DOI: https://doi.org/10.54361/LJMR.20.1.30

Libyan Journal of Medical Research

www.lmjr.ly/ eISSN: 2413-6096

Original Article

Neurophysiological Characteristics of Orofacial Pain in Patients Attending Private Dental Clinics in Western Libya.

Sarah Yousuf Alhameedi*, Tebra Ramadan Abdulsalam, Salwa Alwafi Abukhedir.
Faculty of Dentistry and Oral Surgery, Surman, Sabratha University, Libya.
Corresponding Author Sarah Yousuf Alhameed i:sara.alhmedy@sabu.edu.ly

Abstract

In private dental clinics in western Libya, dentists frequently encounter patients with orofacial pain that cannot be explained by obvious dental pathology. A retrospective observational study was conducted through the review of archived clinical records of adult patients presenting with orofacial pain between January 2023 and October 2025. Data from 212 eligible cases were analyzed, including demographic variables, pain localization, duration, neurophysiological indicators, and pain mechanism classification. Orofacial pain was categorized as nociceptive, neuropathic, neurovascular, or mixed based on documented clinical assessment. Descriptive statistical analysis was performed using SPSS. The mean age of patients was 42.7 ± 13.6 years, with females comprising 53.8% of the study population. Dental and periodontal pain was the most common presentation (43.4%), followed by temporomandibular joint-related pain (22.6%) and masticatory muscle pain (17.0%). Pain duration exceeded one month in 73.6% of cases, with 32.1% of patients experiencing symptoms for longer than six months. Nociceptive pain was identified in 50.9% of patients, while mixed pain mechanisms accounted for 23.6%, neuropathic pain for 17.9%, and neurovascular pain for 7.5%. Neurophysiological indicators included hyperalgesia in 38.7% of cases, referred pain in 25.5%, allodynia in 21.7%, and persistent pain without identifiable local pathology in 18.9% of patients.The findings demonstrate that a substantial proportion of orofacial pain cases in dental practice involve non-nociceptive or mixed neurophysiological mechanisms and are frequently associated with prolonged pain duration and sensitization-related features. These results underscore the limitations of symptom-based diagnostic approaches and highlight the importance of integrating mechanism-based, neurophysiologically informed assessment strategies into routine dental practice to improve diagnostic accuracy and patient outcomes.

Keywords. Orofacial Pain, Neurophysiology, Trigeminal System, Pain, Dental Practice.

Introduction

In routine dental practice, orofacial pain is often approached as a purely odontogenic problem, despite frequent clinical signs suggesting non-dental mechanisms.

This constitutes a substantial proportion of dental and maxillofacial consultations worldwide.

It encompasses a wide range of pain conditions originating from dental tissues, periodontal structures, temporomandibular joints, masticatory muscles, cranial nerves, and central nervous system pathways [1]. The multifaceted nature of orofacial pain often complicates diagnosis and management, particularly when pain mechanisms extend beyond simple nociceptive processes.

Clinically, patients with chronic orofacial pain often describe burning or electric sensations, which correspond to dysfunction within the trigeminal sensory system.

, which exhibits unique anatomical and functional characteristics compared to spinal pain pathways. Primary afferent nociceptors innervating orofacial structures transmit pain signals to the trigeminal ganglion and subsequently to the spinal trigeminal nucleus, where complex processes of signal integration, modulation, and central sensitization occur

[2]. These mechanisms contribute to clinical features such as hyperalgesia, allodynia, referred pain, and pain chronification, which are frequently observed in dental patients.

Accumulating evidence suggests that persistent orofacial pain is strongly associated with neuroplastic changes at both peripheral and central levels. Peripheral sensitization results from inflammatory mediators lowering nociceptor activation thresholds, whereas central sensitization involves enhanced excitability of second-order neurons and impaired descending inhibitory control [3]. Such neurophysiological alterations may explain why some patients continue to experience pain despite the apparent resolution of the initial dental pathology, leading to diagnostic uncertainty and inappropriate treatment interventions.

