Knowledge and Association of Dental Erosion with Age and Gender in Local OPD of Pakistan

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OBJECTIVES: This quantitative study was designed to record the knowledge and association about dental erosion by patients attending OPD of Dow Dental College, Karachi and influences on their choice of acidic drinks resulting in dental health problems.

METHODOLOGY: Dow Dental Patients aged 12-70 years were randomly selected and investigated. A questionnaire was administered to obtain information on knowledge of dietary habits and presence of esophageal related disease. The sample size calculated was 400 patients. Tooth wear was analyzed via visual oral examination by use of mouth mirror. SPSS 20.0 was used for interpretation of collected data. Level of significance and association among different variables was determined by use of Chi square test.

RESULTS: In total 400 participated in the focused group and results suggested that choice of drink and esophageal related disease was found to be associated with dental erosion. Dental knowledge was confused regarding tooth erosion and its association with acidic drinks especially among younger age groups and females.

CONCLUSION: Knowledge of patients (attending dow dental opd) regarding dental erosion and the effect of drinks and esophageal related disease was confused. The factors that influence drink choice appear to change with age and gender.


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INTRODUCTION

Tooth erosion has gained much popularity by researchers in last 20 years(2–3). A variable, but increased occurrence of tooth erosion is reported in populations around the world(4, 5). Modern researches suggest that tooth erosion is an oral health issue having many etiologic factors(2, 9). Thus it is necessary for dentists to identify the possible causes of tooth erosion and also to understand specific host factors in every case. This in turn requires a complete and systematic evaluation of every case by dentist. There is not only a need for dentist, but for the patient to have sound knowledge of dental wear and its associated factors. In this aspect, studies from Brazil and United Kingdom have shown inadequate awareness of dental erosion among its population(7, 8).

Clinical diagnosis of tooth erosion has over the past years been difficult because of the fact that it was not well known among general public(9, 10). Due to this reason patients often seek treatment when condition has progressed and is in its severe form, with common complain of sensitivity(11). Early detection of dental erosion is only possible when general population have adequate knowledge of dental erosion and its causative factors. However, a study conducted in Brazil showed that knowledge regarding tooth erosion among general population is not widely known(9). A study conducted in Belgaum, India showed prevalence of dental erosion among local population to be 22%(12). A study in Karachi, among children of private schools determined prevalence of tooth erosion in different age groups and came to conclusion that it was very much common among younger age groups with most of dental erosion observed in mandibular anterior, without them being aware of it(13). Our study targets patients aged 20 to 70 attending Dow dental Opd, while this study targeted school children.

Thus it is need of the hour to determine knowledge and association of dental erosion with age and gender among local community and promote knowledge-based programmes to make them more aware of dental erosion and its causative factors and methods of reducing and preventing tooth erosion.

METHODOLOGY

Cross sectional study design was used and random type of sampling technique was adopted. Sample size was
calculated by reviewing different literatures \(^{(3,4,5,13,15)}\) and determining number of participants with multi-variant factors (like *intake of acidic drinks, GERD and use of citrus fruits*) found to be associated with dental erosion, with respect to age and Gender. The mean value was then put into the following formula:

\[
\text{Sample size} = Z_{1-a/2}^2 \frac{p(1-p)}{d^2}
\]

Where \(Z_{1-a/2}^2\) is standard normal variant (At 5% type I error) (\(P<0.05\)), it is 1.96 at type I error (\(P<0.01\)) it is 2.58, \(p\) = Expected proportion in population based on previous studies, \(d\)=Absolute precision of error taken as 5%. The calculated size was 420.

