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Tooth sensitivity experience among residential university students

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Abstract: *Objectives:* The aim of this study was to assess the experience of residential University students about 'sensitive teeth'. *Subject and methods:* Self-administered questionnaires were given randomly to students in all the residential hostels located in the University campus. Data on presence of sensitive teeth, initiating stimulus and duration of each episode of discomfort were elicited. History of common aetiological factors of tooth sensitivity was also taken. *Results:* One thousand and nineteen responses (650 males; 369 females) were analysed in this study. Approximately 697 (68.4%) volunteers claimed to have sensitive teeth. Majority described their discomfort as sharp pain, cold as the initiating stimulus and drinking was mostly interfered with. Tooth sensitivity was found to be common among hard toothbrush users. Multiple regression analysis showed that hard toothbrush had a significant association with tooth sensitivity. Other common aetiological factors, such as history of gastric acid reflux, vomiting, soft drinks and the use of vitamin C were found to have a weak association with tooth sensitivity. *Conclusion:* Prevalence of tooth sensitivity was 68.4%. Presence of tooth sensitivity among these students was associated more with history of hard toothbrush use contrary to widely held belief that erosive agents were mostly responsible. Future studies are needed to provide more epidemiological data on tooth brushing and tooth sensitivity.

Key words: abrasion; tooth sensitivity; toothbrush

Introduction

Tooth sensitivity has been defined as transient pain arising from exposed dentine typically in response to chemical, ther-

mal, tactile or osmotic stimuli that cannot be explained as arising from any other form of dental defect or pathology (1).

Hydrodynamic theory (2, 3) is the most widely accepted theory to explain the sensitivity of dentine. It postulates that most pain-evoking stimuli increase the outward flow of fluid in the tubules. This causes a pressure change across the dentine, which activates the A-δ intradental nerves at the pulp–dentine border or within the dentinal tubules. The stimulation is thought to occur via a mechanoreceptor response that distorts the pulp nerves. Stimuli such as cold which cause fluid flow away from the pulp produce more rapid and greater pulp nerve response than those, such as heat, which cause an inward flow. This explains the rapid and severe response to cold stimuli compared to the slow dull response to heat (4).

The chief symptom of dentinal hypersensitivity is pain characterized by rapid onset, sharpness and short duration. Occasionally, it may persist for a variable time as a dull or vague sensation in the affected tooth after removal of the stimulus. At times, pulpal inflammation complicates the symptomatology; dentine hypersensitivity differs from pain arising in the pulp caused by inflammation. Patients can readily locate the source of discomfort or pain when a stimulus is applied to a hypersensitive tooth. On the other hand, pulpal pain is lasting (sometimes for many hours), intermittent and throbbing. It is usually very difficult to locate (5).

Dentine hypersensitivity affects eating, drinking and breathing. Increased hypersensitivity hinders the ability to control dental plaque effectively and can therefore compromise oral health. Severe hypersensitivity may even result in emotional changes that alter lifestyle (5).

Sensitive teeth have been said to affect more than 40% of the global population (6). Hotz *et al.* (7) suggested that 80% of the population will suffer from the symptoms of dentine exposure at some time during their life and also estimated that dentine hypersensitivity affects 40 million people in the United States at one time or another (8).

Dababneh *et al.* (9), in their review of dentine hypersensitivity, reported prevalence data ranging from 8.0% to 57.0%. The author reported a prevalence of 1.34% among hospitals patients in Nigeria in 2007 (10).

In general, a slightly higher incidence of dentine hypersensitivity is reported in females (11–15), which was said to reflect their overall health care and better oral hygiene awareness (16). Reported studies among periodontal patients suggest figures in the order of 72.0–98.0% (17, 18).

Great variation in the prevalence of dentine hypersensitivity has been attributed to how researchers define 'hypersensitive'. While some use a passive approach, relying on patients complain, others employ active test involving mechanical stimulating devices and temperature variations (19).

The prevalence of dentine hypersensitivity is likely to rise in the future as more teeth are being retained into old age, because of increasing emphasis on preventive dentistry (20).

Furthermore, it has been opined that following the decline of dental caries, the management of other painful dental problems, such as dentine hypersensitivity, seems to have stepped forward (21). It has been explained by the increasing prevalence of tooth surface loss with accompanying sensitivity of teeth not only in the middle-aged and the elderly but also in the younger age groups. The increased prominence of tooth surface in this group has been attributed to the changing lifestyles and social pressures (22).

It was therefore the aim of this study to assess and afterwards provide information on the experience of residential students of Obafemi Awolowo University, Ile-Ife, Nigeria about 'sensitive teeth'. Graham *et al.* (6) have acknowledged that this is the most easily understandable term suitable for this kind of survey.

Obafemi Awolowo University, Ile-Ife is located in the southwestern part of Nigeria, and provides residence for about 9000 students in the hostels located inside the campus.

Subjects and methods

The volunteers were recruited through a purposive sampling technique. Self-administered questionnaires were given randomly to students in all the residential hostels located in the University campus.

