EPIDEMIOLOGY OF OROFACIAL PAIN AMONGST PATIENTS VISITING UNIVERSITY DENTAL HOSPITAL - A RETROSPECTIVE STUDY

Manivasagam Deepigaa, Muthukrishnan Arvind2, Chaudhary Manjari3
1Department of Oral medicine and Radiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences(SIMATS), Saveetha University, Chennai, India
Mail ID- 151810001.sdc@saveetha.com
2Professor and Head, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences(SIMATS), Saveetha University, Chennai, India
Mail ID- arvindm@saveetha.com
3Senior lecturer, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences(SIMATS), Saveetha University, Chennai, India
Mail ID- manjaric.sdc@saveetha.com

ABSTRACT:
Classification and evaluation of epidemiologic data of Orofacial Pain (OFP) are quite challenging because of lack of consensus regarding diagnostic criteria. A thorough understanding of epidemiology and causes of OFP is essential for accurate diagnosis and management.

A retrospective analysis of patients who reported with orofacial pain to the department of oral medicine between June 2019 to March 2020 was done from the college database. 95 patients were included in the final study and analysis.

Temporomandibular disorders (TMD), Neuropathic pain and Burning Mouth Syndrome (BMS) were most prevalent orofacial pain disorders. TMD was more commonly reported (56.7%) amongst patients of 20-30 years (40%) with female predilection and was mainly disc condyle disorders (65.4%). Neuropathic pain observed in 34.02% amongst individuals of 51-60 years (31.3%) with female predilection. Neuropathic pain was predominantly Trigeminal Neuralgia (TN) in 96.88% with left side mandibular division involvement. BMS was observed in 9.28% of the population in 41-50 years (33.3%) again with female predilection. Chi square performed to find association between age and type of orofacial pain revealed a p value < 0.001 and were statistically significant.

OFP comprises an extensive spectrum of disorders because of their unique anatomic and physiologic and biochemical components. Clinicians should use a systemic approach for accurate diagnosis and successful management.

Key words: Burning mouth syndrome; Orofacial pain; Temporomandibular disorder; Trigeminal neuralgia.

I. INTRODUCTION
International Association for Study of Pain (IASP) defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (Okeson, 2008). Pain associated in the head and neck regions are referred to as Orofacial pain. Orofacial pain is divided into physical (axis 1) and psychological (axis 2) by Okeson (Okeson, 2008). Physical conditions include Temporomandibular disorders (TMD), Musculoskeletal disorders (Myofacial pain dysfunction syndrome MPDS), dental (Muthukrishnan and Bijai Kumar, 2017) and pulpal pain of somatic origin, neuropathic pain including trigeminal neuralgia, glossopharyngeal neuralgia, post herpetic neuralgia and neurovascular disorders/headaches (eg.migraine and temporal arteritis) (Okeson, 2008; Steele et al., 2015).
Burning mouth syndrome is a condition characterised by burning sensation or discomfort affecting the mouth, occurring in presence of clinically healthy mucosa (McMillan et al., 2016). They are broadly classified into Primary and Secondary. Primary BMS occurs when organic cause for oral burning cannot be identified, whereas Secondary BMS may arise as a result of any local (Subashri and Uma Maheshwari, 2016) or systemic pathology (McMillan et al., 2016). It may be aggravated on consumption of hot and spicy foods (Dharman and Muthukrishnan, 2016) Studies have reported BMS in patients with diabetes mellitus (Claudia et al., 2017; Maheswari et al., 2018), antihypertensive drugs (de Sousa Lopes et al., 2015). In order to identify the systemic causes of BMS, patients should receive hematological and biochemical investigations to exclude anemia and hematinic deficiency (Renton et al., 2012). BMS is reported to affect 0.7-15% of the population (Patton et al., 2007).

