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Awareness and prevalence of stress induced oral ulcers among clinical medical and dental students in university of Benin: a cross-sectional study

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Author contributions
All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Mercy Okoh and Christopher Oluchi Nwokolo. The first draft of the manuscript was written by Christopher Oluchi Nwokolo. Critical review and editing of the final manuscript was done by Mercy Okoh. All authors read and approved the final manuscript.

Competing interests
The authors declare no conflicts of interest.

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Abbreviations
WHO, World Health Organization; PSS, perceived stress scale.

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Abstract
Background: Awareness of clinical medical and dental students towards stress induced oral ulcer, to determine the most prevalent stress induced oral ulcers among the study population, and the relationship between perceived stress level and prevalence of stress induced oral ulcer. **Methods:** A descriptive cross-sectional study, involving clinical Medical and Dental students in College of Medical Sciences, University of Benin. Participants were in their 400, 500, and 600 levels respectively with a sample size of 226 calculated using the Cochran formula for sample size determination. Data were collected using self-administered questionnaire. **Results:** Two hundred and twenty-six respondents were interviewed in this survey. The age of the participants varied from 21-30 years, with mean age of 25.5%. Majority of the respondents (66.4%) were aware of stress induced oral ulcer. The prevalence of stress induced oral ulcer in this study was 12.8% with recurrent aphthous ulcers accounting for a prevalence of 35.5% of all stress induced oral ulcers. **Conclusion:** Findings from this study shows about 66.4% of clinical Medical and Dental students were aware of stress induced oral ulcer. The prevalence of stress induced oral ulcer in this study was 12.8% and was seen more in males than females, with recurrent aphthous ulcer been the most prevalent stress induced oral ulcer among the study population with a prevalence of about 35.5%.

Keywords: stress-induced; oral-ulcer; awareness; prevalence; clinical students

Background

According to World Health Organization (WHO), stress-related problems will be one of the foremost causes of disability by the end of Year 2020 [1]. Stress can also lead to the incidence of a number of systemic diseases such as diabetes, hypertension and autoimmune diseases etc. Students are being affected by a variety of stressors, such as the strain of academic curriculum, an undecided future and hindrances of incorporating into the system. Medical and dental students, are known to go through extremely intense stress. This may serve as a triggering factor for oral ulcers [2].

The body responses to stress involves a chain reaction of hormonal and physiological changes. When the body is stressed, a trigger is sent to the hypothalamus and this induces the hypothalamus to further send signals to the anterior pituitary gland and adrenal medulla, thus inducing the production of several hormones including norepinephrine, adrenaline, cortisol which have several effects on the human body, and can over a prolonged period cause a suppression of the host immunity leading to conditions such as hypertension, diabetes and some oral ulcers such as recurrent aphthous ulcers and herpes labialis in which stress and high levels of cortisol have been implicated in their aethiopathogenesis by increasing the number of leukocytes at the sites of inflammation thereby increasing the likelihood of oral ulcers [3-6]. These ulcers can range from mild to very severe form in the oral cavity, which can be very painful and can prevent oral and masticatory functions thereby affecting the quality of life of people suffering from it. It is a known fact that oral health is essential to general health, and a healthy mouth not only enables nutrition but also enhances social interactions, promotes self-esteem, and feeling of wellbeing [7].

Stress, depression and anxiety have been reported to be the most common cause of oral ulcers among health care students, with a demonstrated statistically significant association between stressful life events and the onset of recurrent aphthous stomatitis episodes [8, 9]. This finding is corroborated by another study where significant association was shown to exist between stress and oral ulcers in a study group of medical students in India assessed using the perceived stress score to assess their level of stress [9]. Estimated odds of developing oral ulcers was found at to be three times more with a stressful life event. It was also opined in this study that mental stressors were more likely to play etiologic roles in oral ulcers than physical stressors [10].

Previous reports [9, 12-16] have linked stress with the following oral ulcerative conditions: oral lichen planus; which is a chronic inflammatory condition characterized by bilateral white striations or plaques on the buccal mucosa, tongue and gingiva [9]. Other ulcers associated with stress include herpes labialis; acute necrotizing ulcerative gingivitis, recurrent aphthous ulcer, recurrent oral erythema multiforme, factitious ulceration (self-inflicted oral lesions) and mucous membrane pemphigoid [12-16].

Although stress is a phenomenon known to all. However, most people are unaware of the relationship with oral ulcers. Therefore, this study aims to know the awareness of clinical medical and dental students towards stress induced oral ulcer; to determine the most prevalent stress induced oral ulcers among the study population, and the relationship between perceived stress level and prevalence of stress induced oral ulcer. This will enhance the management of stress induced oral ulcers as well as improve treatment outcomes and contribute to the already existing body of knowledge.