Clinically, orofacial pain may be classified into nociceptive, neuropathic, neurovascular, and centrally mediated pain disorders. Conditions such as trigeminal neuralgia, burning mouth syndrome, persistent idiopathic facial pain, and temporomandibular disorders exemplify the intricate relationship between neural dysfunction and clinical symptomatology [4]. Failure to recognize the underlying neurophysiological mechanisms often results in overtreatment, including unnecessary dental extractions or endodontic procedures, which may exacerbate patient suffering and healthcare burden.

The epidemiology and clinical patterns of orofacial pain vary considerably across populations, influenced by

Received: 15-02-2026-*Accepted:* 02-04-2026 -*Published:* 08-04-2026

DOI: https://doi.org/10.54361/LJMR.20.1.30

Libyan Journal of Medical Research

www.lmjr.ly/ eISSN: 2413-6096

demographic factors, healthcare infrastructure, diagnostic awareness, and sociocultural context. In low- and middle-income countries, limited access to specialized pain services and insufficient incorporation of neurophysiological principles into dental education further hinder optimal management [5].

In Libya, particularly in the western region, data on the neurophysiological mechanisms of orofacial pain remain limited. Despite its clinical relevance, region-specific research addressing the neurophysiological basis of orofacial pain in dental practice remains scarce.

In Libya, particularly in the western region, available literature on orofacial pain is limited and predominantly focuses on descriptive clinical findings, with minimal emphasis on neurophysiological mechanisms and their implications for dental management. The city of Surman represents a key regional center for dental healthcare, serving patients with diverse acute and chronic orofacial pain conditions. Therefore, this study was conducted to describe the neurophysiological characteristics of orofacial pain among patients attending private dental clinics in Surman and to explore their implications for routine dental diagnosis.

Metrial and Methods

Study Design

A retrospective observational study was performed using archived clinical records from private dental clinics in Surman. designed to investigate the neurophysiological basis of orofacial pain and its clinical implications in dental practice. A retrospective design was selected to enable systematic evaluation of real-world clinical data derived from routine dental care, with particular emphasis on pain characteristics and diagnostic patterns encountered in private dental settings.

Study Setting

The study was carried out in private dental clinics located in the city of **Surman, Western Libya**. These clinics represent the primary point of care for patients seeking dental consultation for orofacial pain and provide a broad range of services, including oral diagnosis, conservative dentistry, and management of acute and chronic pain conditions. No hospital-based data were included in this study.

Study Period

Clinical records were reviewed for the period extending from **30 January 2023 to 30 October 2025**. This duration was selected to ensure adequate case accumulation and to capture variations in clinical presentation over time.

Study Population

During the study period, a total of **238 patient records** presenting with orofacial pain were initially identified from participating private dental clinics. After applying the predefined inclusion and exclusion criteria, **212 cases** were deemed eligible and included in the final analysis. This sample size was considered appropriate for descriptive and exploratory assessment of orofacial pain patterns within the defined timeframe and clinical setting.

Inclusion and Exclusion Criteria

Inclusion criteria

The inclusion criteria for the study encompassed patients of both sexes aged 18 years and older who presented with pain localized to the orofacial region, including dental, periodontal, temporomandibular, muscular, or neuropathic origins. Only cases with complete clinical documentation detailing pain characteristics, diagnostic evaluation, and management approach were considered eligible. Furthermore, the study was restricted to cases managed exclusively within private dental clinics during the designated study period.

Exclusion criteria

The exclusion criteria for the study encompassed cases with incomplete or insufficient clinical records, as well as patients presenting with orofacial pain secondary to acute facial trauma or recent maxillofacial surgery. Individuals who were referred directly to hospital-based care without undergoing a definitive diagnostic assessment in the private clinic setting were also excluded. Furthermore, patients with documented systemic neurological or psychiatric conditions identified as the primary cause of pain perception were not considered eligible for inclusion.