The questions asked were based (with few modifications) on the questionnaire used by Flynn *et al.* (12) to investigate the incidence of 'hypersensitive' teeth in the West of Scotland. The volunteers were asked whether they thought that they had 'sensitive' teeth; positive respondents to this question were requested to indicate the initiating stimulus of the discomfort and how long the discomfort normally lasted. Data on history of medical conditions associated with tooth surface loss and vomiting were elicited. Type of toothbrush and frequency of use of soft drinks and vitamin C were also assessed.

The questionnaires were retrieved immediately after completion for analysis of their responses. Statistical analysis was performed using SPSS statistical software version 11.0 (SPSS Inc., Chicago, Illinois, USA) for windows. Frequencies and proportions were calculated. Associations between discreet variables were tested by chi square. In all cases, a P-value < 0.05 was taken as significant.

Results

One thousand and thirty-five volunteers participated in the study, but only 1019 questionnaires were adequate for interpretation. There were 650 (63.8%) males and 369 (36.2%) females; age of the participants ranged from 14 to 41 years with a majority of the respondents aged 20 years.

A total of 697 (68.4%) volunteers claimed to have sensitive teeth; males: 469 (67.29%); females: 228 (32.71%). Three hundred and thirty students (47.3%) expressed tooth sensitivity as sharp pain, 187 (26.8%) as dull, while 148 (21.2%) as throbbing; 311 (44.6%) participants described the frequency of tooth sensitivity as occasional; rare in 244 (35%) while 111 (15%) said it occurred often.

Cold stimulus was indicated by 384 (55.1%) respondents as the initiating stimulus; air-stimulus in 114 (16.4%), while the least mentioned stimulus was hot, 52 (7.5%) participants. The results also showed that drinking (40%) was the most mentioned oral habit affected by sensitivity, followed by eating (36.3%) and tooth brushing (34.4%).

Medium-bristled toothbrushes were mostly used by the respondents, but tooth sensitivity was indicated predominantly by hard toothbrush users Fig. 1. History of vomiting was reported by about 257 (25.2%) volunteers; 605 (59.45) said that they never had history of vomiting, while 157 (15.4%) gave no response. Tooth sensitivity was indicated by 82.1% and 77.1% of the respondents who reported history of vomiting and no vomiting respectively.

History of gastric reflux was reported by126 (12.4%) respondents, while 684 (67.1%) indicated no history. A 78.6% of the respondents with history of gastric reflux had tooth sensitivity, while 78.7% of respondents with no history of gastric reflux had tooth sensitivity.

Table 1 shows the use of erosive agents and tooth sensitivity. Four hundred and eighty-four respondents claimed to drink soft drinks often, 357 (35%) occasionally and 112 (11%) rarely, while 277 (27.2%) used vitamin C often, 426 occasionally and 211 (20.7%) rarely. A 72.5% of the respondents reported that use soft drinks often had tooth sensitivity; 65.5% occasionally and 59.8% rarely, while 73.6% of respondents who used vitamin C often had tooth sensitivity, 59.5% occasionally and 67.5% rarely.

Multiple regression analysis showed that hard toothbrush had a significant association with tooth sensitivity ($P = 0.00$). Other common aetiological factors such as history of gastric acid reflux, vomiting, soft drinks and the use of vitamin C

Table 1. **Erosive agents and tooth sensitivity**

	Number of respondents $n = 1019$	Respondents with tooth sensitivity $n = 697$
Soft drinks		
Often	484 (47.5)	351 (72.5)
Occasional	357 (35)	234 (65.5)
Rare	112 (11)	67 (59.8)
No response	66 (6.5)	45 (68.2)
Chewable vitamin C		
Often	277 (27.2)	204 (73.6)
Occasional	426 (41.8)	296 (59.5)
Rare	211 (20.7)	126 (59.7)
No response	105 (10.3)	71 (67.6)

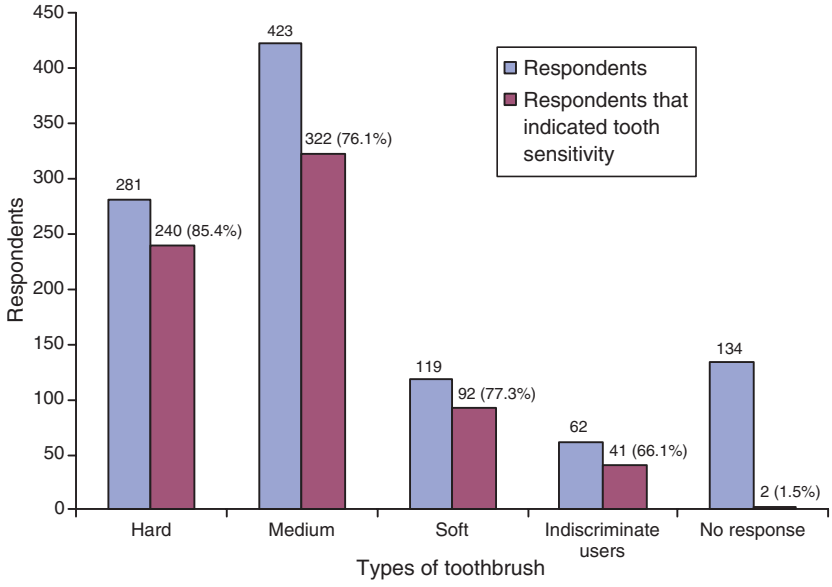

Fig. 1. History of use of toothbrushes and sensitivity.

