# Aims and Scope

## Aims

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Manuscript categories: Original scientific research articles, systematic reviews/meta-analyses, comprehensive reviews, communications, case reports, case series, letters, commentaries, editorials. Conference proceedings are also welcomed and other expressions of interest should be directly communicated to the Editors.

## Scope

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    - Tumors
    - Developmental disorders
    - Oral Histology
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- Forensic odontology
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    - Oral and maxillofacial infections
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- Dental Biomaterials Science
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    - Dental Orthopedics
    - Orthodontics
    - Dental, Oral and Facial Growth
- Pediatric Dentistry
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    - Early Dental Care
    - Primary Dentition and Caries

- Early Dental Care
- Primary Dentition and Caries
- Medical Emergencies in Dentistry
- Translational Research

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EDITORIAL

# Artificial Intelligence's Challenges in Medical and Dental Education

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Artificial intelligence (AI) has transferred from presentation slides to application in educational institutions, laboratories, and healthcare facilities. It currently generates treatment plans, assesses radiographs, and suggests succeeding actions at the point of intervention in medicine and dentistry.Medical and dental education is rapidly embracing AI, which opens new avenues for independent learning, simulation training, and effective evaluation.[1,2] However, our institutional curriculum, evaluation methods, faculty training, and administration are struggling to adapt this shift. AI cannot be legally and ethically included into healthcare education until several significant challenges are addressed.

Potential worsening of intellectual skills is one serious concern. Over-reliance on algorithmic help could cause learners to forgo the growth in ability to solve problems and diagnose.[3] AI can offer direction; it cannot take the place of the intricate judgment that comes from human experience and skill. AI-driven applications for assignments and projects have increased the probability of academic dishonesty. Learning outcomes may be weakened if learners rely on automated outputs instead of putting out real effort. Thus, evaluation must emphasize on intellectual thinking, decision making power and clinical application.[4]The successful use of AI in education requires access to imaging and medical records for precise data. This raises concerns about consent, data privacy, and bias associated with algorithms. Training an AI algorithms on skewed or inadequate data runs the risk of sustaining errors that could impair patient care and learning. Many educators are not ready to cope with AI due to unawareness of skills, tools and unbiased grading. Periodic workshops and collaborative resources can boost self-assurance and connect AI to educational objectives.[5] Education in healthcare emphasizes empathy, communication, and patient care in addition to technical knowledge. Although AI can simulate situations, it is unable to replicate genuine human interaction.[6] Therefore, AI should be used as supportive tool while ensuring growth of students in both interpersonal and technological skills.

AI does neither offer a quick solution to expertise nor represent an observational threat to clinical judgment. It effectively amplifies both negative behaviours and good didactics.[7] It is our responsibility to establish the frameworks in the medical and dental domains where amplification fosters professional growth and patient safety, such as transparent policies, synchronized curricula, more sophisticated assessments, and professionals who are willing to ask questions. The real challenge for educators is not just to embrace new technology but to make sure AI is a supportive tool that improves clinical judgment, critical thinking, and patient-centred care while maintaining the vital human element that characterizes the healing professions.

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# Assessment of Facial Nerve Dysfunction in the Retromandibular Approach for Mandibular Condylar Fracture Management

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## Abstract

**Background:** Condylar fractures account for a significant proportion of mandibular fractures. Surgical management of these fractures often involves navigating around the facial nerve, which controls the motor function of the muscles of facial expression along with other specialized functions. Preserving the integrity of this nerve during surgical intervention is crucial to prevent functional impairment.

**Objective:** To evaluate the incidence of facial nerve dysfunction following the retromandibular approach for the management of mandibular condylar fractures.

**Materials & Methods:** It was a 'Descriptive Case Series' completed within six months from October 20, 2020 to April 20, 2021 in the department of oral and maxillofacial surgery, Mayo Hospital, Lahore. A total of 60 patients meeting the inclusion criteria were enrolled in the study. All patients underwent surgical reduction and fixation of condylar fractures via the retromandibular approach under general anesthesia. Facial nerve dysfunction involving any of its peripheral branches was assessed three months postoperatively using the House-Brackmann Facial Nerve Grading System (HBFNGS). Nerve involvement was documented if dysfunction was observed in any of the branches, including the zygomatic, temporal, buccal, marginal mandibular, or cervical branches.

