






ORIGINAL PAPER

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## The incidence and pattern of non-odontogenic orofacial pain conditions at a tertiary hospital in Tanzania

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### ABSTRACT

**Introduction and aim.** Non-odontogenic orofacial pain (NOFP) is a result of pathology, or injury to the structures in the orofacial region including the muscles, temporomandibular joint, neurovascular structures, and glands. This multi-diverse aetio-pathogenesis poses a challenge in the diagnosis and management of NOFP. To determine the incidence and trend of various non-odontogenic orofacial pain conditions at a tertiary hospital in Tanzania.

**Material and methods.** This cross-sectional study was conducted at the Muhimbili National Hospital (MNH) for 6 months. The information gathered included socio-demographic characteristics of participants, characteristics of pain, and cause of pain. Pain intensity was assessed using the Visual Analogue Scale (VAS).

**Results.** The incidence of NOFP was 3.3%. The male to female ratio was 1.7:1 and the mean age of patients was  $44.2 \pm 17.4$  years. The mean intensity of the pain using the VAS was  $47.27 \pm 5.66$ . Most (36.7%) patients experienced sharp pain. The common causes of NOFP were trauma (43.3%) and malignant lesions (38.3%). A statistically significant association between the age and sex of the patients and the causes of non-odontogenic pain was observed ( $p < 0.05$ ).

**Conclusion.** The incidence of non-odontogenic orofacial pain is low. Trauma and malignant conditions were the leading causes of NOFP.

**Keywords.** incidence, inflammation, non-odontogenic pain, pattern, Tanzania

### Introduction

Orofacial pain (OFP) which has been defined as pain whose origin is below the orbito-meatal line, above the neck, and anterior to the ears, including pain within the mouth is a common affliction that affects between 10 and 50% of the population.<sup>1,2</sup> The pain in the facial region can be classified broadly based on its origin as odontogenic (arising from the tooth and its supporting structures) or non-odontogenic (which can arise from musculoskeletal, neurological, or vascular structures around the head and neck).<sup>3,4</sup>

When pain occurs in the orofacial area, it is very important to identify and diagnose its cause.<sup>5</sup> Odontogenic pain is the most common orofacial pain and it can be managed well and predictably.<sup>3,6</sup> However, non-odontogenic orofacial pain (NOFP) represents a challenge to the clinician since the pain can arise from many sources with overlapping signs and symptoms.<sup>2,7</sup>

The clinical presentation of non-odontogenic pain varies and can be very mild and intermittent or severe, sharp, and continuous depending on the etiology/source.<sup>6,8</sup> Obtaining a detailed history from the patient

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including the location, duration, frequency, periodicity, character, and quality of pain assists in reaching to correct diagnosis.<sup>9</sup> This is of key importance to guide the delivery of appropriate treatment and avoiding unnecessary treatment without eliminating the source.<sup>8</sup>

Currently in Africa there is a paucity of studies on orofacial pain especially of the non-odontogenic type.<sup>2</sup> and Tanzania is not exceptional. This makes it a challenging task to quantify the extent of the problem in our population. It is important to have local epidemiological information regarding non-odontogenic pain in Tanzania instead of basing on western literature due to considerable differences in sociocultural and environmental factors. With local information at hand, it will become easier for clinicians to have a high suspicion index for the cause when a person with orofacial pain present to them for treatment.

### Aim

This study was conducted to determine the incidence and trend of various non-odontogenic orofacial pain conditions at a tertiary hospital in Tanzania.

### Material and methods

This was a cross-sectional hospital-based study that was conducted at the Muhimbili National Hospital (MNH) from September 2019 up to February 2020. A convenient method of sampling was used whereby all patients with orofacial pain were received and screened. Only those with non-odontogenic OFP were further physically examined, investigated and those who consented were included in the study. Patients who were mentally challenged, aged under 18 years, and/or had been previously diagnosed with non-odontogenic orofacial pain and in whom management had already been instituted before the commencement of the study were excluded. All patients who qualified were recruited until the end of the data collection period (i.e Feb 2020).

A specific questionnaire that was translated to the Swahili language was used for this study. It captured information regarding the socio-demographic characteristics of participants, the characteristics of pain (intensity, nature, aggravating factors, and relieving factors), and the cause of pain (which was obtained after a thorough examination of the patient to ascertain diagnosis). The questionnaire used was reviewed by specialists in the field of oral and maxillofacial surgery and medicine for the assessment of its validity. A pilot study was conducted to ascertain the clarity of the questions asked.

