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Original Article

Evaluation of orofacial pain and psychological comorbidities in health sciences university students

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Abstract – Introduction: Orofacial pain (OP) is a common public health problem among the general population however, its distribution among the young population like students has not been evaluated so far. The objectives of this study were to investigate the self-reported prevalence, and characteristics of OP, and to evaluate its association with psychological comorbidities such as anxiety and depression. **Materials and Methods:** A questionnaire-based study was conducted on students studying health sciences programs at SEGi University, Malaysia. A well-designed, structured questionnaire was utilized to assess the prevalence and characteristics of OP. Hospital Anxiety and Depression (HAD) scale was used to evaluate the psychological status of the students. The collected data was subject to statistical analysis by using the SPSS version 22 software. **Results:** Overall 494 university students had participated in the study of which, 78% (n = 375) of students had suffered from OP and it was significantly higher among the female students ($p < 0.03$). Headache was the most common type of OP (66.2%) followed by pain in temple region (47.2%), in and around eyes (29.1%), facial region (23.3%), and tooth/gingival pain (20.9%). The association between the prevalence of OP and anxiety was statistically significant ($p < 0.019$). About 35.4% of the health sciences students had first OP episode started three months ago, 4.2% had daily pain, 14.3% suffered from continuous pain, and only 14% of the students had consulted professionals and 36.1% of them took medication. **Conclusion:** A significantly higher prevalence of self-reported OP was evident among the health sciences university students and students with different types of OP had higher anxiety and depression scores. Early recognition of OP symptoms and associated comorbidities must be considered for the prevention and successful management of these conditions to circumvent its negative academic impact on the students.

Introduction

Orofacial pain (OP) is a multidimensional distressing public health problem caused by diseases of regional structures, signals from distant disorder, or dysfunction of the nervous system [1]. It may originate from the temporomandibular joint, mucous membrane of the oral cavity or nose, pulpo-periodontal region, and meninges [1]. OP has diverse characteristics as the pain arises from the different tissues around the head and neck region. Researchers found that the psychosocial alterations may aggravate the intensity and duration of pain particularly in chronic pain and patients with chronic temporomandibular disorders [2]. These patients may have a larger emotional component of pain than a sensory one [3] and aggravation of the pain occurs by a psychogenic exaggeration of somatic pain or through the hysterical mechanism [4].

Although the prevalence of OP was considered to be high in the general public, its distribution in the young population particularly among university students is still unknown. Therefore, a cross-sectional study was undertaken to investigate the self-reported prevalence of OP, and its association with the psychologic comorbidities like anxiety and depression among the students studying health sciences programs.

Materials and methods

Study design

A cross-sectional questionnaire-based study was conducted among the students studying health sciences programs at SEGi University, Malaysia. The study was conducted from October 2018 to March 2019. Ethical clearance was obtained from the institutional ethical committee and participating students' consent was obtained before the start of the study. A universal sampling method was employed to collect the data and

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Table I. Sociodemographic characteristics and psychological status of students with OP.

Presence of OP	Yes (n = 385) (%)	No (*n* = 109) (%)	*p*-value
Gender (*n*)			
Male (170)	123 (31.9)	47 (43.1)	$p < 0.03$
Female (324)	262 (68.1)	62 (56.9)	
Age (*n*)			
17-20 years old (146)	111(28.8)	35 (32.1)	$p < 0.778$
21-25 years old (337)	265 (68.8)	72 (66.1)	
25 and above (11)	9 (2.3)	2 (1.8)	
Place of residence (*n*)			
Stay with family (222)	169 (43.9)	53 (48.6)	$p < 0.381$
Independent living (272)	216 (56.1)	56 (51.4)	
Field of study (*n*)			
Faculty of Dentistry (229)	169 (43.9)	60 (55)	$p < 0.004$
Faculty of Medicine (89)	75 (19.5)	14 (12.8)	
Faculty of Optometry (80)	56 (14.5)	24 (22)	
Faculty of Pharmacy (96)	85 (22.1)	11 (10.1)	
Year of study (*n*)			
Year 1 (100)	88 (22.9)	12 (11)	$p < 0.076$
Year 2 (123)	93 (24.2)	30 (27.5)	
Year 3 (112)	84 (21.8)	28 (25.7)	
Year 4 (112)	87 (22.6)	25 (22.9)	
Year 5 (47)	33 (8.6)	14 (12.8)	
Anxiety (*n*)			
Healthy (242)	177 (46)	65 (59.6)	$p < 0.019$
Borderline case (125)	99 (25.7)	26 (23.9)	
Definite anxiety (127)	109 (28.3)	18 (16.5)	
Depression (*n*)			
Healthy (370)	283 (73.5)	87 (79.8)	$p < 0.393$
Borderline case (71)	59 (15.3)	12 (11)	
Definite depression (53)	43 (11.2)	10 (9.2)	