Methods

This was a descriptive cross-sectional study conducted among clinical medical and dental students in the College of Medical Sciences, University of Benin, Benin City, Nigeria. The study population involved all students in clinical class- 400 level, 500 level, and 600 level dental and medical students in the University of Benin, within the period of May 2021 and June 2021. Stratified sampling technique was used in selecting the respondents from each level. Clinical students who declined voluntarily not to partake in the study were excluded from the study.

All methods were carried out in accordance with relevant guidelines and regulations, and informed consent was obtained from all subjects. Ethical approval to perform this study was obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital with protocol number: ADM/E 22/A/VOL. VII/14831103.

Method and tools of collecting data

Data were collected using self-administered questionnaire. The purpose of the questionnaire was explained to the principal investigator and its anonymous nature was emphasized. The questionnaire comprises structured open and closed ended questions. The questionnaire had four sections which covered the set objectives for the study: (a) Socio-demographic data; which consists of the clinical students' gender, age, levels, course of study whether dentistry or medicine, and place of residence; (b) the second section was based on assessment of the participants awareness of stress induced oral ulcers, and knowledge of the possible predisposing factors to stress induced oral ulcers; (c) the third section used the modified perceived stress scale (PSS-10) in assessing the level of the participant perceived stress. The Perceived Stress Scale (PSS) is a globally used and self-report scale measuring perceived stress [17]. Each item is rated on a 5-point Likert-type scale, ranging from 0 = 'never' to 4 = 'very often'; (d) the fourth section assessed presence of stress induced oral ulcers, the types and site of stress induced oral ulcers among the participants.

Sample size determination

The sample size was estimated using Cochran formula for sample size determination

$n = Z^2pq/d^2$

Where n = minimum sample size

Z = standard normal deviate

p = prevalence rate in a study conducted by Charanya and Vasugi [18].

q = 1 - P (1 - 0.102 = 0.898)

d = degree of precision set at 0.05 confidence interval

Z = 1.96

p = 0.102

q = 0.898

d = 0.05

$n = (1.962 \times 0.102 \times 0.898)/0.052$

$n = 140.75$ which is the minimum calculated sample size

Taking into cognizance a design effect of 1.5 for stratified sampling technique and a non-response rate (attrition) of 10% of the minimum calculated sample size, the final calculated minimum sample size = 140.75 × 1.5 + (14.075) = 225.2

Thus, n = 225 which is the final calculated sample size.

The data collected were tabulated and analyzed using the Statistical Package for the Social Sciences for Windows (version 25, Chicago, IL, USA) statistical software package. Statistical analysis carried out was descriptive analysis in the form of frequencies, percentages, cross-tabulations, mean and standard deviation. Chi-square was used to determine the association between variables with p-value set ≤ 0.05.

Results

Two hundred and twenty-six, respondents were interviewed in this survey. There was a male gender preponderance in this study (62%). Majority (93%) of the population fell within the age range of 21-30 years. Majority of the respondents were medical students (69.5%) with the other proportion (30.5%) from the dental classes. 82(36.3%), 76(33.6%) and 68(30.1%) were respondents drawn from 400, 500 and 600 level classes respectively. About 125(55.3%) resided within the school residence and 101(44.7%) resided outside the school residence (Table 1).

Figure 1 shows the awareness of the respondents to stress induced

oral ulcers. 150(66.4%) were aware and 76(33.6%) were not aware of stress induced oral ulcers. Of the 150(66.4%) respondents that have awareness, 133(88.7%) had good knowledge, while 17(11.3%) of those aware had poor knowledge. In response to knowledge of factors associated with the development of oral stress ulcers among the respondents, 97(35.0%) responded to anxiety as cause of stress induced oral ulcers, 13(5.8%) responded to brushing twice daily, 93(41.2%) responded to psychological stress, 51(22.6%) responded to local irritation from dental treatment, 9(4.0%) responded to food eating, and 114(50.4%) responded to emotional stress (Table 2).

Concerning the modified perceived stress scale, 118(52.2%) responded sometimes to being upset at unexpected life events, 39(17.3%) responded very often to inability to control the important things in their lives. 64(28.3%) responded very often to feeling nervous or stressed. About 87(38.5%) responded fairly often to feeling of confidence about ability to handle personal problems, resulting to 49.5% attesting to a high stress level and 50.5% attesting to a low stress level among the respondents (Table 3).