Pain intensity was assessed using the Visual Analogue Scale (VAS) which is a continuous scale comprised of a horizontal line of 10 centimeters (100 mm) in length, anchored by “no pain” (score of 0) and “pain as bad as it could be” or “worst imaginable pain” (score

of 100 [100-mm scale]). The respondent was asked to place a line perpendicular to the VAS line at the point that represents their pain intensity and that was measured with a ruler. The VAS scale was graduated into ten intervals for ease of understanding for the patients. Before administering the questionnaire, patients were given an explanation and demonstration of how to score the VAS scale.

The management of NOFP in this study followed the protocol of managing orofacial pain in the department on oral and maxillofacial surgery - MNH. All patients were managed on the same day of reporting after establishing the cause of pain. Chronic pain due to malignancy was managed initially by acetaminophen and non-steroidal anti-inflammatory drugs (diclofenac and/or ibuprofen). The 2<sup>nd</sup> line of treatment included weak opioids (tramadol), and strong opioids (morphine) depending on the severity of pain. Pain due to trauma and inflammatory conditions was managed by either acetaminophen alone or in combination with non-steroidal anti-inflammatory drugs (NSAIDs). The neuropathic pain was managed by anticonvulsants (carbamazepine) and antidepressants (amitriptyline). The myofascial pain and temporomandibular joint disorders were managed by the use of acetaminophen and/or NSAIDs and antidepressants/ muscle relaxants (diazepam).

Age was grouped into 18-40, 41-60, and > 60 years. Marital status was dichotomized into those without a partner (single, divorced, and widowed) and those with a partner (cohabiting and married). Education was dichotomized into lower (no formal education and primary education) and higher education (secondary, college education, and above). The occupation was dichotomized into those with a stable income (civil servants, businesspersons, the self-employed, and those who were employed privately were considered to have a stable income) and with unstable income (no formal employment, students, peasants, petty traders). The pain intensity was categorized into no pain (0–4 mm), mild pain (5–44mm), moderate pain (45–74 mm), and severe pain (75–100 mm).<sup>10</sup>

The data obtained from this study were coded, entered into the computer program, and analyzed using SPSS software version 23.0. Data was presented in the form of the mean for continuous variables and percentages for categorical variables. The probability level of  $p < 0.05$  was selected for statistical significance.

The study was approved by the Institution Review Board of the Muhimbili University of Health and Allied Sciences (Ref.No.287/298/01A) and permission was granted by the MNH. Participation was voluntary and for each participant, a signed informed consent form was obtained before data collection. The participants were assured of confidentiality and their right to par-

ticipate or withdraw without any conditions. No names were used to avoid identification. All patients were treated according to the established protocol in MNH, and refusal to participate or withdraw from the study did not compromise the management of the patient.

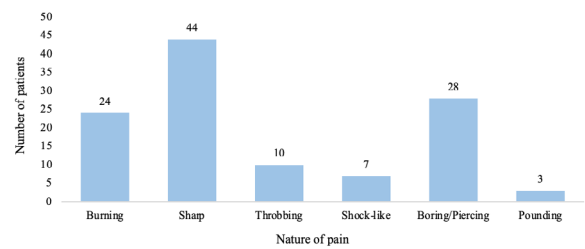
**Results**

A total of 3651 patients with orofacial pain (OFP) were attended to at the oral and maxillofacial clinic throughout the study period. Those who had orofacial pain due to non-odontogenic causes were 120 (3.3%). Most (75, 62.5%) were male, with a male to female ratio of 1.7:1. The age of the patients ranged from 19 to 89 years, with a mean age of  $44.2 \pm 17.4$  years. Almost half (61, 50.8%) of the patients were aged  $\leq 40$  years, most (82, 68.3%) had a low level of education and a few had a stable source of income (Table 1).

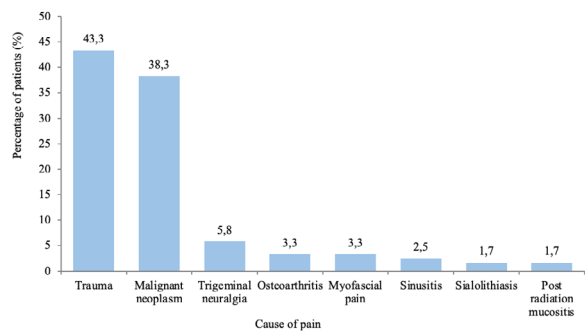
**Table 1.** Distribution of patients with non-odontogenic orofacial pain according to socio-demographic features