structured validated questionnaires was used. The content validation of the questionnaire was made by the oral diagnosis subject specialist from the faculty. For face validation, the questionnaire was administered to the 25 random students, and corrections were made after obtaining their feedback. The item analysis was done for the internal consistency which was within Cronbach's alpha value of 0.79.

The first part of the questionnaire comprised of details regarding the socio-demographical data, presence or absence of OP, and different characteristics of OP which students had experienced in the past three months. Students with the presence of OP were given questionnaire to evaluate the different types and characteristics of OP which included the time of first pain episode, frequency, nature, and duration of the pain. Besides, the questionnaire also inquired whether the students had pursued any professional medical/dental consultation or taken medications for OP (Tab. I).

The second part of the questionnaire evaluated the anxiety and depression levels by using the HAD scale for the students who answered positively for the presence of OP. HAD scale consists of seven item questions for evaluation of anxiety and depression. Each item is scored on a response-scale ranging between 0 and 3. According to Zigmond and Snaith, the recommended total cut-off scores are 8–10 for doubtful cases and equal/ more than 11 for definite cases of anxiety and depression [5]. Students studying the health sciences program and willing to participate were included in the study and those who do not want to take part were excluded from the study.

Statistical analysis

Statistical analysis was performed by using SPSS version 22 software (IBM SPSS Amos Statistics V22.0). Chi-square test of independence was used to determine the associations between

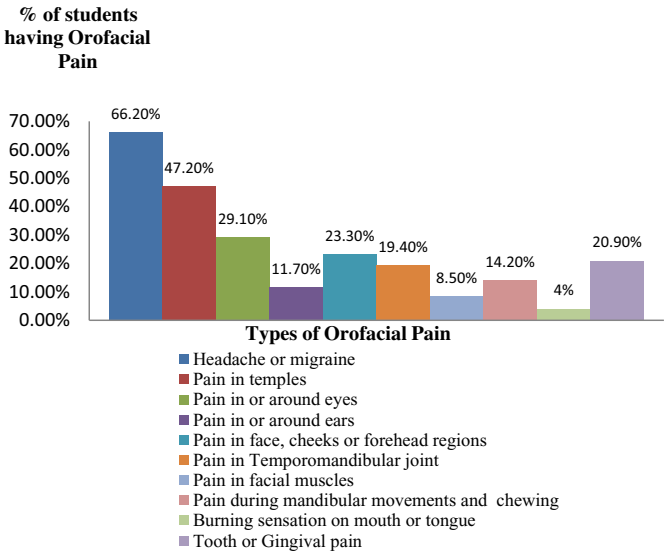

Fig. 1. Prevalence of different types of OP.

the OP and the independent factors such as gender, age, the field of study, year of study, place of residence, and psychological comorbidities like anxiety and depression.

Results

Prevalence of OP and its association with sociodemographic characteristics

A total of 494 students from the faculty of Dentistry, Medicine, Pharmacy, and Optometry participated in the study, of which 170 (34.4%) were males and 324 (65.6%) were females (Tab. I). The age of the students varies between 17 and 25 years. The overall self-reported prevalence of OP was 78% (385/ 494) in students studying health sciences programs.

The prevalence of OP was significantly associated with gender ($p < 0.03$) and the field of study ($p < 0.004$). Female students and students from the Faculty of Pharmacy were more frequently affected by OP than others. In contrast, age, place of residence, and year of the study did not influence the occurrence of OP (Tab. I). The most frequently reported type of OP was migraine (66.20%) followed by the pain in the temple (47.20%) and the least common pain was burning sensation of mouth (4%) (Fig. 1).

Characteristic of OP

The pain which lasted for more than three months was considered as the chronic OP. About, 35.4% of students had reported chronic OP. More than half of the students (54.8%) revealed that the OP occurred less than once a week whereas, 4.2% of students had reported daily pain. Most students had intermittent pain (85.7%) and only 14.3% complained of continuous pain.

