes in their teeth (blue color). Chi square test (2.029) was done and association was found to be statistically significant. Pearson's Chi square P value of 0.012 < 0.05.



that acts as a diffusion barrier and is capable of further erosion progression [49, 50]. In addition to the type and frequency of acid exposure, modifying host factors determine the extent and progression of erosive defects. These factors include in particular, saliva properties such as flow rate, buffering capacity, pH and composition. Extrinsic acid exposures include the consumption of acidic foods such as soft drinks, citrus fruits, vinegar, wine and acidic drugs such as acetyl salicylic acid, Iron tablets and vitamin supplements [51, 52]. Occupational acid exposures might affect the industrial workers, professional swimmers and wine tasters. The extent of dental hard tissue erosion is determined by the erosivity of erosion causing solution and also the frequency and type

of consumption [53, 54]. Certain drinking habits (drinking in sips, use of straws in direct tooth contact, and intensive rinsing) leads to the prolonged pH drop in the oral cavity compared to the short consumption. Jarvinen et al, 2015 have shown the intake of citrus fruits more than twice daily, the daily drinking of soft drinks and the weekly consumption of vinegar or sport drinks is capable of increasing dental erosive tooth wear significantly [55].

Intrinsic erosion is caused by the acidic gastric fluid coming into contact with the oral cavity. In patients with bulimia nervosa, gastrointestinal reflux disease or alcohol abuse. The prevalence of dental erosion in reflux patients amounts to 17 percent to 68 per-

Table 1. Showing distribution of respondents which were included for the study based on age, gender. Maximum number of respondents were reported in the age group of 20-30 years. Out of 302 responses , 36.4 % were female and 63.5 % were male.

Demographic variables	Categories	No of respondents	Percentage
Gender	Female	110	36.40%
	Male	192	63.50%
Age (years)	18-30 years	164	54.30%
	31-40 years	107	35.40%
	41-50 years	31	10.20%

Table 2. Showing Questionnaire and the Responses.

S.No	Questions	Options	Number of responses	Percentage %
1	How often do you take carbonated drinks?	Twice or thrice a week.	137	44.3
		More than thrice in a week	91	30.9
		On a daily basis	47	10.6
		Rarely	24	16.5
		Never	2	0.5
2	How often do you take non carbonated drinks?	Others	1	0.3
		On a daily Basis	55	19%
		Rarely	53	18.3
		More than thrice in a week	115	39.2
		Twice or thrice in a week	72	23.4
3	How often do you take energy drinks?	Others	3	2.1
		Twice or thrice in a week	96	32
		On a daily basis	46	15.8
		Rarely	64	21
		More than thrice in a week	89	29.6
4	How often do you take citrus fruits?	On a daily basis	132	43.6
		More than thrice in a week	25	8.7
		Rarely	99	33.6
		Twice or thrice in a week	42	14.2
5	Do you eat more sour food?	On a daily basis	124	41.6
		More than thrice in a week	34	18.7
		Rarely	86	23.6
		Twice or thrice in a week	51	15.3
6	Do you take vitamin supplements on a regular basis?	Yes	83	27.8
		No	169	56.5
		Others	47	15.7
7	Do you wake up with a sour taste in your mouth ?	Yes	77	25.8
		No	161	53.8
		Others	64	20.1
8	Do you have regurgitation(backward flow of incompletely digested food from the stomach to mouth)often?	Yes	126	42.3
		No	141	47
		Others	32	10
		Rarely	3	1.7
9	Do you have heartburn (acid indigestion) often?	Yes	103	33.4
		No	144	48.2
		Others	53	17.4
10	Are you active in Water pool sports (swimming)?	Yes	77	25.7
		No	163	54.3
		Others	60	20.1
11	Do you take any beverages (Milk/ Juice) at bedtime?	Yes	115	38.5
		No	139	46.5
		Others	45	15.1
12	Do you ruminate(contents of the stomach are drawn up to the mouth, chewed for a second time and swallowed again)?	Yes	98	32.8
		No	163	54.5
		Others	38	12.7
13	Do you know what dental erosion is?	Yes	96	32.1
		No	157	52.3
		Others	49	15.8
14	Do you know the causes of dental erosion?	Yes	44	13.7
		No	199	66.6
		Others	59	19.7
15	Have you noticed any wear changes in your teeth?	Yes	48	16.2
		No	139	46.3
		Others	115	37.7

Table 3. KAP scores towards the association of dental erosion with the diet.

Variables	Number of subjects	Percentage of subjects
Knowledge	0-3(poor)	161(53.8%)
	3-9(fair)	77(25.8%)
	9-12(good)	62(20.1%)
	Total	302(100%)
Practice	9-15(poor)	144(48.4%)
	15-18(fair)	103(34.4%)
	18-20(good)	53(17.4%)
	Total	302(100%)
Attitude	11-20(poor)	189(66.5%)
	20-30(fair)	59(19.7%)
	30-40(good)	44(13.7%)
	Total	302(100%)

Table 4. Correlation analysis of KAP toward the association of dental erosion with the diet.

Variables	p value
Knowledge	0.03
Attitude	0.02
Practice	0.01

cent. Conversely, 25 percentage to 83 percentage of all patients with erosion suffer from reflux [25, 56].

Furthermore, patients with eating disorders often show a low salivary flow rate as a result of general dehydration or as a side effect of psychotropic drugs, which might further increase the risk of developing erosive lesions [10]. When dietary related erosion is diagnosed, patients should be advised to restrict the consumption of acidic foods and drinks to the meals [5]. Acidic beverages should be consumed, cooled and as fast as possible in order to reduce their erosivity [57, 58].

It was shown that the addition of calcium effervescent tablets to orange juice reduced the erosivity, but did not have a negative impact on the taste [10]. Yoghurt contains quite high concentrations of calcium and phosphate and is therefore non erosive despite its low pH [2]. Staufenbiel et al, 2015 found that erosive lesions are more prevalent in patients with a vegetarian diet than in non-vegetarians [55]. A comparison of erosivity of different acid sources is difficult because not only chemical parameters but also the adhesion to the tooth structure as well as dietary habits such as frequency, quantity, and temperature must be considered. [59, 60].

So, intervention measures should be taken to reduce or prevent dental erosive tooth wear from diet factors. Dental professionals should educate patients about the consequences of frequent soft drink consumption and provide positive suggestions to minimize the risk. Public health professionals should guide the people especially youth and children to limit the intake of acidic beverages. Oral health educators should reinforce the association between dietary factors and associated erosive tooth wear among the general public to create and establish awareness concerning dental erosive tooth wear.

Conclusion

This cross sectional descriptive study shows a majority of the general public are associated with the consumption of potentially erosive drinks. They do not have adequate knowledge about dental erosion and its correlation with diet factors. Hence, establishing awareness among the general public regarding dental erosion and its correlation with diet is mandatory.

Clinical Significance

The prevalence of dental erosion seems to be increasing and dietary components contribute to many enamel defects. Modern diet appears to contain more acidic content which can demineralise enamel, alters the buffering capacity of saliva and plays an aetiological role in many oral disorders.

Limitations

This study was confined among a smaller number of populations and have not focused on the occupation of the respondents.

Future Scope

This study can be conducted in a larger number of populations, The questions can be focused on the occupation of respondents.

Acknowledgement

With Sincere gratitude, we acknowledge the staff members of the department of Conservative Dentistry and Endodontics and Saveetha Dental College and study participants for their extended

support towards the completion of research.

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