ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 4, Issue – 3, May - 2021, Page No. : 403 - 407

Prevalence and characteristics of referred pain of pulpal origin in the head and neck region

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Citation of this Article: Dr. Bharati Patil, Dr. Sikha Poudyal, "Prevalence and characteristics of referred pain of pulpal origin in the head and neck region", IJDSIR- May - 2021, Vol. – 4, Issue - 3, P. No. 403 – 407.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Objective: To evaluate the prevalence and characteristics of referred pain of pulpal origin in the head and neck region.

Material and Methods: In this cross sectional study 100 patients (65 females and 35 males) experiencing odontogenic pain were evaluated via clinical and radiographic examination to seek their pain sources and sites. Non-odontogenic painful diseases, advanced periodontal disease and multiple carious lesions were excluded. The characteristics of pain and its referral pattern was noted with the help of a validated questionnaire.

Results: 53 out of 100 participants were found to have referred pain. Among patients with referred pain 88.7% had sudden onset of pain, 56.6% had dull type of pain, 62.3% had moderate pain intensity, 13.2% had pain duration of less than one week and 86.8% had intermittent type of pain. Among the study participants 36% showed pain referral to the region of ear, 29% to the region of head, 27% to neck region, 12% to upper jaw, 10% to lower jaw and 9% to temporal region.

According to statistical analysis, severity of pain (P=0.04), duration (P=0.01) and frequency (P=0.01) influenced its referral nature, while age and gender of patients, aggravating and relieving factors had no considerable effect on pain referral.

Conclusion: The prevalence of referred pain with pulpal origin in the head and neck region is moderately high and the pain characteristics have a significant role in influencing the nature of pain referral.

Keywords: Referred Pain, Pulpal Origin

Introduction

Referred pain is a kind of pain perceived in a part of body, which is far from the source of pain. It may also be detected in the face and teeth e.g. a toothache may be referred to non-dental anatomic structures and vice versa pain from other regions may be perceived in teeth.[1] Pain sensations during pulpitis can range from hypersensitivity to thermal stimuli to severe throbbing, aching pain that can be referred and often difficult to localize, making

diagnosis a challenging situation for the clinician. The perception of pain is an unpleasant and devastating experience, and its variable levels of discomfort are a challenge to diagnostic methods, endodontic therapy and endodontic knowledge.[2]

In the trigeminal system high convergence at the spinal trigeminal nucleus of the trigeminal and cervical primary afferent neurons, originating in the pulp, periodontal, oral mucosa, muscles and joints, has been implicated in the mechanism of referred pain. For this reason referred painful conditions of the teeth may have originated in distant territories as the ear, muscles of occipital region, masticatory muscle or in other teeth. And likewise the teeth have a propensity to cause pain which can be referred to other distant sites resulting in complaints like headache earache neck pain etc.[3]

Referred pain is frequently distinguished by local irritation and elective local anaesthesia. In other words, whenever there is referred pain, the local irritation such as, heat and percussion do not increase pain, and local anaesthesia when given at the site of pain does not alleviate it as well. However, referred pain may interfere with diagnosis as the basic step for treatment. They do not appear to follow a uniform pattern and new referral modalities may always be encountered.[1]

Meanwhile, paucity of literature regarding referred pain makes it necessary to design studies about similar subjects. Therefore, this study was aimed to evaluate the prevalence and characteristics of referred pain of pulpal origin in the head and neck region.