TMDs refer to conditions affecting the temporomandibular joint (TMJ), and/or the muscles of mastication (Durham and Wassell, 2011). Diagnosis of TMD follows a thorough history and examination. History includes pain character, precipitating and exacerbating factors, habits (Muthukrishnan and Warnaokusriyia, 2018) and previous trauma (Choudhury et al., 2015; Durham, 2015). Clinical examination includes assessment of mouth opening (Rohini and Kumar, 2017), palpation of TMJ and auscultation of joint sound (Durham, 2015). Palpation of muscles of mastication to elicit tenderness or hypertrophy. panoramic radiographs are used in detection of dental pathology (Durham, 2015; Muthukrishnan et al., 2016), condylar and degenerative changes (Ribeiro-Rotta et al., 2011). Magnetic resonance imaging (MRI) is used to assess disc position, osteoarthrosis and inflammatory changes (Maixner et al., 2011). Computed tomography (CT) (Misra et al., 2015) and cone beam CT (Patil et al., 2018) are used in detection of osseous changes (Maixner et al., 2011).

Neuropathic orofacial pain is described as a pain caused by a lesion or disease of the somatosensory nervous system. Trigeminal Neuralgia (TN) is a neuropathic condition affecting one or more branches of the trigeminal nerve (Zakrzewska and Linskey, 2014). It is defined as constant unilateral facial pain that varies in intensity, aggravated by trigger factors (Subha and Arvind, 2019). Pain is episodic and of brief duration, occurring unilaterally, with abrupt onset and termination. Pain is often excruciating and maybe described as stabbing, or like an electric shock, and may occur spontaneously, or triggered by mild stimuli such as touch, eating or wind (Zakrzewska and Linskey, 2014). TN is categorised into classical TN and symptomatic TN by International Headache society (IHS) (Olesen and Steiner, 2004). Classical TN is due to neurovascular compression, commonly superior cerebellar pontine artery. Symptomatic TN is caused due to structural lesion other than a vascular compression, such as multiple sclerosis (MS) or a space occupying lesion (Olesen and Steiner, 2004). Recent classification suggests a third diagnostic category for TN- idiopathic TN (i.e) there is no compression or pathology identified (Crucu et al., 2016).

A study reported an incidence of 27 per 100,000 for TN. Glossopharyngeal neuralgia (GPN) is a severe, transient, stabbing pain experienced in the ear, base of the tongue, tonsillar fossa, and or beneath the angle of the jaw. Usually they are unilateral, bilateral pain is experienced by 25% of patients (Katusic et al., 1991). Incidence of GPN is estimated between 0.2 and 0.7 per 100,000 individuals per year (Katusic et al., 1991). Herpes zoster (HZ) results from reactivation of varicella zoster virus (V2V) within cranial sensory ganglia. 16-22% patients of acute HZ will report pain for 3 to 6 months. It is a direct complication of acute HZ of trigeminal nerve and is localized to affected dermatome (Christoforou, 2018).

Orofacial pain is a multidimensional phenomenon (Chaitanya et al., 2018) which affects the quality of life (Chaitanya et al., 2017) and is always challenging for the clinician for diagnosing because of a lack of consensus regarding diagnostic criteria. Adopting a biopsychosocial approach for early diagnosis and a holistic approach to management is central to limiting the negative psychosocial impact of orofacial pain, whilst ensuring care remains effective and efficient. Previously our team has a rich experience in working on various research projects across multiple disciplines ((Abdul Wahab et al., 2017; Eapen et al., 2017; Ezhilarasan et al., 2018; Jeevanandam and Govindaraju, 2018; MalliSureshbabu et al., 2019; Manivannan et al., 2017; Mehta et al., 2019; Neelakantan et al., 2015; Patil et al., 2017; Rajeshkumar et al., 2019; Ramamoorthy et al., 2015; Ravindiran and Praveenkumar, 2018; Samuel et al., 2020; Sathish and Karthick, 2020; Wahab et al., 2018). Aim of the study is to evaluate the prevalence and epidemiology of orofacial pain amongst patients visiting our university hospital.