Table II. Characteristic of OP.

Characteristic of OP	*n* (%)
The onset of pain episode	
Before 3 months	136 (35.4)
Before 2 months	54 (14)
Before 1 month	62 (16.1)
3–4 weeks back	59 (15.3)
1–2 weeks back	74 (19.2)
Frequency of pain	
Daily	16 (4.2)
4–5 times a week	21 (5.5)
2–3 times a week	72 (18.7)
Once a week	65 (16.9)
Less than once a week	211 (54.8)
Nature of Pain	
Continuous	55 (14.3)
Intermittent	330 (85.7)
Duration of last pain episode	
Less than 30 minutes	185 (48.1)
About 1 hour	83 (21.6)
1–4 hour	66 (17.1)
5–8 hour	19 (4.9)
9–12 hour	9 (2.3)
More than 12 hours	23 (6)
Sought for medical/ dental help	
Yes	54 (14)
No	331 (86)
Take medication for pain	
Yes	139 (36.1)
No	246 (63.9)

In nearly half (48%) of the students, the previous pain episode lasted for less than 30 minutes, whereas 6% of students reported that the pain lasted for more than 12 hours. Most of the health sciences students (63.9%) had taken over the counter drugs on their own and 14.1% of the students had consulted physicians or dentists. (Tab. II).

Association between OP and psychological status

The prevalence of OP was significantly associated with the anxiety levels of the students ($p < 0.019$) (Tab. I) and it was significantly higher in the students with definite anxiety. Additionally, an association was found in all different types of OP and anxiety scores except for the burning sensation of mouth which had higher depression scores (Tab. III). A statistically significant association was evident between the depression scores and headache, pain in and around the ears, facial muscles, burning sensation of the oral mucosa, and tooth/gingival pain.

Table III. Association between anxiety and depression with different types of OP symptoms.

Different types of OP		Anxiety			Depression		
		Healthy	Borderline Case	Definite case	Healthy	Borderline Case	Definite case
Headache/Migraine	*n*	139	91	97	231	53	43
	%	57.4	72.8	76.4	62.4	74.6	81.1
	p	<0.001			0.007		
Pain in temples	*n*	94	62	77	164	38	31
	%	38.8	49.6	60.6	44.3	53.5	58.5
	p	<0.001			0.079		
Pain in/ around the eyes	*n*	61	32	51	99	29	16
	%	25.2	25.6	40.2	26.8	40.8	30.2
	p	0.007			0.056		
Pain in /around the ears	*n*	17	15	26	34	14	10
	%	7	12	20.5	9.2	19.7	18.9
	p	0.001			0.010		
Pain in face/ cheeks/ forehead	*n*	45	28	42	78	23	14
	%	18.6	29.1	33.1	21.1	32.4	26.4
	p	0.007			0.1		
Pain in temporomandibular joints	*n*	22	29	34	66	18	12
	%	13.6	23.2	26.8	17.8	25.4	22.6
	p	0.005			0.281		
Pain in facial muscles	*n*	10	10	22	24	11	7
	%	4.1	8	17.3	6.5	15.5	13.2
	p	<0.001			0.019		
Pain when opening/ closing of mouth or chewing	*n*	18	25	27	7	13	20
	%	7.4	20	21.3	0	0.3	0.2
	p	<0.001			0.768		
Burning sensation of tongue/ mouth	*n*	7	5	8	11	2	7
	%	2.9	2	5.1	3	2.8	13.2
	p	0.246			0.011		
Tooth/ gingival pain	*n*	35	26	42	66	22	15
	%	14.5	20.8	33.1	17.8	31	28.3
	p	<0.001			0.016		

Discussion

Orofacial pain is a complex multifactorial public health problem affecting the quality of life among the general population. The present cross-sectional study was conducted on the health sciences students as they are familiar with the terminologies used in the questionnaire and they may have similar responsibilities and behaviors. The earlier investigators have found that the profession of an individual plays a vital role in OP and the most vulnerable groups are students, housewives, and unemployed youth [6].

Numerous studies have shown no direct causal relationship between psychological alterations and OP however, these symptoms may exist as comorbidities and may aggravate the intensity and duration pain particularly in patients with the chronic OP [2]. The patient with acute pain can describe the pain more accurately because the brain is better able to localize and isolate the pain during the first six months as the discriminative system dominates the motivational/effective system however, as time progresses, this ability declines, and expression of the motivational/effective system begins to become more dominant in the pain experience, and so, the pain language used by patients changes to one that is characterized more by psychological nondescriptive terms [7].