Socio-demographic characteristics	Gender		Total n (%)
	Male n (%)	Female n (%)	
<b>Age (years)</b>			
18-40	46 (61.3%)	15 (33.3%)	61 (50.8%)
41-60	17 (22.7%)	13 (28.9%)	30 (25.0%)
>60	12 (16.0%)	17 (37.8%)	29 (24.2%)
<b>Marital status</b>			
Without partner	32 (42.7%)	20 (44.4%)	52 (43.3%)
With partner	43 (57.3%)	25 (55.6%)	68 (56.7%)
<b>Education</b>			
Lower level	51 (68.0%)	31 (68.9%)	82 (68.3%)
Higher level	34 (32.0%)	14 (31.1%)	38 (31.7%)
<b>Occupation</b>			
Stable income	40 (53.3%)	16 (35.6%)	56 (46.7%)
Unstable income	35 (46.7%)	29 (64.4%)	64 (53.3%)

The onset of the pain in the majority (91, 75.8%) was gradual and the remaining ones (29, 24.2%) reported a sudden onset. Pain radiation to the other side was reported by 47 (39.2%) patients. The intensity of the pain using the visual analogue score (VAS) ranged from 13 to 100 with a mean of  $47.27 \pm 5.66$ . Most (44, 36.7%) patients experienced sharp pain (Fig 1). The factors that aggravated pain included chewing (105, 87.5%), tooth brushing (70, 58.3%), speaking/talking (63, 52.5%), and washing face (14, 11.7%). Most (72, 60%) patients took medication for pain relief, other methods included resting (59, 49.2%) and massaging the painful region (4, 3.3%). The common causes of non-odontogenic orofacial pain were trauma (52, 43.3%), malignant lesions (46, 38.3%), inflammatory conditions (11, 9.2%), neuralgia (7, 5.8%) and myofascial pain disorder (4, 2.3%) (Fig. 2).



**Fig. 1.** Distribution of patients with non-odontogenic orofacial pain according to the nature of pain experienced



**Fig. 2.** Percentage distribution of patients according to the cause of non-odontogenic orofacial pain

A statistically significant association between causes of non-odontogenic pain and socio-demographic characteristics of the patients was observed ( $p < 0.05$ ). Trauma was the most common cause of pain orofacial pain in males, individuals aged less than 40 years, and those with a stable source of income. Malignant conditions were the cause of pain in females and those aged above 40 years. Myofascial pain disorder was predominantly noted in females (Table 2). With an exception of neuralgia, non-odontogenic pain due to all causes was mostly of gradual onset, with mild to moderate intensity and aggravated by chewing (Table 3).

**Discussion**

Non-odontogenic orofacial pain (NOFP) is a result of pathology, or injury to the structures in the orofacial region including the muscles, temporomandibular joint, neurovascular structures, and the glands.<sup>6</sup> Thus, the aetiology of non-odontogenic pain can be trauma to the facial structures, idiopathic (burning mouth syndrome), orofacial neoplasms, inflammatory conditions (sinusitis), and psychogenic.<sup>6,11</sup> The pain of non-odontogenic cause is not a common entity, with a reported prevalence of less than 10% from different studies, similarly in the current study a low incidence (3.3%) was obtained.<sup>2,12,13</sup>

The findings of this study depicted that the common causes of NOFP in our setting were traumatic conditions, and inflammatory conditions. This is contrary to findings from Nigeria which reported infective process, neoplasia, and psychological stress as the

**Table 2.** Causes of non-odontogenic pain in respect to the sociodemographic characteristics of the patients

Socio-demographic characteristics	Causes of non-odontogenic pain					p-value
	Trauma n (%)	Malignancies n (%)	Inflammatory conditions n (%)	Neuralgia n (%)	Myofascial pain n (%)	
<b>Sex</b>						
Male	48 (64%)	19 (25.3%)	6 (8%)	2 (2.7%)	-	<0.001
Female	4 (8.9%)	27 (60%)	5 (11.1%)	5 (11.1%)	4 (8.9%)	
<b>Age group</b>						
≤ 40 years	44 (72.1%)	11 (18%)	4 (6.6%)	1 (1.6%)	1 (1.6%)	<0.001
41-60 years	8 (26.7%)	14 (46.7%)	4 (13.3%)	3 (10%)	1 (3.3%)	
> 60 years	-	21 (72.4%)	3 (10.3%)	3 (10.3%)	2 (6.9%)	
<b>Income</b>						
Stable	33 (58.9%)	13 (23.2%)	6 (10.7%)	2 (3.6%)	2 (3.6%)	0.01
Unstable	19 (29.7%)	33 (51.6%)	5 (7.8%)	5 (7.8%)	2 (3.1%)	
<b>Education</b>						
Low level	32 (39%)	41 (50%)	4 (4.9%)	4 (4.9%)	1 (1.2%)	0.001
High level	20 (52.6%)	5 (13.2%)	7 (18.4%)	3 (7.9%)	3 (7.9%)	