Data Collection

Data were retrospectively extracted from archived clinical records using a standardized data extraction form specifically developed for this study. The collected data encompassed demographic variables, including age and sex, as well as detailed pain-related characteristics such as pain duration, anatomical location, pain quality (e.g., sharp, burning, or throbbing), pain intensity as documented by the attending clinician, and the presence of triggering or alleviating factors. Clinical findings were also recorded, including dental and periodontal status, temporomandibular joint assessment, muscular tenderness, and neurological signs when available. In addition, pain conditions were diagnostically classified as nociceptive, neuropathic, neurovascular, or Pain was classified as neuropathic when it was described as burning or electric in nature and accompanied by sensory disturbances such as allodynia or numbness; nociceptive pain was considered when pain was clearly related to identifiable dental or periodontal pathology. Information regarding management strategies was collected, including dental interventions, pharmacological treatments, patient counseling, and referrals to specialists when indicated.

Neurophysiological Assessment

Clinical interpretation of pain mechanisms was guided by contemporary neurophysiological concepts of

Received: 15-02-2026-*Accepted:* 02-04-2026 -*Published:* 08-04-2026

DOI: https://doi.org/10.54361/LJMR.20.1.30

Libyan Journal of Medical Research

www.lmjr.ly/ eISSN: 2413-6096

orofacial pain, including peripheral and central sensitization, trigeminal nerve involvement, and pain modulation pathways. Although advanced neurophysiological testing was not routinely performed in private clinics, clinical indicators such as allodynia Hyperalgesia was recorded when patients reported exaggerated pain in response to gentle dental probing or palpation compared with adjacent tissues, while allodynia was noted when normally non-painful stimuli elicited pain.

Ethical Considerations

Ethical approval for this study was obtained from the authorities before data collection. Given the retrospective nature of the study and the use of anonymized clinical records, informed consent was waived. All data were handled confidentially, and no personally identifiable information was recorded or disclosed.

Statistical Analysis

All data were entered into a computerized database and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistical analyses were performed to summarize demographic variables and clinical characteristics. Categorical data were presented as frequencies and percentages, while continuous variables were expressed as means and standard deviations. The analysis was primarily descriptive, in line with the exploratory objectives of the study.

Results

A total of 212 patients presenting with orofacial pain were included in the final analysis. The study population consisted of adult patients managed exclusively in private dental clinics in Surman, Western Libya, during the defined study period.

Table 1. Demographic Characteristics of the Study Population (n = 212)

Variables	(n)	(%)
Male	98	46.2
Female	114	53.8
Age Group (years)		
18–30	48	22.6
31–50	94	44.3
51–65	52	24.5
>65	18	8.6
Total	212	100

n = number; % = Percentage.

The demographic distribution of the study population is presented in (**Table 1**). The mean age of patients was **42.7 ± 13.6 years,** with ages ranging from 18 to 78 years. The highest frequency of cases was observed in the 31–50-year age group. A slight female predominance was observed.

Table 2. Pain Localization and Duration (n = 212)

Variables	(n)	(%)
Primary Pain Location		
Dental / Periodontal	92	43.4
Temporomandibular joint	48	22.6
Masticatory muscles	36	17.0
Multiple orofacial sites	22	10.4
Other facial regions	14	6.6
Pain Duration		
< 1 month	56	26.4
1–6 months	88	41.5
> 6 months	68	32.1

n= number; % = Percentage.