Material and Methods

One hundred patients (65 females and 35 males) reporting odontogenic pain who visited the outpatient department of Oral Medicine and Radiology in the Oxford Dental College, Bangalore were evaluated via clinical and radiographic examination to seek their pain sources and sites. Inclusion criteria were patients ranging from 18-60 years who presented with pain of pulpal origin which was confirmed by diagnostic aids. Exclusion criteria were non-odontogenic painful diseases, advanced periodontal disease and multiple carious lesions that make it difficult to consider a distinct pulpal origin for the pain. A questionnaire validated by subject experts was distributed among the patients which included demographic information, medical history, characteristics of pain, aggravating and relieving factors. Pain intensity was measured by having patients mark the appropriate number on a numerical rating scale ranging from 0 to 10 where 0 signified no pain and 10 signified extreme pain respectively. And if patients had referred pain then they were asked to specify the region and mark the area in the questionnaire. Searching for pain source began using subjective reports of patients, clinical verification and radiographic interpretation. After recognition of pain source and site, if they were the same it was considered as non-referred pain otherwise it was considered as a referred pain. The Chi-square test was used to detect the prevalence of referred pain and the association of referred pain with the verbal description of its characteristics, the region involved, aggravating and relieving factors, and the final diagnosis.

Results

Among 100 patients (65females and 35males), ranging from 18-60 years old who presented with pulpal pain, 53% had experienced pain referral to the head and neck region. Majority of the patients who experienced referred pain were between the age group of 31-40years (56.0%).Males showed significantly higher prevalence of referred pain (71.4%) as compared to their female (43.1%) counterparts. Among patients with referred pain, 88.7% had sudden onset of pain, 56.6% had dull type of pain, 62.3% had moderate intensity of pain, 52.8% had pain duration for 3-

4 weeks and 86.8% had intermittent type of pain. 86.8% patients with referred pain showed increase in pain while chewing food, 11.3% while lying down and 21.3% during night time while 41.5% had relief from pain on taking medication. Among the 100 study participants 88.7% showed unilateral type of referred pain whereas 11.3% showed bilateral type of referred pain. Among patients with referred pain, 58.5% were diagnosed with chronic periapical abscess followed by acute periapical abscess (9.4%) and periapical granuloma (9.4%) and chronic irreversible pulpitis (22.6%).

Discussion

Referred pain is a phenomenon experienced by countless individuals and can cause considerable difficulties in diagnosis. A mechanism that has been proposed to explain referral pain is convergence, in which primary afferent fibers from different sites converge on the same second order neuron in the brainstem nucleus. In this study the prevalence of referred pain was found to be 53% which is low in comparison with the study conducted by Maryam et al where the prevalence of referred pain was found to be 67.3%.[4]

Majority of patients with referred pain were between the age group of 31-40years (56.0%). Males showed significantly higher prevalence of referred pain (71.4%) which is in contrary with the study by Brandao et al where females had a higher prevalence which was linked to estrogen receptors in the spinal trigeminal nucleus.[3]

The present study evaluated the effect of the intensity, quality, duration and frequency of odontogenic pain on the prevalence and clinical characteristics of pain referral in the orofacial region. Among patients with referred pain, 88.7% showed sudden onset of pain, 56.6% showed dull type of pain, 62.3% showed moderate type of pain, 86.8% had intermittent type of pain and 52.8% had pain for duration of 3-4 weeks.

The intensity, duration and frequency of pain was found to significantly affect the presence of referred pain that is in agreement with the study conducted by Falace et al. The relationship between intensity of pain and the tendency for referral is attributable to extensive convergence of primary orofacial afférents into the medullary dorsal horn of the spinal cord. Thus, nociceptive input from painful teeth converges onto specific areas of the medullary dorsal horn. The noxious input may be perceived by cortical structures to originate from surrounding areas, leading to inability of patients to accurately localize deep sources of pain.[5]

In this study, among patients with referred pain 86.8% showed increase in pain while chewing food, 11.3% on lying down, 21.3% during night time and 41.5% showed relief from pain on taking medications that is in contrary with the findings in the study by Mardani et al where the kind of stimulus like temperature, mastication and pressure had no effect on the prevalence of referred pain.[1]

Among the 100 study participants 88.7% had unilateral type of referred pain and maximum patients (36%) showed pain referral to the ear region which is in agreement with the study conducted by Sameer et al and Mohammad et al.[6 7]