II. MATERIALS AND METHODS:

The study was conducted in an university dental hospital setting covering patients visiting with management for various orofacial pain conditions. The research was approved by the institutional ethical committee and scientific
The ethical approval number for the study is SDC/SIHEC/2020/DIASDATA/0619-0320. The study was carried out by 2 members, the primary researcher and a department faculty. The study was carried out by analysis of electronic databases of patients from June 2019 - March 2020. The data base of around 86000 were reviewed and for final research analysis case records of 95 orofacial pain patients were retrieved. The case sheets were cross verified based on clinical diagnosis, lab reports and radiographic findings. The data was verified by both researchers. The internal validity was maintained as set diagnostic criteria was followed and this methodology can be cases replicated at other centres also, maintaining the external validity also.

The data was retrieved from university dental hospital electronic database system DIAS. The extracted data was verified by both researchers and had explicit fields. The retrieved data was formulated on an excel sheet then later transferred to a SPSS file. IBM SPSS 20 was used in our study. The qualitative variables used in the study are gender, orofacial pain disorders like Burning mouth syndrome(BMS), Trigeminal neuralgia (TN), Postherpetic neuralgia (PHN), disc condyle disorders, Myofascial pain dysfunction syndrome (MPDS), Degenerative disorders, laboratory investigations. Quantitative variables include the age and duration of pain. Patients whose data was incomplete and could not be retrieved were excluded from being included in final analysis.

The statistical software used for analysis was IBM SPSS20. Descriptive analysis was performed for the independent and dependent variables as mentioned above. The type of analysis used was correlation and association and Chi Square test was performed to evaluate the level of significance.

III. RESULTS AND DISCUSSION

In this retrospective study, 95 case sheets were reviewed and involved in the study and consisted of BMS (9.28%), neuropathic pain (TN- 32.9%, PHN-1.03%), TMDS (Disc condyle disorders 37.1%, MPDS 17.53%, Degenerative disorders 2.03%).

The frequency distribution of age and sex of BMS patients were 21-30 years (22.2%), 31-40 years (11.1%), 41-50 years (33.3%), 51-60 years (22.2%), 61-70 years (11.1%) with a female predilection (55.6%) and male (44.4%) [graph-1,2].

Frequency distribution of duration of BMS patients revealed minimum duration of 10 days (11.1%) and a maximum duration of 1440 days (11.1%) and most frequent duration observed was 120 days (22.2%) and mean duration was 243.3 [graph-3]. Etiology for BMS was unknown in 78% cases. Iron, Vitamin B12 deficiency was observed in 22%. (graph-4)

Frequency distribution of age and sex of neuropathic pain patients reveals it was more frequently observed in 51-60 years (28.1%), 41-50 years (25.0%), and least observed in 21-30 years (3.1%) with a female predilection (56.25%) and male (43.75%) [graph-5,6]. The minimum duration reported was 90 days (6.25%) and a maximum duration of 2880 days (3.1%) and most frequent duration observed was 120 days(25%)

with a mean duration was 536.25[graph-7].The most common type of neuropathic was TN (96.88%), PHN (3.13%)[Graph-8] and left side (53.13%) was more involved than right side (46.88%) [graph-9]. The most frequently affected divisions of TN were V3 (68.75%) followed by V2 and V3 (12.5%), V1 and V3 (9.38%), V2 (6.25%), V1and V2 (3.1%) respectively.[graph-10].Descriptive statistics for age and side of TN involved performed using chi-square test revealed left side was more common in 51-60 years and right side was more common in 61-70 years and p > 0.05. [graph-11].Chi-square test for age and type of neuropathic pain revealed TN was more common in 51-60 years and PHN in 61 to 70 years and p > 0.05. [graph- 12]

Chi-square test for age and division of nerve involved reveals mandibular division involvement is more common in 51-60 years and 61-70 years; p>0.05. [graph-13]

The frequency of distribution of age and sex of TMD reveals maximum in 21-30 years (43.64%), followed by, 11-19 years (21.8%), 71-80 years (14.5%), 41-50 years (5.5%). [graph-14] with a female predilection (50.9%) and male (49.1%). [graph-15]