The study was conducted in Dow Dental Opd, during Nov-Dec 2015. Personal consent was also acquired from participants. Inclusion criteria included participants above the age of twelve, consisting of both males and females. Exclusion criteria consisted of patients under the age of twelve, having had mental problems or any type of physical disability like Parkinson’s disease etc that might hinder in interview process, patient wearing prosthesis, patient with edentulous mouth, patient with multiple teeth restoration. Collection of data was undertaken via questionnaire, adapted from Al Ashtal et al \(^{(1)}\). Accurate diagnosis of erosion and erosive tooth wear begins with in-depth assessment of risk factors, which in our study include consumption of acidic drinks and underlying esophageal disease like GERD. Gastroesophageal reflux disease was also included along with consumption of drinks, because of the fact that lingual dental erosion is very common in patient with GERD, along with erosion patterns seen when consuming frequent acidic drinks. Visual inspection of tooth surfaces and wear patterns provided direct evidence of dental erosion.

The questionnaire for this study was adopted by review of literature (Awareness and knowledge of dental erosion among Yemeni processonals and students) that focused on university students by asking responders direct questions related to dental erosion such as “I think dental erosion is cause by, bruxism, acidic drinks, forceful tooth brushing etc” and modifications were done according to local culture. Analysis of data was done by using SPSS 20.0. Chi-Square test was used to detect statistically significant association of dental erosion with fizzy, citrus fruits and GERD with respect to age and gender. Permission for undertaken the study was taken by Dean of dentistry of Dow University of Health Sciences.

**RESULTS**

**Distribution of Sample and Respondents**

Out of 420 patients interviewed,400 agreed or were within the inclusion criteria and returned their questionnaire, giving an overall response rate of 95\%(400/420). Five were unable to complete the questionnaire. Respondents comprised of both male and female, having age ranges from 12 to 69 years old. Table 1 demonstrates trend of consumption of citrus fruits among respondents of different age groups. A statistically significant association (\(p=0.047\)) was observed among individuals consuming citrus fruits from different age groups (*daily, 2/3 times, multiple times and once in a month*). Highest number of individuals consumed citrus fruits at least once a month with majority of them from 21 to 40 years old group. It was also observed that trend of intake decreased with increasing age. Least number of respondents consumed citrus fruits on daily basis.

Table 2 demonstrates frequency of participants from different age groups consuming fizzy drinks (carbonated cola etc). A statistically significant association was observed (\(p=0.024\)) among this group. Majority of individuals consumed fizzy drinks at least once in a month, with highest intakes reported in participants from age groups 21-29 years old. A linear pattern was also observed in this result, with number of consumption decreasing with progression in age.
Table 2. Consumption of Fizzy Drinks

<table>
<thead>
<tr>
<th>Consume Fizzy Drinks</th>
<th>Age Range</th>
<th>Total</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td># Daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count#</td>
<td>6#</td>
<td>16#</td>
<td>18#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>1.5%</td>
<td>4.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>2/3 times/week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count#</td>
<td>24#</td>
<td>22#</td>
<td>14#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>6.0%</td>
<td>5.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Multiple times/month</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count#</td>
<td>18#</td>
<td>14#</td>
<td>10#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>4.5%</td>
<td>3.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Once a month</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count#</td>
<td>34#</td>
<td>54#</td>
<td>38#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>8.5%</td>
<td>13.5%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

Table 3. Frequency of GERD

<table>
<thead>
<tr>
<th>Have GERD</th>
<th>Age Range</th>
<th>Total</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td># Yes</td>
<td>18#</td>
<td>16#</td>
<td>22#</td>
</tr>
<tr>
<td>% of Total</td>
<td>4.5%</td>
<td>4.0%</td>
<td>5.5%</td>
</tr>
<tr>
<td>No</td>
<td>64#</td>
<td>90#</td>
<td>58#</td>
</tr>
<tr>
<td>% of Total</td>
<td>16.0%</td>
<td>22.5%</td>
<td>14.5%</td>
</tr>
</tbody>
</table>