As shown in Table 2, most patients initially attended the clinic with complaints that were initially interpreted as dental or periodontal pain. However, subsequent assessment suggested non-dental mechanisms in a considerable proportion. presentation, accounting for 92 cases (43.4%), followed by temporomandibular joint-related pain in **48 patients (22.6%)** and masticatory muscle pain in **36 patients (17.0%)**. Pain involving multiple orofacial sites was observed in **22 cases (10.4%),** while other facial regions accounted for **14 cases (6.6%),** reflecting the heterogeneous nature of orofacial pain presentations in private dental practice. With respect to pain duration, symptoms lasting **1–6 months** were reported by **88 patients (41.5%)**, whereas **68 patients (32.1%)** experienced pain persisting for more than six months. Short-term pain of less than one month was documented in **56 cases (26.4%)**. Clinically, prolonged pain was reflected in repeated visits for unresolved symptoms lasting several months.

Table 3. Neurophysiological Classification of Orofacial Pain (n = 212)

Pain Mechanism	(n)	(%)
Nociceptive	108	50.9
Neuropathic	38	17.9
Neurovascular	16	7.5
Mixed	50	23.6
Total	212	100

n = number; % = Percentage.

As presented in (Table 3), nociceptive pain was the predominant mechanism, identified in **108 patients (50.9%)**. Mixed pain mechanisms were observed in **50 cases (23.6%),** followed by neuropathic pain in **38 patients (17.9%)**, while neurovascular pain accounted for **16 cases (7.5%)**. The considerable proportion of non-nociceptive and mixed pain presentations highlights the clinical complexity of orofacial pain and underscores the importance of mechanism-based classification to support accurate diagnosis and appropriate management in dental practice.

Received: 15-02-2026-*Accepted:* 02-04-2026 -*Published:* 08-04-2026

DOI: https://doi.org/10.54361/LJMR.20.1.30

Libyan Journal of Medical Research

www.lmjr.ly/ eISSN: 2413-6096

Figure 1. Distribution of Neurophysiological Indicators among Patients with Orofacial Pain (n = 212)

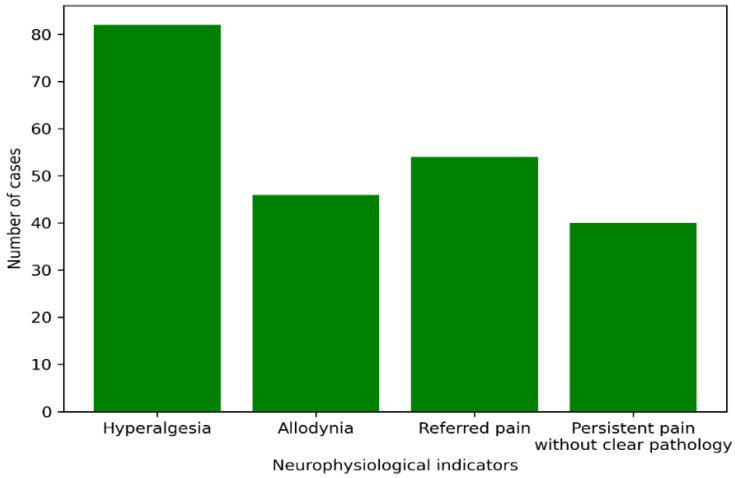

Figure 1 illustrates the distribution of key neurophysiological indicators among patients presenting with orofacial pain. Hyperalgesia was the most frequently documented indicator, observed in 82 patients (38.7%), reflecting heightened peripheral or central nociceptive sensitivity. Referred pain was identified in 54 cases (25.5%), suggesting involvement of convergent neural pathways within the trigeminal system. Allodynia was reported in 46 patients (21.7%), indicating altered central pain processing and reduced inhibitory modulation. Persistent pain in the absence of identifiable local pathology was documented in 40 cases (18.9%), highlighting the potential contribution of central sensitization mechanisms to pain chronification. Collectively, these findings underscore the significant role of neurophysiological alterations in a substantial proportion of orofacial pain presentations and emphasize the importance of incorporating mechanism-based assessment into routine dental practice.