Of the 494 students who had completed the questionnaire, a significantly high number of (78%) the students reported to be suffering from OP in the past three months. This was much higher than the study by Smiljic *et al.* (2016) who had reported

Table IV. Prevalence of OP reported in the literature.

Authors	Prevalence of OP
Smiljic S *et al.*, (2016) [6]	32% among the university students
Maulina *et al.*, (2014) [8]	55.9% in Indonesian community health centers
Oberoi SS *et al.*, (2014) [9]	42.7% in patients attending tertiary care hospitals in India
Chung *et al.*, (2004) [10]	42% in Korean elders
Allen *et al.*, (1999) [11]	41.6%
Locker and Grushka *et al.*, (1987) [12]	39.7% in the city of Toronto.
Riley *et al.*, (2002) [13],	17.4% in Americans
Macfarlane *et al.*, (2001) [14]	26%

32% among university students [6]. Previous studies have reported the prevalence between 17.4% and 55.9% [8–14] (Tab. IV).

As compared to earlier studies, the present study reported the highest self-reported prevalence of OP among the students studying in the health sciences program.

The OP was significantly higher in female students as compared to male students. This was in accordance with the studies by Kohlmann *et al*. (2002) [15], Oberoi *et al*. (2014) [9], and Smiljic *et al*. (2016) [6]. In addition, they also had higher duration, frequency, and severity of pain than their counterparts [16]. This could be due to the differences in the pain sensitivity among the genders, as females tend to have lower pain thresholds and tolerance than males [16]. Moreover, the central processing of nociceptive input can be easily upregulated into pathological hyperexcitability in females [17]. Additionally, an increased level of estrogen and progesterone sex hormones could influence the pain threshold [17].

Age is one of the risk factors that may affect the occurrence of OP. Previous researchers had observed that the OP more often occurs in a younger age group and reduces in older individuals [18] due to the higher work productivity in adult age groups [19]. A similar observation was noticed in the present study however this was not statistically significant.

Students who were living independently (n = 216, 56.1%) had reported slightly higher OP as compared to those who stayed with their family members (n = 169, 43.9%) however, this was not statistically significant. Similar findings were noticed by Smiljic *et al*. (2016) who concluded that the place of residence and shifting to a new environment will not affect the prevalence of OP among university students [6]. The interesting observation found in our study was that the prevalence of OP among university students was significantly associated with the field of study ($p < 0.004$). Students from the Faculty of Pharmacy were frequently affected by the OP and the least frequent were students from the Faculty of Optometry. This could be attributed to their examination schedule and semester break for the four faculties just before the data collection process. Although the field of study was associated with the prevalence of OP, the year of study was not associated with the prevalence of OP among the health sciences students.

The association between the prevalence of OP and anxiety levels was statistically significant ($p < 0.019$). Moreover, students with increased anxiety scores had significantly higher OP and suffered from different types of OP. This finding was in accordance with the studies by Calixtre *et al*. (2014) [19] and Vasudeva *et al*. (2014) [20].

The overall association between OP and depression levels was not significant however, students reported with headache/ migraine, pain in and around the ears, pain in facial muscles, burning sensation of tongue/ mouth, and tooth/ gingival pain had higher depression scores. Similar findings were reported by Alkhubaizi *et al*. (2017) [21], Fillingim *et al*. (2013) [22], Macfarlane *et al*. (2014) [23]. A large population-based retrospective cohort study reported that people with depression were at 2.2 times greater risk of developing temporomandibular disorder as compared to those without depression [24].

Although the causal relationship between depression and different types of OP does not exist, they may occur due to the alterations in the underlying neurotransmitter mechanism. This pathophysiology can be explained by the modern concept of nociplastic pain. Earlier, the pain was described as either nociceptive or neuropathic, this dichotomous vision excluded many patients particularly the patients with chronic pain. Currently, nociceptive pain is a "pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors," and neuropathic pain is a "pain caused by a lesion or disease of the somatosensory nervous system" [25]. A large gray area exists between these two descriptors of pain. In few conditions, the pain has neither an obvious activation of nociceptors nor a proven lesion or disease of the somatosensory nervous system. Hence a new third descriptor, nociplastic pain was proposed in 2016 [26]. The nociplastic pain is the "pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence of the disease or lesion of the somatosensory system causing the pain." This definition states that patients can have a combination of nociceptive and nociplastic pain [26]. The concept of nociplastic pain may explain the correlation found between the depression levels and headache/ migraine, pain in and around the ears, pain in facial muscles, burning sensation of tongue/ mouth, and tooth/ gingival pain

in our study. Nonetheless, this new descriptor of pain was contended by few researchers as the core component of this concept rests on "altered nociceptive function," which was not precisely described by the authors [27].