Table 1 Socio-demographic characteristics of respondents

Socio-demographic variables	Frequency(n = 226)	Percent (%)
Gender		
Male	140	61.9
Female	86	38.1
Age		
≤ 20	5	2.2
21-25	134	59.3
26-30	76	33.6
31-35	9	3.9
36-40	1	0.44
41-45	1	0.44
Course of Study		
Medicine	157	69.5
Dentistry	69	30.5
Level of Respondent		
400 level	82	36.3
500 level	76	33.6
600 level	68	30.1
Place of Residence		
School	125	55.3
Outside school	101	44.7

Table 2 Knowledge of predisposing factors to stress induced oral ulcers among respondents

Variable	Frequency (n = 226)	Percent (%)
Anxiety	97	35.0
Brushing less than three times daily	13	5.8
Local irritation from dental treatment	51	22.6
Emotional stress	114	50.4
Eating food	9	4.0
Psychological stress	51	22.6

Figure 2 shows the prevalence of stress induced oral ulcers. Twenty-nine (12.8%) respondents had the presence of a stress-induced oral ulcer, 197(87.2%) did not have stress-induced oral ulcers. The following were the types of stress induced oral ulcers among the respondents: Eleven (35.5%) had recurrent aphthous ulcer, 10(32.3%) had factitious ulcers, 8(25.8%) had herpes labialis, 1(3.2%) had both erythema multiforme and oral lichen planus (Table 4).

Concerning the relationship between stress level and prevalence of oral ulcers, 12(10.7%) who had high level of perceived stress had the presence of a stress induced oral ulcers, 17(14.9%) who had low level of perceived stress had stress induced oral ulcers. Ninety-seven (85.1%) of those who had low perceived stress level did not have oral ulcers, and 100(89.3%) of those who perceived high stress level did not have an oral ulcer. The relationship between perceived stress level and prevalence of stress induced oral ulcer was not significant (p = 0.345) (Table 5). Most of the ulcers were located on the lips (42.4%) and gingival (24.2%) (Table 6).

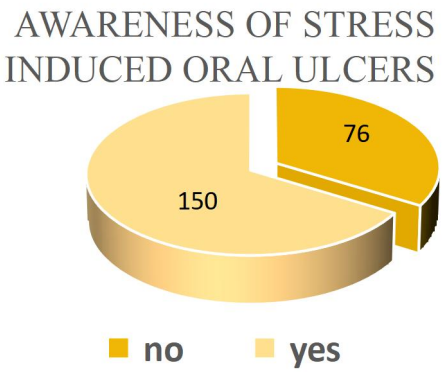


Figure 1 Awareness of stress induced oral ulcers

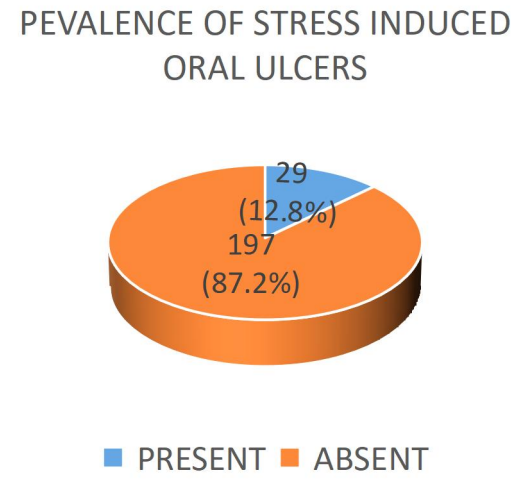


Figure 2 Prevalence of stress induced oral ulcers

Table 3 Modified perceived stress scale

Variables	Never	Almost never	Sometimes	fairly often	very often
Upset due to unexpected happening	8(3.5%)	14(6.2%)	118(52.2%)	54(23.9%)	32(14.2%)
Feeling of inability to control the important things in your life	9(4.0%)	24(10.6%)	81(35.8%)	73(32.3%)	39(17.3%)
Feeling nervous or stressed	5(2.2%)	8(3.5%)	85(37.6%)	64(28.3%)	64(28.3%)
Feeling of confidence about ability to handle personal problems	3(1.3%)	9(4.0%)	81(35.8%)	87(38.5%)	46(20.4%)
Feeling of things going your way	3(1.3%)	7(3.1%)	87(38.5%)	87(38.5%)	42(18.6%)
Feeling of not being able to cope with all the things to be done	2(0.9%)	34(15.0%)	82(36.3%)	74(32.7%)	30(13.3%)
Ability to control irritations in your life	2(0.9%)	11(4.9%)	101(44.7%)	67(29.6%)	45(19.9%)
Feeling on top of things	6(2.7%)	8(3.5%)	86(38.1%)	85(37.6%)	45(19.9%)
Anger due to things outside your control	3(1.3%)	14(6.2%)	89(39.4%)	78(34.5%)	42(18.6%)
Feeling of overwhelming difficulties	16(7.1%)	16(7.1%)	92(40.7%)	53(23.5%)	49(21.7%)