Discussion

In daily clinical practice, this variability was reflected in patients returning repeatedly with unresolved pain after conventional dental treatment. The findings revealed considerable variability in pain characteristics, duration, and underlying mechanisms, highlighting the multifactorial nature of orofacial pain and the importance of mechanism-based diagnostic approaches in dental practice. The demographic distribution of the study population demonstrated a higher prevalence of orofacial pain among middle-aged adults, with a slight predominance among female patients. This pattern is consistent with previous epidemiological studies indicating that chronic orofacial pain conditions are more frequently reported in females and individuals within middle adulthood [5, 6]. Hormonal influences, psychosocial stressors, and gender-related differences in pain perception have been proposed as contributing factors to these observations. Regarding pain localization, odontogenic and periodontal pain represented the most commonly reported sources, followed by temporomandibular joint and masticatory muscle-related pain. While similar patterns have been reported in specialist pain clinics, our data originate from general dental practice, where diagnostic uncertainty is more frequent. This identified dental and musculoskeletal etiologies as the predominant causes of orofacial pain in general dental practice [6]. However, the presence of pain affecting multiple orofacial sites in a substantial proportion of patients suggests an overlap between peripheral and central pain mechanisms, complicating diagnosis and management. A notable finding of the present study was the high proportion of patients experiencing prolonged pain duration. More than two-thirds of the study population reported symptoms persisting for longer than one month, while a considerable number experienced pain for more than six months. These findings align with previous research indicating that persistent nociceptive input may lead to central sensitization, resulting in pain chronicity even in the absence of ongoing tissue damage [3]. Chronic orofacial pain poses significant diagnostic and therapeutic challenges in dental settings. The neurophysiological classification of pain mechanisms revealed that nociceptive pain was the most prevalent; however, a substantial proportion of patients exhibited neuropathic or mixed pain characteristics. This observation is consistent with earlier reports emphasizing that neuropathic components of orofacial pain are frequently underrecognized in dental practice, often leading to inappropriate or excessive dental interventions [8]. Mixed pain mechanisms reflect the complex interaction between peripheral pathology and central neural dysfunction.

Clinical indicators such as hyperalgesia, referred pain, and allodynia were commonly identified, suggesting altered pain processing within the trigeminal system. These findings are supported by neurophysiological studies demonstrating that both peripheral sensitization and central sensitization play key roles in the development and maintenance of orofacial pain disorders [1, 2]. The identification of pain in the absence of clear local pathology in some patients further underscores the importance of considering central mechanisms during clinical assessment. From a clinical perspective, the findings highlight the limitations of purely structural or symptom-based diagnostic approaches in the management of orofacial pain. Previous studies have shown that failure to identify underlying neurophysiological mechanisms may result in unnecessary endodontic or surgical procedures, potentially exacerbating pain chronicity and negatively affecting patient outcomes [9]. Integrating neurophysiological principles into routine dental evaluation may improve diagnostic accuracy and guide more effective, individualized management strategies. The consistency of pain patterns observed across private dental

Received: 15-02-2026-*Accepted:* 02-04-2026 -*Published:* 08-04-2026

DOI: https://doi.org/10.54361/LJMR.20.1.30

Libyan Journal of Medical Research

www.lmjr.ly/ eISSN: 2413-6096

clinics suggests that the neurophysiological characteristics of orofacial pain are broadly applicable across different practice settings. Similar conclusions have been reported in international studies conducted in both community-based and specialist dental environments [10]. Nevertheless, the limited availability of regional data emphasizes the importance of the present study in contributing context-specific evidence from Libya. Because pain mechanisms were inferred from routine clinical notes rather than standardized diagnostic instruments, misclassification cannot be excluded, particularly in patients with overlapping muscular and neuropathic features. Its reliance on clinical records may have limited the availability of standardized pain assessment data, and advanced neurophysiological testing was not routinely performed. Additionally, the findings may not be fully generalizable to public or hospital-based dental services. Future prospective studies incorporating standardized diagnostic criteria, validated pain assessment tools, and longer follow-up periods are recommended to further clarify the neurophysiological determinants of orofacial pain [11]. In summary, the findings of this study emphasize the clinical relevance of understanding the neurophysiological basis of orofacial pain. Adopting a mechanism-based approach to diagnosis and management may enhance patient outcomes, reduce unnecessary interventions, and improve the overall quality of dental care.