The most common type of temporomandibular disorder observed was the Disc-condyle disorder (65.45%), MPDS (30.9%), Degenerative disorders (3.6%). [graph- 16] with minimum duration of 3 days (5.5%) and a
maximum duration of 720 days (7.3%) and most frequently observed duration observed was 30 days (23.6%). The mean was 123.3 and SD was 193.607.[graph-17]

Chi-square test for age and TMD disorders reveals disc condyle disorder and MPDS was more common in 21-30 and Degenerative disorder in 30 to 40 years $p > 0.05$. [graph- 18] and association between sex and TMD disorders reveals disc condyle disorder had equal gender distribution, MPDS has a male predilection and Degenerative disorders was more common in females;$p > 0.05$. [graph- 19].

Frequency distribution for orofacial pain reveals TMD was the most common and reported in 56.7%(Disc-condyle disorders- 37.11%, MPDS- 17.53%, Degenerative disorders- 2.06%) , followed by neuropathic pain seen in 34.02%(TN-32.99%, PHN- 1.03%) and BMS in 9.28%. [graph- 20].Chi-square test reveals association between age and orofacial pain shows BMS was more common in 41-50 years, neuropathic pain in 51 to 60 years and TMD in 21 to 30 years $p < 0.001$. [graph- 21]

Orofacial pain is the term used to describe pain arising from regions of the face and mouth and they are caused due to diseases of regional structures, nervous system disorders, referral from distant sources or sometimes an unknown etiology(Benoliel et al., 2019). They are described as acute when present less than 3 months and chronic when present more than 3 months. Orofacial pain diagnosis and management are challenging because of their complex histories, pathophysiology and are usually associated with psychosocial co-morbidities such as depression, stress(Venugopal and Uma Maheswari, 2016) and anxiety.

Based on the present study BMS was more common in 41-50 years (33%) with a female sex predilection. These results were similar to a study conducted by Olga Susana et al(Tomattis et al., 2016). The maximum duration observed was 1440 days. Unknown etiology was observed in 78% . Iron and vitamin B12 deficiency was observed in 22%. These results were similar to a study conducted by Nasir Heir et al in 2015(Nasri-Heir et al., 2015).

Neuropathic pain was more commonly observed in 51-60 years (31.3%) with a female sex predilection. Korczienawska O.A et al in 2018 have reported in 60-69 years there is more prevalence(Korczienawksa et al., 2018). Trigeminal neuralgia was more commonly observed neuropathic pain and Veerapaneni KD et al has also reported the same in 2020(Veerapaneni et al., 2020).The most common side affected was the left side and the mandibular division was more commonly involved and study conducted by BangashTH in 2011 and Subha et al in 2019 reported that right mandibular division was commonly affected (Bangash, 2011; Subha and Arvind, 2019). Correlation between age and neuropathic pain revealed TN was more common in 50-60 years and PHN in 60-70 years. Siquenia et al in 2009 reported in their study Trigeminal Neuralgia was more common in 61-70 years(Siqueira et al., 2009).

TMD was more common in 20-30 years (40%) with a female sex predilection, Robert L Gaverin his study reported that TMD was more common in 20-40 years(Gauer and Semidey, 2015). The maximum duration of TMD reported was 720 days. Disc condyle disorder was the most common cause of TMD and results were similar to a study by de Paia et al in 2018(Bertoli et al., 2018). Disc condyle disorder was more common in 20-30 years and MPDS in 20 to 30 years and Degenerative disorder in 30 to 40 years. These results were similar to a study conducted by Mazzetto et al in 2014(Mazzetto et al., 2014). The most common orofacial pain observed due to TMD disorder (57.2%) and results are similar to a study conducted by Derafshi R et al 2019(Derafshi et al., 2019).Our institution is passionate about high quality evidence based research and has excelled in various fields(Ezhilarasan et al., 2019; Mathew et al., 2020; Pc et al., 2018; Ramadurai et al., 2019; Ramesh et al., 2018; Sridharan et al., 2019; VijayashreePriyadarsini, 2019). We hope this study adds to this rich legacy.