**Results:** The mean age of the patients was 30.50 ± 11.88 years. The study population comprised 55 (91.67%) males and five (8.33%) females. At the three-month follow-up, buccal nerve involvement was noted in two patients (66.67%), while zygomatic nerve involvement was observed in one patient (33.3%). Overall, facial nerve dysfunction was identified in three patients (5%).

**Conclusion:** The retromandibular approach is effective with minimal facial nerve complications.

**Keywords:** Facial Paralysis, Mandibular Condyle. Mandibular Fractures. Oral Surgical Procedures, Postoperative Complications, Temporomandibular Joint, Treatment Outcome.

## Introduction

Extraoral approaches for maxillofacial trauma, especially in high-velocity injuries with multiple fractures or comminution, often require open reduction and internal fixation and carry a risk of facial nerve injury ranging from 0% to 48%.[1-3] Facial nerve impairment affects facial expression, lacrimation, salivation, and taste, making objective evaluation challenging and usually reliant on subjective methods like the House-Brackmann Facial Nerve Grading System with high inter observer reliability.[4,5] International studies report varying dysfunction rates among different branches—10.7% for the temporal, 16.66% for the marginal mandibular, 5% for the buccal, and 5.3% for the zygomatic—with recovery rates as high as 100% at 6 months in some cases. Specific studies noted recovery rates of 94.7% and 88% following the retromandibular trans-parotid approach in mandibular condylar fractures and maxillofacial trauma, respectively.[6]

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Condylar and subcondylar fractures account for up to 30% of all mandibular fractures. However, statistics from Pakistani trauma centers remain scarce. To date, no comprehensive investigation has been conducted to assess the incidence, diagnostic delays, and treatment outcomes of subcondylar fractures in our region. This lack of data hinders the development of evidence-based guidelines tailored to our patient population.

This study aims to evaluate facial nerve recovery after the retromandibular approach, addressing a gap in local research and supporting its efficacy in managing mandibular condylar fractures.

### Diagnostic and Treatment Considerations in Mandibular & Sub-Condylar Fractures:

A mandibular fracture is a break in the jawbone, often occurring in two places. It may cause difficulty opening the mouth, misaligned teeth, or gum bleeding, mostly affecting males in their 30s.[7] Most commonly affecting the condyle (36%), body (21%), angle (20%), and symphysis (14%).[8] While panoramic radiographs and lateral oblique views offer a rapid initial assessment, CT imaging remains the gold standard for accurately delineating fracture lines and guiding treatment—from maxillomandibular fixation to open reduction internal fixation.[9] These injuries present with pain, swelling, malocclusion, ear bleeding, and jaw deviation; bilateral or severe ("flail mandible") cases can obstruct the

airway or even risk cranial displacement and vascular injury.[10] Sub-condylar fractures, accounting for 11–16% of facial and 30–40% of mandibular fractures, pose additional challenges due to their proximity to the TMJ, pterygoid muscles, and facial nerve, with displacement severity influencing long-term outcomes such as TMJ dysfunction, chronic pain, and facial asymmetry.[11,12]

Clinically, any chin, preauricular, or contralateral facial trauma especially when accompanied by contusions, hemotympanum, malocclusion, or nerve deficits should prompt a thorough history, occlusal evaluation, and imaging–.[13] Trauma to the chin, preauricular area, or contralateral face should raise suspicion, as mandibular fractures often occur in multiple sites.[14] Evaluating occlusion and mandibular function is crucial, though multiple fractures or nerve injuries may distort perception. Understanding normal occlusal patterns and mandibular motion helps guide diagnosis and treatment, with dental study models aiding complex cases. Accurate diagnosis of sub-condylar fractures relies on radiographic imaging, with panoramic radiography being the most commonly used modality, offering a full view of the mandible, TMJs, and surrounding structures.[15] If unavailable, lateral oblique mandibular views can help assess the condylar region.[16] Ultimately, proper use of panoramic, Towne, and CT projections ensures accurate diagnosis, complete injury mapping, and optimal treatment planning.[17]

### Treatment Approaches

Sub-condylar fractures are significant due to their impact on TMJ function and the risk of complications like malocclusion, pain, muscle spasms, and mandibular deviation. Management includes closed reduction with maxillomandibular fixation, open reduction with internal fixation, or endoscopic-assisted fixation. Closed reduction, though traditionally preferred, carries risks like TMJ dysfunction and inadequate ramus height restoration (Figure 1).