Conclusion

Dentists should suspect non-odontogenic pain when symptoms persist despite adequate dental treatment and when sensory abnormalities such as allodynia are present. The findings demonstrate that orofacial pain presents with diverse characteristics and underlying mechanisms, extending beyond purely odontogenic causes and frequently involving neuropathic and mixed pain components. Such complexity underscores the necessity for comprehensive diagnostic strategies that integrate clinical examination with an understanding of peripheral and central pain mechanisms. The results emphasize that prolonged pain duration and the presence of sensitization-related features are common among dental patients, suggesting a substantial risk of pain chronicity when underlying mechanisms are not adequately addressed. These observations reinforce the limitations of symptom-based treatment approaches and support the integration of mechanism-based pain classification into routine dental care to enhance diagnostic accuracy and therapeutic effectiveness. Furthermore, the study provides context-specific evidence from private dental clinics in Surman and Sabratha, contributing to the limited regional literature on orofacial pain within the Libyan clinical setting. The consistency of findings across clinical environments indicates that neurophysiological principles of pain assessment are broadly applicable and can be effectively implemented in diverse dental practice contexts.

Acknowledgements

The authors would like to thank the staff team at Libyan Teaching Hospital for their help and support during the research study. They appreciate their cooperation, which was invaluable in enabling the author to conduct the research, and they are grateful to those who participated in the study.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

1. Sessle BJ. Peripheral and central mechanisms of orofacial pain and their clinical correlates. Minerva Anestesiol. 2011 Mar;77(3):233-46.
2. Borsook D, Burstein R, Yamamura H. The neurobiology of pain: Implications for clinical dentistry. J Oral Rehabil. 2014 Feb;41(2):87-99. doi: 10.1111/joor.12130.
3. Woolf CJ. Central sensitization: implications for the diagnosis and treatment of pain. Pain. 2011 Mar;152(3 Suppl):S2-S15. doi: 10.1016/j.pain.2010.09.030
4. Orofacial Pain Classification Committee. International classification of orofacial pain, 1st edition (ICOP). Cephalalgia. 2020 Feb;40(2):129-221. doi: 10.1177/0333102419893823.
5. Macfarlane TV, Beasley M, Macfarlane GJ. The epidemiology of orofacial pain. Pain. 2018 Sep;159(9):1691-1697. doi: 10.1097/j.pain.0000000000001274.
6. Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley JL 3rd. Sex, gender, and pain: a review of recent clinical and experimental findings. J Pain. 2009 May;10(5):447-85. doi: 10.1016/j.jpain.2008.12.001.
7. Okeson JP. Management of Temporomandibular Disorders and Occlusion. 8th ed. St. Louis: Elsevier; 2020.
8. Benoliel R, Eliav E. Neuropathic orofacial pain. Oral Maxillofac Surg Clin North Am. 2008 May;20(2):237-54. doi: 10.1016/j.coms.2007.12.002.
9. Renton T. Dental (odontogenic) pain. Rev Pain. 2011 Mar;5(1):2-7. doi: 10.1177/204946371100500102.
10. Sharav Y, Benoliel R. Orofacial Pain and Headache. 2nd ed. Edinburgh: Elsevier; 2015.
11. Ohrbach R, Dworkin SF. The evolution of temporomandibular disorder diagnosis: Past, present, future. J Dent Res. 2016 Oct;95(10):1093-101. doi: 10.1177/0022034516653922.

Received: 15-02-2026-*Accepted:* 02-04-2026 -*Published:* 08-04-2026