Table 4. Consumption of Fizzy Drinks According to Gender

<table>
<thead>
<tr>
<th>Consume Fizzy Drinks</th>
<th>What is Your Gender</th>
<th>What is Your Gender</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>Count#</td>
<td>20#</td>
<td>32#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>5.0%</td>
<td>8.0%</td>
<td>13.0%</td>
</tr>
<tr>
<td>2/3 times/week</td>
<td>Count#</td>
<td>30#</td>
<td>54#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>7.5%</td>
<td>13.5%</td>
<td>21.0%</td>
</tr>
<tr>
<td>Multiple times/month</td>
<td>Count#</td>
<td>12#</td>
<td>46#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>3.0%</td>
<td>11.5%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Once a month</td>
<td>Count#</td>
<td>96#</td>
<td>110#</td>
</tr>
<tr>
<td>% of Total#</td>
<td>24.0%</td>
<td>27.5%</td>
<td>51.5%</td>
</tr>
</tbody>
</table>

Table 3 demonstrates participants having GERD from different age groups. A highly significant value P=0.004 was observed among individuals in this group. Out of 400 participants 26% responded of having GERD, with most of them from 40 to 50 years old age groups. Out of 12 elderly respondents (60-69) only two of them reported of having GERD.

Table 4 demonstrates participants consuming fizzy drinks with respect to gender. A correlation was observed (P=0.004) in this group with increasing number of participants consuming fizzy drinks at least once in a month, with frequency of female drinkers being more than males. Only 3% of males reported to have consumed fizzy drinks multiple times in a week.

Table 5 demonstrates Frequency of consumption of citrus fruits with respect to gender. Out of 400 participants 34.5% females and 22% males reported to have at least consumed citrus fruits once a month, making it the highest number of
all other frequency intakes. Least number of males (only 3.5%) reported of consuming citrus fruits multiple times in a month.

Table 6 demonstrates participants having GERD with respect to their Gender. Number of females (16%) reported of having GERD was more than males (10.0%). This number was reported to be more with respect to age group also. During visual examination it was observed that participants with increased consumption of carbonated and acidic drinks had dental erosion on lingual aspect of their anterior teeth, with increase in severity as number of intakes increased.

DISCUSSION

Our study has shown knowledge about association of dental erosion with causative factors such as citrus, fizzy drinks and GERD to be more in females and young individuals, it is still inadequate when compared with other similar studies in similar settings. Gastro esophageal reflux has most of the time been associated with dental erosion as a result of regurgitation of stomach acid.

The study has revealed that although participants who were consuming frequently acidic drinks and those who had GERD demonstrated signs of dental erosion, but they seem to be oblivion regarding any association of their current dietary habits and gastric disease with dental erosion.

Fizzy and cola drinks have many oral health related issues like dental erosion and caries. Most common source of acid present is in fizzy drinks such as cola. Comparing effect of oral health problems, tooth erosion has a strong association with consumption of fizzy drinks, when compared with dental caries. Erosive capabilities in fizzy drinks are represented by degree of PH and its buffering capacities. Researches have determined PH values of some known fizzy drinks, with respect to their buffering capabilities, such as Coca Cola® having ph. of 2.52, Pepsi® 2.53, Coke Zero® 3.18, Diet Pepsi® 3.03, Mountain Dew® 3.22 and 7UP® 3.20. These values are alarming due to the fact that Enamel dissolves below critical Ph of 5.5. Interestingly carbonated drinks have low PH than fresh fruit juices. Order of buffer is in the order of citrus drinks > fruit based carbonated drinks > Carbonated drinks (Non fruit based). Carbonated drinks have shown to reduce surface hardness of micro filled composites, dentin and Enamel. Further studies have demonstrated that tooth erosion has strong association with methods of drinking, which current study have not taken into consideration and can be evaluated in further studies.