**Table 3.** Distribution of patients according to clinical characteristics of pain from different causes

Clinical characteristics	Causes of non-odontogenic pain				
	Trauma n (%)	Malignancies n (%)	Inflammatory conditions n (%)	Neuralgia n (%)	Myofascial pain n (%)
<b>Onset</b>					
Gradual	39 (75%)	39 (84.8%)	9 (81.8%)	1 (14.3%)	3 (75%)
Sudden	13 (25%)	7 (15.2%)	2 (18.2%)	6 (85.7%)	1 (25%)
<b>Nature of pain</b>					
Burning	-	22 (47.8%)	2 (18.2%)	-	-
Sharp	39 (75%) (26.7%)	3 (6.5%)	2 (18.2%)	-	-
Throbbing	3 (5.8%)	5 (10.9%)	2 (18.2%)	-	-
Shock-like	-	-	-	7 (100%)	-
Boring/Piercing	9 (17.3%)	15 (32.6%)	4 (36.3%)	-	-
Pounding	1 (1.9%)	1 (2.2%)	1 (9.1%)	-	-
Dull	-	-	-	-	4 (100%)
<b>Intensity</b>					
Mild	40 (76.9%)	17 (37%)	5 (45.5%)	-	2 (50%)
Moderate	12 (23.1%)	15 (32.6%)	2 (18.2%)	1 (14.3%)	1 (25%)
Severe	-	14 (30.4%)	4 (36.4%)	6 (85.7%)	1 (25%)
<b>Aggravating factor</b>					
Chewing	49 (94.2%)	37 (80.4%)	9 (81.8%)	6 (85.7%)	4 (100%)
Brushing	36 (69.2%)	24 (52.2%)	3 (27.3%)	6 (85.7%)	1 (25%)
Speaking	30 (57.7%)	21 (45.7%)	4 (36.4%)	7 (100%)	1 (25%)
Washing face	2 (3.8%)	5 (10.9%)	-	7 (100%)	4 (100%)
<b>Relieving factor</b>					
Medication	43 (87.2%)	21 (45.7%)	4 (36.4%)	2 (28.6%)	2 (50%)
Resting	36 (69.2%)	9 (19.6%)	7 (63.6%)	3 (42.9%)	4 (100%)
Massaging	-	-	1 (9.1%)	-	3 (75%)

leading cause. A study from India found the common causes of NOFP were temporomandibular joint disorders, facial pain, and oral sores.<sup>2,14</sup> The different causes of NOFP as seen in different studies, including the current one can be attributed to the environmental and socio-cultural differences in the study population, and design

of the studies (retrospective vs prospective, duration, and setting).

In this study, it was illustrated that there was a statistically significant association between the causes of NOFP and the sociodemographic characteristics of the patients. Trauma as the leading cause of the pain was

more common in males and young individuals with stable income. Several local and international studies have reported that males and young individuals are prone to orofacial injuries due to their risk-taking behaviour and tendency of being active and remaining outdoors.<sup>15-21</sup>

Malignant conditions of the orofacial region were the second most common cause of NOFP. Females, elderly individuals aged above 60 years, and those with unstable income were more affected. It was not surprising to find that most patients who suffered from NOFP due to neoplastic conditions had an unstable income, because, most individuals with malignancy were elderly, who could not work, due to their debilitating physical condition caused by their ailment. Though previous epidemiological studies from the setting of the current study pointed out males were more affected with malignant conditions, in this study females reported more with NOFP due to malignant conditions.<sup>22,23</sup> These findings may indicate a shift in the trend of orofacial malignancies or easy accessibility of hospital services to females compared to what was in the past. Another reason can be the mere fact that females have a lower pain threshold compared to males, thus most of the males with malignancy did not complain of pain, therefore, were not included in this study.<sup>24</sup>