Limitation of the study is relatively smaller sample size, short time period of the study . In future a longitudinal observation study should be conducted at multi centres for better understanding of epidemiology, etiology and dynamics of orofacial pain.

IV. CONCLUSION

The results of the study proves that temporomandibular disorder was the most prevalent orofacial pain and seen in 56.7% with disc condyle disorder being most common and found in 65.4% with a significant association($p<0.001$) between age and type of orofacial pain was established. Orofacial pain conditions occur due to complex pathophysiology and are often associated with psychosocial co-morbidities. Chronic orofacial pain has a significant impact upon quality of life and daily functioning. A biopsychosocial approach for the
diagnosis and management may address the multifactorial etiology of orofacial pain conditions while limiting the economic and health related burden associated with these conditions.

V. ACKNOWLEDGEMENTS

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AUTHOR CONTRIBUTIONS

ManivasagamDeepigaa has made substantial contributions to the research design, acquisition analysis of data, and drafting the paper and revising it critically.

Muthukrishnan Arvid has made substantial contributions to the research design, acquisition analysis of data, and drafting the paper and revising it critically.

ChaudaryManjari has made substantial contributions in proofreading and final drafting

CONFLICT OF INTEREST

The authors declares that there is no conflict of interest

REFERENCES


**GRAPHS**

Graph 1: This bar graph represents the age distribution of Burning mouth syndrome in our study population where the X axis represents the age in years and Y axis represents the frequency in number of burning mouth syndrome patients. In our study the maximum patients (n=3) belonged to the age group of 41 to 50 year (33.33%).

Graph 2: This bar graph represents the sex distribution of the Burning mouth syndrome in our study population where the X axis represents the sex and Y axis represents the frequency in numbers of burning mouth syndrome patients. Graph 2 shows that females (55.56%) were predominantly affected than males (44.44%).

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Graph 3: This bar graph represents the duration of symptoms reported in Burning mouth syndrome, where the X axis represents duration in days and Y axis represents the frequency in numbers of burning mouth syndrome patients. In our study, the maximum duration of symptoms were reported in 120 days (22.22%).
Graph 4: This pie graph represents the etiology reported in Burning mouth syndrome patients. Red denotes decreased Hb, vitamin B12 and folic acid deficiency; Green denotes decreased RBC and Hb; Violet denotes unknown etiology. In our study the unknown etiology (77.78%) was maximum reported.

Graph 5: This bar graph represents the age distribution of the neuropathic pain in our study population where the X axis represents the age in years and Y axis represents the frequency in numbers of neuropathic pain patients. In our study the maximum patients (n=10) belonged to age group of 51 to 60 years (31.25%)

Graph 6: This bar graph represents the sex distribution of the neuropathic pain in our study population where the X axis represents the sex and Y axis represents the frequency in numbers of neuropathic pain patients. Graph 2 shows that females (56.25%) were predominantly affected than males (43.75%)
Graph 7: This bar graph represents the duration of symptoms reported in neuropathic pain, where the X axis represents duration in days and Y axis represents the frequency in numbers of neuropathic pain patients. In our study, the maximum duration of symptoms were reported in 120 days (25%).

Graph 8: This bar graph represents the type of neuropathic pain reported in our study population, where the X axis represents the type of neuropathic pain (TN - Trigeminal neuralgia, PHN - Postherpetic neuralgia) and Y axis represents the frequency in number of neuropathic pain patients. In our study, the maximum reported neuropathic pain was TN (96.88%).
Graph 9: This pie chart represents the most common side of face affected in neuropathic pain. Blue colour denotes left side and green denotes right side. This graph shows that left side was predominantly affected (53.13%) followed by right side (46.88%).
Graph 10: This bar graph represents the most commonly affected division of trigeminal nerve in our study population where the X axis represents the division of trigeminal nerve (V1-ophthalmic division, V2- maxillary division, V3- mandibular division) and Y axis represents the frequency in number of neuropathic pain patients. In our study the most commonly affected branch was V3- mandibular division (68.75%).