Holding carbonated drinks in oral cavity for long period have shown to produce a drop in PH. Depth of surface affected by dental erosion is also dependent on increase in flow of consumed acidic drink within the oral cavity. The
effect becomes much more pronounced, when temperature of acid becomes higher, as a result of temperature of oral cavity.\(^{20}\)

Reports from England and China have demonstrated that awareness of dental erosion among general population is inadequate. It was further revealed that dental erosion was not very well known in the community.\(^{8, 21, 22}\) Epidemiological studies in the last decade in Britain and other parts of the world have elucidated prevalence of tooth erosion. Cross sectional data from Britain demonstrated prevalence of tooth erosion to increase in different age cohorts in young individuals with passage of time.\(^{23, 24}\) Our study also revealed increased consumption of fizzy and citrus fruits resulting in dental erosion among younger age groups. A study among 1,149 Leicestershire students found association of dental erosion with intake of fizzy and citrus drinks among individuals aged 12-25 years old.\(^{25}\) In studies by S Kumar have showed definite evidence of dental erosion to be associated with younger age (11-14 yrs.) group.\(^{12}\) This can be explained as a result of increased intake of fizzy (carbonated and citrus drinks) in younger population.

In 2008, a systematic review by Pace et al analyzed seventeen studies including case-control and observational, demonstrating a strong association between tooth erosion and GERD. Median of incidence for tooth erosion in patients having GERD was around 24% and median prevalence in adults having tooth erosion came out to be 32.5% and in children it was 17%.\(^{26}\) In 2011, Wild et al\(^{27}\) in his report demonstrated a cross sectional study consisting of 59 children in age range of 9-17 years with symptoms of GERD and 20 asymptomatic children being in control group.\(^{27}\)

Firouzei et al\(^{28}\), in his study demonstrated tooth erosion and GERD having strong association. Number of cases in dental erosion increased with progression of age, while this association was not found to be strongly associated in young individuals.

This confines with our study, with individuals reported of having GERD with visible visual dental erosion constituting the older age group (40-60yrs). The reason behind GERD being commonly reported among older age group, has to do with increase gastro problems, indigestion and lack of exercise leading to GERD.

A study in Chennai India, reported that out of 400 individuals, majority of females reported to have dental erosion as a result of intakes of carbonated drinks.\(^{29}\) This is in accordance with our study which also demonstrated high number of females to be consuming fizzy drinks and citrus fruits, and had dental erosion upon visual inspection without presence of any other erosion related symptoms.

A study at Liaquat University of Health Sciences reported dental erosion to be more prevalent in males then in females.\(^{27}\)

**CONCLUSION**

Our study has demonstrated knowledge and association of dental erosion to citrus fruits, fizzy drinks and GERD with age and gender. We have shown increase consumption of these drinks in females and younger age groups. Increase in knowledge regarding association of dental erosion with intake of fizzy, citrus fruits and gastroesophageal reflux syndrome among. For awareness of effects of acidic drinks and GERD on teeth among people of Pakistan, different strategies have to be adopted. These include knowledge base programmes by advertisements, through social media, billboards and outreach programmes especially in Rural areas of Pakistan.

**AUTHORS CONTRIBUTIONS**

Dr. Hasan Baber: Conceived the idea, collection of Data, Interpretation of Data on SPSS

Dr Zia Abbas: Writing of discussion and conclusion

Dr Shahida Maqsood: Writing of Introduction, proof reading and correcting any grammatical mistakes

**DISCLOSURE**

Declared none.

**REFERENCES**


[13] Najmi N, Bugti AA, Nadeem M, Ayaz H, Tanwir F, Shafiq F. Prevalence and predictors of dental erosion in school children of age and gender. We have shown increase consumption of these drinks in females and younger age groups. Increase in knowledge regarding association of dental erosion with intake of fizzy, citrus fruits and gastroesophageal reflux syndrome among. For awareness of effects of acidic drinks and GERD on teeth among people of Pakistan, different strategies have to be adopted. These include knowledge base programmes by advertisements, through social media, billboards and outreach programmes especially in Rural areas of Pakistan.

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