Table 4 Type of stress induced oral ulcer

Variable	Frequency (n = 31)	Percent
Recurrent aphthous ulcer	11	35.5%
Factitious or self-inflicted oral ulcers	10	32.3%
Herpes Labialis or cold sore	8	25.8%
Erythema Multiforme	1	3.2%
Oral Lichen Planus	1	3.2%

Table 5 Perceived stress level by prevalence

Perceived Stress Level	Prevalence of Stress Induced Oral Ulcers(n = 226)				p value
	No		Yes		
	Freq.	Percent	Freq.	Percent	
Low	97	85.1	17	14.9	0.345
High	100	89.3	12	10.7	

Table 6 Location of stress-induced oral ulcers

Variable	Frequency (n = 33)	Percent
Lips	14	42.4%
Gingiva	8	24.2%
Cheek	5	15.2%
Tongue	5	15.2%
Soft palate	1	3.0%
Hard Palate	0	0.0%

Discussion

This study was carried out amongst the clinical medical and dental students of the University of Benin, to determine the awareness of clinical medical and dental students towards stress induced oral ulcer, the most prevalent stress induced oral ulcers among the study population, and the relationship between perceived stress level and prevalence of stress induced oral ulcer. On awareness of stress induced oral ulcers, about two-third (66.4%) of all our respondents had heard about the term stress-induced oral ulcers, and about one third (33.6%) were not aware of stress induced oral ulcer. This proportion (33.6%) is a bit high considering that the respondents in this study were senior medical and dental clinical students who would be doctors eventually. It is important that a good awareness and knowledge of stress induced oral ulcers will help in proper management and referral of these conditions.

With regards to prevalence, twenty-nine (12.8%) of the respondents stated that they currently had stress induced oral ulcer presently. About 48.3% who had stress oral ulcers were females, and 51.7% were males. This study contrasts the findings of Charanya and Vasugi, 2020, [18] were females were more likely to have stress induced oral ulcers compared to males by 14%. Regarding the type of ulcer, our study found out that recurrent aphthous ulcer was the commonest type of stress oral ulcers in this population accounting for a prevalence rate of 35.5%. This is corroborated by a previous study [10]. Factitious ulcers and Herpes Labialis were found to account for 32.3% and 25.8% respectively. Commonest site for location of the ulcers included the lip (42.4%). These findings could be compared to findings by Oyetola et al., 2018, [19], were the commonest site was lower lip.

Analysis of the perceived stress scale carried out to determine the level of stress perception amongst the respondents, 49.5% attested to a high stress level, and 50.5% attested to a low stress level. This is similar to the findings of a previous study [9], were 46.2% were under high stress according to perceived stress scale.

Findings from our study showed that half the respondents were positive to emotional stress as a factor associated with the development of stress induced oral ulcers. About two-fifths (41.2%) were positive to psychological stress, and approximately one third (35%) believed that anxiety was related with development of stress oral ulcers. This knowledge is in keeping with literature [13, 18], which suggests that stress, depression and anxiety are found as the most common cause of oral ulcers among health care students.

As demonstrated by a study [8], a significant association exists between stressful life events and the onset of recurrent aphthous oral ulcers. This is also supported by another study [9] were significant association was shown to exist between stress and oral ulcers in a study group of medical students in India assessed using the perceived stress score to assess their level of stress. Estimated odds of developing oral ulcers was found at to be three times more with a stressful life event.

Further analysis carried out to determine the relationship between stress perception and presence of the oral ulcers amongst the students in the present study demonstrated interesting and atypical findings in that the perception of high levels of stress did not necessarily equate with a higher proportion of stress induced oral ulcers. In the present study, 14.9% of those with a low stress level compared with 10.7% of

those who had a high stress level had stress induced oral ulcers. Coping mechanisms and bodily adaptations to stress despite level of stress perception may have accounted for these findings. Factors such as immunity, nutritional status or genetic predisposition could also have played a role [20], hence, the findings in this study. This study would serve as a pilot study for further research into stress induced oral ulcers among the public.

Conclusion

Findings from this study shows that 66.4% of clinical medical and dental students were aware of stress induced oral ulcer. The prevalence of stress induced oral ulcer in this study was 12.8% and was seen more in males than females, with recurrent aphthous ulcer been the most prevalent stress induced oral ulcer among the study population with a prevalence of about 35.5%.

We recommend the need for inclusion of stress induced ulcerative conditions into the Medical and Dental curriculum as this will help improve the management and treatment outcomes.

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