Graph 11: This bar graph represents the association of age in years and the common side of the face affected in neuropathic pain where the X axis represents the side of face and Y axis represents number of neuropathic patients. Left side was more affected in 51 to 60 (18.75%) years and right in 61 to 70 years (15.62%). Pearson chi square = 2.897  p = 0.575 (p>0.05)(chi-square) which was statistically not significant.
Graph 12: This bar graph represents the association of age and the common type of neuropathic pain where the X axis represents the type of neuropathic pain and Y axis represents number of neuropathic patients. Trigeminal neuralgia was more reported in 51 to 60 (18.75%) years and PHN in 61 to 70 years (15.62%). Pearson chi square = 2.638, p = 0.620 (p > 0.05) (chi-square) which was statistically not significant.
Graph 13 This bar graph represents the association of age and the division of trigeminal nerve affected where the X axis represents the division of trigeminal nerve (V1-ophthalmic division, V2- maxillary division, V3- mandibular division) and Y axis represents number of neuropathic patients. Mandibular division was more reported in 51 to 60 (21.87%) and in 61 to 70 years (21.87%). Pearson chi square= 8.357 p= 0.938 (p>0.05)(chi-square) which was statistically not significant.
Graph 14: This bar graph represents the age distribution of TMD in our study population where the X axis represents the age in years and Y axis represents the frequency in numbers of TMD patients. In our study the maximum patients (n=24) belonged to age group of 21-30 years (43.64%).

Graph 15: This bar graph represents the sex distribution of TMD in our study population where the X axis represents the sex and Y axis represents the frequency in numbers of TMD patients. Graph 2 shows that females (50.91%) were affected more than males (49.09%).
Graph 16: This bar graph represents the type of TMD reported in our study population where the X axis represents the type of TMD (Disc-condyle, MPDS-Myofascial pain syndrome, degenerative disorder) and Y axis represents the frequency in number of TMD patients. In our study the maximum reported TMD was Disc-condyle disorder (65.45%).
Graph 17: This bar graph represents the duration of symptoms reported in TMD, where the X axis represents duration in days and Y axis represents the frequency in numbers of TMD patients. In our study the maximum duration of symptoms were reported in 30 days (23.66%).

Graph 18: This bar graph represents the association of age and type of TMD where the X axis represents the type of TMD (Disc-condyle, MPDS-Myofascial pain syndrome, degenerative disorder) and Y axis represents number of TMD patients. Disc condyle disorder (27.27%) and MPDS (12.7%) was more predominant in 21 to 30 years and in degenerative disorders in 71 to 80 years (3.63%). Pearson chi square = 2.966 p = 0.935 (p>0.05) (chi-square) which was statistically not significant.
Graph 19: This bar graph represents the association of gender and type of TMD where the X axis represents the type of TMD (Disc-condyle, MPDS-Myofascial pain syndrome, degenerative disorder) and Y axis represents number of TMD patients. Disc condyle disorder was predominant in both genders, MPDS in male gender and degenerative disorders in female gender. Pearson chi square= 2.041 p= 0.360 (p>0.05)(chi-square) which was statistically not significant.
Graph 20: This bar graph represents the type of orofacial pain reported in our study population where the X axis represents the type of orofacial pain (Disc-condyle, MPDS-Myofascial pain syndrome, degenerative disorder, TN-Trigeminal neuralgia, PHN-Postherpetic neuralgia, BMS-Burning mouth syndrome) and Y axis represents the frequency in number of orofacial pain patients. In our study the maximum reported was Disc-condyle disorder (37.11%) followed by Trigeminal neuralgia (32.99%).

Graph 21: This bar graph represents the association of age and type of orofacial pain where the X axis represents the type of orofacial pain and Y axis represents number of patients. BMS was more common in 41-50 years (3.15%), neuropathic pain
in 51 to 60 years (11.57%) and TMD in 21 to 30 years (23.15%). Pearson chi square = 65.905 \ p = 0.000 (p < 0.001) (chi-square)

thus revealed a significant association was found between age and type of orofacial pain.