Table 2. **Multiple regression of aetiological factors (predictors) against the presence of tooth sensitivity among the students**

Predictors	Coefficient	SE	Sig.	95% CI
History of vomiting	−0.217	0.209	0.299	0.534–1.213
Gastric acid reflux	0.118	0.253	0.639	0.686–1.847
Chewable vitamin C	−0.084	0.099	0.397	0.758–1.116
Soft drinks	0.130	0.211	0.539	0.753–1.722
Hard toothbrush	1.115	0.357	0.002	1.514–6.140
Medium toothbrush	0.317	0.326	0.331	0.725–2.602
Soft toothbrush	0.323	0.379	0.394	0.657–2.905

were found to have a weak association with tooth sensitivity Table 2.

Discussion

Dentine hypersensitivity was described as an enigma in 1982 because it was frequently encountered; yet, many aspects of it were poorly understood by dental professionals (23). Over the last decade, much has been learned through research on the subject of dentine hypersensitivity. This study provides information on tooth sensitivity among university students.

The prevalence of dentine hypersensitivity among the volunteers who participated in this study was 68.4%, which was quite similar to that in the report of Rees *et al.* (24). Although diverse prevalence figures of dentine hypersensitivity in different populations have been reported, sometimes as low as 1%, this has been explained by much of procedural differences in diagnosing tooth sensitivity such as the use of questionnaires, intra oral testing and mouth rinsing with cold water.

The prevalence of tooth sensitivity was slightly higher in males than in females, which was similar to the finding of the authors in a previous study among hospital patients suffering from dentine hypersensitivity (10).

A majority of the volunteers described tooth sensitivity as sharp pain that comes occasionally. This quite agrees with the general definition, characteristics and previous reports on dentine hypersensitivity where the chief symptom has been described as pain characterized by rapid onset, sharpness and of short duration. This painful response usually results from stimuli, such as toothbrushing, digital probing, hot or cold drinks/food as well as exposure to air (11, 25, 26).

Cold was the most mentioned stimulus by the respondents, which is consistent with the recommendations on the diagnosis of dentine hypersensitivity by the Canadian Advisory Board on Dentine Hypersensitivity (27). It has been explained that cold stimuli which cause fluid to flow away from the pulp produce more rapid and greater pulp nerve responses than stimuli such as heat, which causes inward flow. Heat expands the fluid within the tubules, causing it to flow towards the pulp, whereas cold causes the fluid to contract, producing an outward flow. Researchers (28, 29) have found that outward flow of fluid produces a much stronger nerve response than inward movement. This certainly would explain the rapid and severe response of patients to cold stimuli compared with the slow and dull response to heat.

Eating and brushing were indicated as less interfered with than drinking. This is similar to the findings of Taani and Awartani (30) that 64% of the dentine hypersensitivity in their patients did not interfere with normal functions of eating and brushing. This has been explained by the fact that drinking water gains access to relatively more sites in the mouth (10).

Toothbrush characteristics is one of the major variables in hard and soft tissue damage (31); hard bristled toothbrush users were observed to have the most tooth sensitivity than medium, soft and indiscriminate users. Hard toothbrushes have been implicated in gingival recession and abrasion as is dentin hypersensitivity (32–34).

Findings from this study show a relationship (on observation) between respondents who have history of vomiting, gastric acid reflux, use of chewable vitamin C and soft drinks with the presence of dentine hypersensitivity. These variables have been mentioned in the discussion about the aetiological factors and diagnosis of dentine hypersensitivity: vomiting (35, 36), gastric acid reflux (37, 38), vitamin C (39, 40) and soft drinks (41, 42).

Regression analysis showed that the presence of dentine hypersensitivity in these respondents was influenced only by the use of hard toothbrush. This finding brings to the fore the fact that tooth sensitivity as a result of erosive agents like soft drinks and vitamin C, medical conditions such as vomiting and gastric reflux are not significant health issues among these students other than the consequences of abrasive wear of hard toothbrush use.

Toothbrush abrasion was implicated as a cause of non-carious cervical lesion at the beginning of the 20th century and was demonstrated *in vitro* by Manly (43).

As tooth brushing appears to be an aetiological factor in dentine hypersensitivity, instruction in proper brushing technique, use of excessive force and hard toothbrushes should be avoided to prevent further loss of dentine and the resulting hypersensitivity (9). Drisko (44) also suggested that patient with tooth sensitivity should avoid hard bristled brushes without end rounded bristles.

In recent years, much attention has been focused on erosion as the principal aetiological factor in relation to tooth wear (45–47). In contrast, there is paucity of data in the literature

regarding the epidemiology of dental abrasion vis-à-vis the contribution of toothbrush characteristics in tooth wear and dentine hypersensitivity. There is a need for more direct clinical and scientific evidence for these associations which are the subject matter for the future research of authors.

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