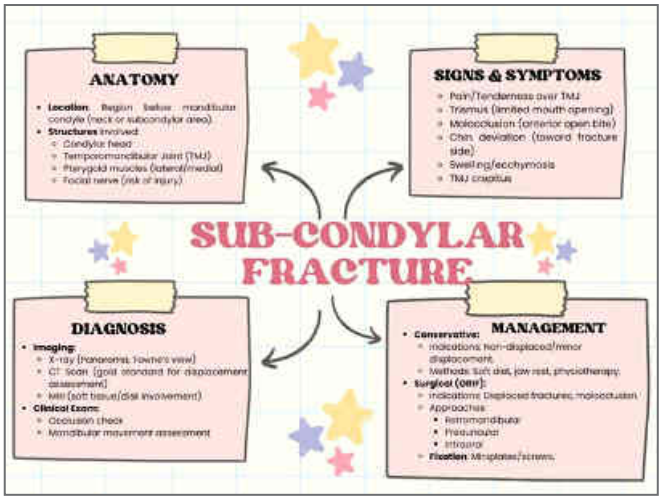


Figure1: Sub-condylar Fractures: Anatomy, Diagnosis, Clinical Presentation, and Management Strategies

A comprehensive overview of sub-condylar fractures, highlighting anatomical considerations, diagnostic methods, clinical signs, and treatment approaches, including both conservative and surgical management. Advances in osteosynthesis techniques have shifted the preference toward surgical intervention, prioritizing anatomic reduction and early mobilization to restore function and prevent long-term complications —[12,18] (Table 1).

Table 1: The Various Treatment Approaches for Sub-Condylar Fractures their advantages and disadvantages

| Treatment Approach | Advantages | Disadvantages |
|---|---|---|
| Closed Reduction with Maxillomandibular Fixation (MMF) | - Non-invasive, avoids surgical complications<br>- Suitable for minimally displaced fractures<br>- Lower risk of facial nerve injury | - Prolonged immobilization may lead to joint stiffness<br>- Potential for malocclusion and TMJ dysfunction<br>- Higher risk of long-term complications like ankylosis [19] |
| Open Reduction with Internal Fixation (ORIF) | - Precise anatomical reduction & stable fixation<br>- Allows early jaw mobilization<br>- Reduced risk of long-term TMJ dysfunction | - Risk of facial nerve injury<br>- Surgical risks such as infection and scarring<br>- Requires specialized surgical skills [20] |
| Endoscopic-Assisted Reduction with Internal Fixation | - Minimally invasive approach<br>- Lower risk of visible scarring<br>- Reduced surgical trauma and faster recovery | - Technically demanding and requires specialized equipment<br>- Limited access in severely displaced fractures<br>- Higher cost and learning curve [21] |

### Clinical Significance and Research Considerations

One major concern in sub-condylar fractures is facial nerve involvement, whether due to trauma or surgical intervention.[22] Given the functional implications of facial nerve injury and TMJ dysfunction, an important research question emerges: What patient and injury-related factors are associated with the development of facial nerve dysfunction following the retromandibular approach for mandibular condylar fracture management? Addressing this could guide treatment protocols and improve patient outcomes in maxillofacial trauma management.

## Materials and Methods

This was a descriptive case series conducted at the Department of Oral and Maxillofacial Surgery, Mayo Hospital, Lahore, over six months from October 20, 2020 to April 20, 2021. This prospective descriptive study was approved by the Institutional Review Board of King Edward Medical University and Dissertation was approved by college of Physicians and Surgeons (REU No. 41889; approved on 17 September 2021). All participants provided written informed consent. A total of 60 patients were included based on predefined inclusion and exclusion criteria. The sample size was calculated using an expected incidence of facial nerve dysfunction of 48% with a 95% confidence level.[23]

**Inclusion Criteria:**

- Patients aged 16 to 70 years
- Both male and female patients
- Patients with confirmed mandibular condylar fractures requiring surgical intervention

**Exclusion Criteria:**

- Patients with pre-existing facial nerve dysfunction
- Patients with comminuted fractures requiring different surgical approaches
- Patients with penetrating injuries or tumors

**Surgical Procedure:**

All patients underwent open reduction and internal fixation (ORIF) using the retromandibular approach under general anesthesia.