In this study, inflammatory conditions included an array of pathologies that affected the; TMJ (TMJ arthritis), salivary glands (sialadenitis), and sinuses (sinusitis). Inflammation is the physiological response of the body to injury which can be either acute or chronic and the NOFP due to inflammatory conditions is often chronic.<sup>11,25</sup> There is evidence in humans that some chronic pain conditions reflect a heightened central excitatory state, resulting from a decrease in central inhibitory control mechanisms.<sup>26</sup> Animal studies have shown that central sensitization is associated with a reduction in descending inhibition and enhancement of descending facilitation from some structures.<sup>26</sup> Due to central sensitization, the neuronal hyperexcitability may not be readily reversible and may become sustained resulting in a chronic state of nociceptive neuronal hyperexcitability.<sup>27</sup>

Pain can either be of sudden onset which begins within a few seconds and steadily increases in severity over the next several minutes, or of gradual onset which begins slowly and becomes more severe only after several hours or even days have elapsed.<sup>28</sup> The findings of the current study depicted that with an exception of neuralgia, the NOFP due to the rest of the causes was of gradual onset. These findings are supported by literature which reports that neuralgia is usually of sudden onset and that pain of gradual onset is commonly associated with neoplasms, trauma, and chronic inflammatory processes.<sup>11,28,29</sup>

In this study, the diverse clinical characteristics of NOFP due to different causes as shown in Table 3 may

be partly explained by pain transmitting fibers. It is a fact that the majority of nociceptive impulses from the orofacial region are mainly (but not exclusively) mediated by the trigeminal nerve, which has both the A- and C-fibers.<sup>30</sup> The A-fibers are fast conducting myelinated fibers and result in a short-lasting-sharp-pricking type of pain sensation, while the C-fibers are slow conducting unmyelinated fibers which often results in poor localization and dull pain sensation.<sup>30,31</sup> Chronic inflammatory pain which can be due to malignancy and trauma is typically mediated by C-fibers, while A-fibers mediate neuropathic pain.<sup>30-33</sup>

The intensity of the pain ranged from mild to severe. The malignant conditions had a wide range of intensity from mild to severe. A major concept in the level of pain in malignant lesions is dependent on the stage of presentation of the condition, The more advanced the lesion the more the intensity of the pain.<sup>34</sup> In the current study of the patients with malignant conditions presented to us late with advanced lesions. Thus moderate to severe intensity of pain was not a surprising finding. Most patients with trauma had mild to moderate pain intensity. These findings are concurrent to the report by Dilunga et al.<sup>35</sup> One of the possible explanations for this may be because most patients who were seen in our setting had sustained trauma more than 3 days before reporting to us, as such the acute inflammatory phase had waned off hence less severe pain.

#### **Study limitation**

There were certain limitations in the study that should be mentioned. First, the cross-sectional study design cannot infer the causative effect of the variables strongly. Secondly, the study data were collected from a single tertiary hospital as such patients with mild chronic pain in the community might not have come to the particular center for management. However, despite these limitations, the results from the current study are very valuable as they provide very useful information to the clinicians and thus making it easier for them to have a high suspicion index for coming up with a cause of orofacial pain when an odontogenic cause is not found.

#### **Conclusion**

The incidence of non-odontogenic orofacial pain is low, however, it is important to take into cognizance, the existence of such pain for adequate diagnosis and management of patients. Trauma and malignant conditions are the leading causes of NOFP. There was a statistically significant association between the cause of NOFP and sociodemographic characteristics of patients. Most of the patients with NOFP have the pain of gradual onset which is of mild to moderate intensity.

## Declarations

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### Author contributions

Conceptualization, V.A.H. and K.S.S.; Methodology, V.A.H., J.R.M., S.S.O. and K.S.S.; Software, K.S.S.; Validation, V.A.H., J.R.M., S.S.O. and K.S.S.; Formal Analysis, V.A.H., S.S.O. and K.S.S.; Investigation, V.A.H., J.R.M., and S.S.O.; Resources, V.A.H., J.R.M., and K.S.S.; Data Curation, V.A.H. and K.S.S.; Writing – Original Draft Preparation, V.A.H. and K.S.S.; Writing – Review & Editing, J.R.M., S.S.O. and K.S.S.; Visualization, V.A.H., J.R.M., S.S.O. and K.S.S.; Supervision, J.R.M. and S.S.O.; Project Administration, J.R.M. and S.S.O.

### Conflicts of interest

The authors declare that they have no competing interests with regards to authorship and/or publication of this paper.

### Data availability

The data from this study is freely available from the corresponding author on reasonable request.

### Ethics approval

The study was approved by the Institution Review Board of the Muhimbili University of Health and Allied Sciences (Ref.No.287/298/01A).

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