In this study when considering various regions of the head and neck affected by referred pain based on the different teeth involved,66.7% of the maxillary posterior teeth showed referred pain in the upper jaw region, 90% of the mandibular posterior teeth showed referred pain in the lower jaw, 37.9% of the maxillary posterior teeth showed referred pain in the head region,51.9% of the maxillary posterior teeth showed referred pain in the neck region,47.2% of the mandibular posterior teeth showed referred pain in the ear region, 44.4% of the maxillary posterior teeth showed referred pain in the temporal region which is in agreement with the study conducted by Falace

et al where the most commonly reported site of pain referral was to the adjacent teeth and to the teeth in the opposite arch along with extra oral pain referral which occurred in the jaw, face, head, and neck region.[5]

It has been estimated that about 50% of all pulpal neurons converge with other neurons onto the same trigeminal projection neurons. A strong nociceptive barrage is thought to contribute to central nervous system hyper excitability which may be responsible for spread and referral of pain outside the normal dermatomal distribution.[8]

The results of the present study show that there is a positive correlation between pain referral and intensity, duration and frequency of pain.

Figures

The referral pattern of pain to various regions among the study participants and the various regions affected by referred pain based on different teeth involved has been described below.

Figure 1

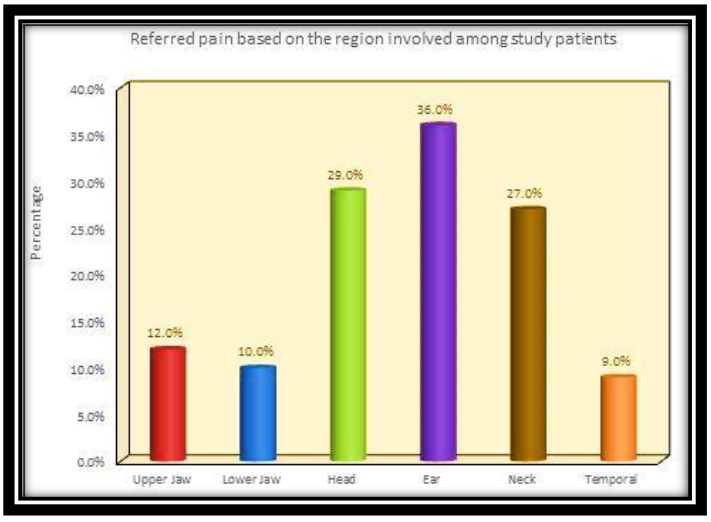
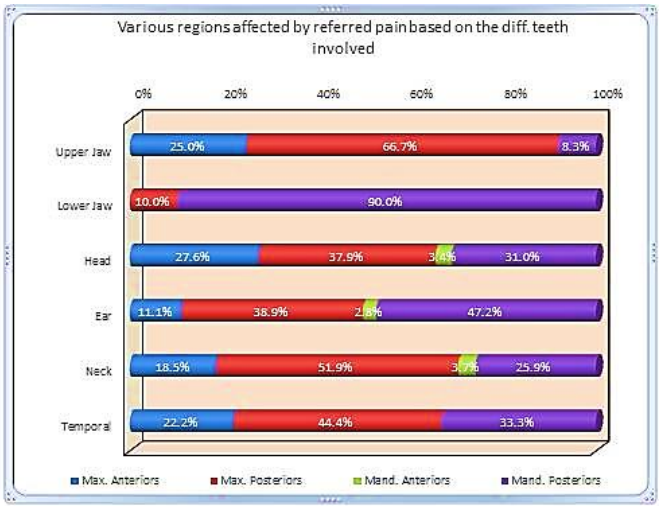


Figure 2



Conclusion

Odontogenic pain can produce widespread referral pain to a variety of sites in the head and neck region .It is essential to listen to each patient, obtain a detailed case history, collect comprehensive diagnostic data, and develop an accurate diagnosis before initiating treatment. Once the diagnosis of odontogenic referred pain is established, the treatment should emphasize on eliminating the etiology causing the original pain.

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