We observed that the headache (n = 327, 66.2%) was the most common type of OP followed by pain in the temple (n = 233, 47.2%), pain in and around the eyes (29.1%), pain in the facial region (23.3%) and tooth/gingival pain (20.9%). These findings were in accordance with the studies by Macfarlane *et al*. (2002) [28], and Smiljic *et al*. (2016) [6]. Headache is the most common neurological symptom that affects everyone however, frequent headaches among the students may have a negative influence on the academic outcome of the students [29].

Toothache is the most frequent reason to seek dental consultation and the most common type of OP [30–32]. In our study, only 20.9% (n = 103) of students reported tooth or gingival pain. This could be attributed to the fact that the majority of the study participants were from the Faculty of Dentistry (46.4%) and they may have better knowledge and awareness of dental health thus reducing the risk of getting dental problems. Besides this, dental pain is considered a preventable form of pain, so good oral health behaviors may reduce the risk of getting dental problems [33].

In the present study, the percentage of students seeking professional medical or dental consultation was only 54 (14%). This was slightly lower than that of the previous studies by Smiljic *et al*. (2016) [6], Siddiqui *et al*. (2015) [34].

Riley (2006) [30] reported that young adults between the age group of 18–25 years seek less medical or dental consultation than the other age groups, and some of the young individuals delay their visit until the pain becomes unbearable [23]. On the contrary, chronic OP patients seek professional advice more often than acute pain patients [35].

The limitation of the present study includes a small sample size; hence further studies with a larger study population are required to obtain a conclusive result. Furthermore, the results of our study cannot be generalized as the study participants were from the health sciences program.

Conclusion

A significantly higher prevalence of self-reported OP was observed among the health sciences students and students with higher anxiety and depression scores had suffered from different types of OP. Headache was the most common and burning sensation of the oral mucosa was the least common type of OP. The prevention and early recognition of these symptoms are crucial to circumvent the negative academic outcomes, daily duties, and social lives of the students.

Conflicts of interests

The authors declare that they have no conflicts of interest in relation to this article.

References

1. Ghurye S, McMillan R. Orofacial pain – an update on diagnosis and management. Br Dent J 2017;223:639–647.
2. Dahan H, Shir Y, Velly A, Allison P. Specific and number of comorbidities are associated with increased levels of temporomandibular pain intensity and duration. J Headache Pain. 2015;16:528.
3. Miura A, Tu TTH, Shinohara Y, Mikuzuki L, Kawasaki K, Sugawara S, *et al.* Psychiatric comorbidities in patients with Atypical Odontalgia. J Psychosom Res. 2018;104:35–40.
4. Bridges PK. Psychological aspects of headache. Postgrad Med J 1971;47:556–561.
5. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361–370.
6. Smiljic S, Savic S, Stevanovic J, Kostic M. Prevalence and characteristics of orofacial pain in university students. J Oral Sci 2016;58:7–13.
7. Auvenshine RC. Temporomandibular disorders: Associated features. Dent Clin North Am. 2007;51:105–127.
8. Maulina T, Rachmi CN, Akhter R, Whittle T, Evans RW, Murray GM. The association between self-report of orofacial pain symptoms with age, gender, interference in activities, and socioeconomic factors in Indonesian community health centers. Asian Pac J Dent 2014;14:23–34.
9. Oberoi SS, Hiremath SS, Yashoda R, Marya C, Rekhi A. Prevalence of various orofacial pain symptoms and their overall impact on quality of life in a tertiary care hospital in India. J Maxillofac Oral Surg 2014;13:533–538.
10. Chung JW, Kim JH, Kim HD, Kho HS, Kim YK, Chung SC. Chronic orofacial pain among Korean elders: prevalence, and impact using the graded chronic pain scale. Pain 2004; 112: 164–170.
11. Allen PF, McMillan AS, Walshaw D, Locker D. A comparison of the validity of generic and disease-specific measures in the assessment of oral health-related quality of life. Commun Dent Oral Epidemiol 1999;27:344–352.
12. Locker D, Grushka M. Prevalence of oral and facial pain and discomfort: preliminary results of a mail survey. Community Dent Oral Epidemiol 1987;15:169–172.
13. Riley JL, Wade JB, Myers CD, Sheffield D, Papas RK, Price DD. Racial/ethnic differences in the experience of chronic pain. Pain 2002;100:291–298.
14. Mcfarlane TV, Glenny AM, Wothinghton HV. Systematic review of population based studies of orofacial pain. J Dent 2001;29: 451–467.
15. Kohlmann T. Epidemiology of orofacial pain. Schmerz. 2002; 16:339–345.
16. Dao TT, LeResche L. Gender differences in pain. J Orofac Pain 2000;14:169–195.
17. Sarlani E, Grace EG, Reynolds MA, Greenspan JD. Sex differences in temporal summation of pain and after sensations following repetitive noxious mechanical stimulation. Pain 2004;109: 115–123.
18. Rikmasari R, Yubiliana G, Maulina T. Risk factors of orofacial pain: a population-based study in West Java Province, Indonesia. Open Dent J 2017;29:710–717.
19. Calixtre LB, Grüninger BL, Chaves TC, Oliveira AB. Is there an association between anxiety/depression and temporomandibular disorders in college students? J Appl Oral Sci 2014;22: 15–21.