**Operative and Peri-operative Procedures are given as:**

**Pre-operative Protocol**

All patients fasted for 8 hours prior to surgery and gave written informed consent. Baseline laboratory tests and panoramic radiographs/CT scans were reviewed. Thirty minutes before incision, each patient received IV cefazolin 2 g as antibiotic prophylaxis. Anaesthesia was induced with propofol (2 mg/kg) and fentanyl (2 µg/kg) and maintained with isoflurane (1 MAC) via nasotracheal intubation. A single dose of

dexamethasone 8 mg IV was given on induction to reduce postoperative edema.

**Operative Technique**

Under sterile conditions, a standard retromandibular transparotid approach was used.

A 2–2.5 cm vertical skin incision was placed 1.5 cm below the earlobe, just posterior to the mandibular ramus.

The platysma and parotid capsule were incised in line with the skin, and blunt dissection proceeded through the deep lobe of the parotid, carefully identifying and protecting the buccal and marginal mandibular branches of the facial nerve.

Once the fracture site was exposed, reduction was achieved with bone-holding forceps, and two 2.0 mm titanium miniplates (Synthes®) with monocortical screws were applied across the fracture line. Occlusion was checked intra-operatively and fine-tuned with light intermaxillary fixation as needed.

Closure was performed in layers: The parotid capsule and subcutaneous tissue with 4-0 absorbable sutures, and the skin with 5-0 nylon in an interrupted fashion.

**Post-operative Care**

Patients were monitored in the recovery room for 2–4 hours. Intermittent cold compresses were applied over the surgical site for the first 24 hours. Analgesia consisted of IV ketorolac 30 mg every 8 hours for 48 hours, then oral ibuprofen 400 mg TID for five days. The antibiotic course was continued with oral amoxicillin–clavulanate 625 mg TID for five days. Beginning on post-op Day 2, patients performed supervised mouth-opening exercises (10 reps, 3×/day). Soft diet was maintained for two weeks. Skin sutures were removed on Day 5. Facial nerve function was formally graded on postoperative Days 1, 7, and at 3 months using the House–Brackmann scale Postoperatively, patients were assessed at regular intervals, and facial nerve function was evaluated three months postoperatively using the House-Brackmann Facial Nerve Grading System (HBFNGS).

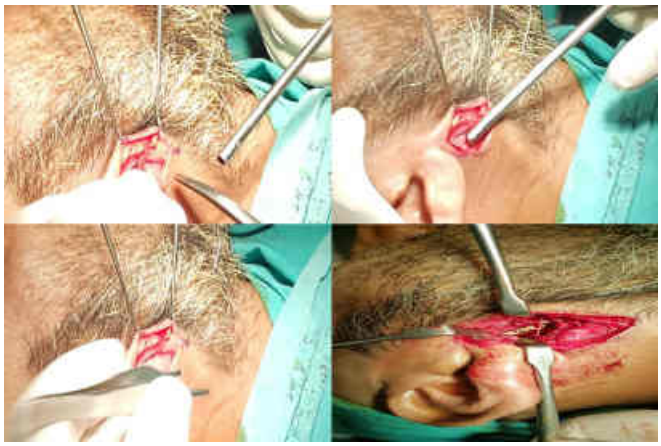

Figure 2: Sequential intraoperative steps of the retromandibular approach for open reduction and internal fixation of a mandibular condylar fracture.

**Data Analysis:**

Data were entered and analyzed using SPSS version 21. Continuous variables were expressed as means and standard deviations, while categorical variables were presented as frequencies and percentages. Chi-square tests were applied to evaluate statistical associations, with a $p$-value $\leq 0.05$ considered significant.

## Results

In this study, 60 patients (mean age 30.50±11.88 years, range from 16 to 65 years of age were enrolled (Table 2), with 55 males (91.67%) and 5 females (8.33%), resulting in an 11:1 male-to-female ratio (Figure 2).

Table 2: Summary statistics of age (years)

| | | |
|---|---|---|
| Age (years) | N | 60 |
| | Mean | 30.50 years |
| | Standard Deviation | 11.88 years |
| | Minimum | 16.00 years |
| | Maximum | 65.00 years |

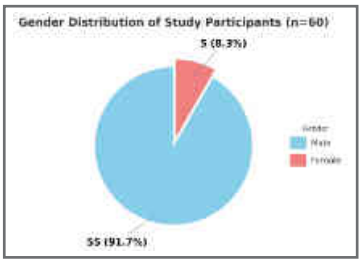


**Figure 3.** Gender distribution of study participants (n = 60), showing that males predominated at 55 (91.7%) and females comprised 5 (8.3%).