20. Vasudeva S, Iyengar A, Seetaramaiah N. Correlation of anxiety levels between temporomandibular disorder patients and normal subjects. J Oral Dis 2014;2014:1–5.
21. Alkhubaizi Q, Sorkin JD, Hochberg MC, Gordon SM. Risk factors for facial pain: data from the osteoarthritis initiative study. J Dent Oral Biol 2017;2:1033.
22. Fillingim RB, Ohrbach R, Greenspan JD, *et al.* Psychological factors associated with development of TMD: the OPPERA prospective cohort study. J Pain 2013;14:T75–T90.
23. Macfarlane TV, Beasley M, Macfarlane GJ. Self-reported facial pain in UK Biobank study: prevalence and associated factors. J Oral Maxillofac Res 2014;5:e2.
24. Liao CH, Chang CS, Chang SN, Lane HY, Lyu SY, Morisky DE, Sung FC. The risk of temporomandibular disorder in patients with depression: a population-based cohort study. Commun Dent Oral Epidemiol 2011;39:525–31.
25. IASP https://www.iasp-pain.org/terminology?navItemNumber=576#Pain, Accessed 4th October 2020.
26. Kosek E, Cohen M, Baron R, *et al.* Do we need a third mechanistic descriptor for chronic pain states? Pain. 2016;157:1382–1386.
27. Granan LP. We do not need a third mechanistic descriptor for chronic pain states! Not yet. Pain. 2017;158:179.
28. Macfarlane TV, Blinkhorn AS, Davies RM, Kincey J, Worthington HV. Oro-facial pain in the community: prevalence and associated impact. Community Dent Oral Epidemiol 2002;30:52–60.
29. Falavigna A, Teles AR, Velho MC, Vedana VM, Silva RC, Mazzocchin T, Basso M, Braga GL. Prevalence and impact of headache in undergraduate students in Southern Brazil. Arq Neuropsiquiatr 2010;68:873–877.
30. Riley JL 3rd, Gibson E, Zsembik BA, Duncan RP, Gilbert GH, Heft MW. Acculturation and orofacial pain among Hispanic adults. J Pain 2008;9:750–758.
31. Renton T. Dental (Odontogenic) Pain. Rev Pain 2011;5:2–7.
32. Renton T, Wilson NH. Understanding and managing dental and orofacial pain in general practice. Br J Gen Pract. 2016;66:236–237.
33. Rugg-Gunn A. Dental caries: strategies to control this preventable disease. Acta Med Acad 2013;42:117–130.
34. Siddiqui TM, Wali A, Ahmad Z, Merchant S, Ahmed F. Prevalence of orofacial pain perception in dental teaching hospital-Karachi. Int Dent Med J Adv Res 2015;1:1–6.
35. Beecroft EV, Durham J, Thomson P. Retrospective examination of the healthcare 'journey' of chronic orofacial pain patients referred to oral and maxillofacial surgery. Br Dent J 2013;214:E12.