We found that 91.67% of the study participants were male, while only 8.33% were female patients The most common facial fracture pattern was sub-condyle para-symphysis (30.0%), followed by symphysis (13.33%) and Lefort II sub-condyle para-symphysis (11.67%), with other types making up the remainder (Table 3, Figure 3).

Table 3: Frequency distribution of HBFN grade

| | | Frequency | Percent (%) |
|---|---|---|---|
| HB FN Grade | Grade 2 | 2 | 66.7 |
| | Grade 3 | 1 | 33.3 |
| | Total | 3 | 100.0 |

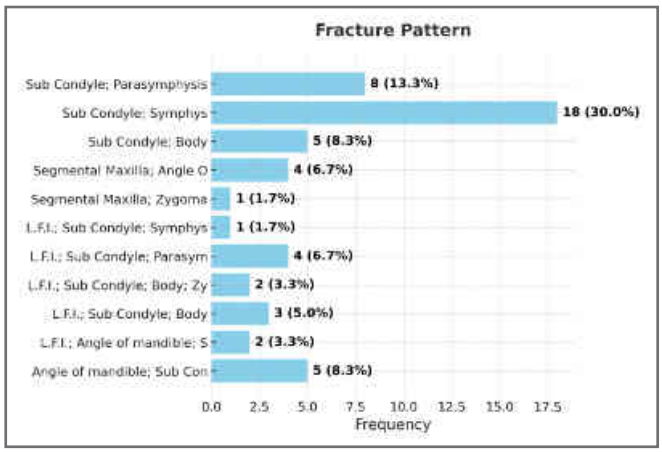


Figure 4: Patterns of Mandibular Fractures in Study Cohort

Distribution of mandibular fracture patterns (n = 60), with sub-condylar body fractures most common (18; 30.0%), followed by sub-condylar parasymphysis (8; 13.3%) and angle of mandible (5; 8.3%).

At the 3-month follow-up, facial nerve assessment showed buccal nerve involvement in 2 patients (66.67%) and zygomatic nerve involvement in 1 patient (33.3%), corresponding to HBFN grades 2 and 3 in 66.7% and 33.3% of affected patients, respectively, suggesting to an overall dysfunction rate of 5% (Figure 4, Table 4).

Table 4: Comparison of facial nerve dysfunction between age groups

| | | Facial Nerve Dysfunction | | Total | P-Value |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Age (years) | ≤30 | 3 | 33 | 36 | 0.268 |
| | | 8.3% | 91.7% | 100.0% | |
| | >30 | 0 | 24 | 24 | |
| | | 0.0% | 100.0% | 100.0% | |
| Total | | 3 | 57 | 60 | |
| | | 5.0% | 95.0% | 100.0% | |

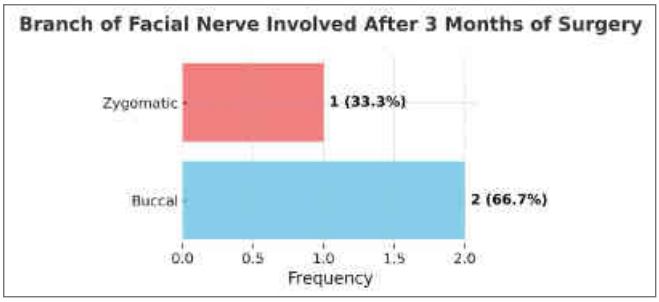


Figure 5: Distribution of Facial Nerve Branch Involvement at 3 Months Post-Surgery

In facial nerve dysfunction it was found that 66% percent of buccal nerve was involved Notably, dysfunction was observed only in patients aged ≤ 30 years (8.3%) and in males (5.5%), while no cases were found in patients >30 years or in females; however, these differences were statistically insignificant ($p$=0.268 and $p$=0.999, respectively) (Figure 6. Table 5). Additionally, there was no significant difference in dysfunction across fracture patterns ($p$=0.340).

Table 5: Incidence of Facial Nerve Dysfunction at Three-Month Follow-Up

| | | Facial Nerve Dysfunction | | Total | P-Value |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Gender | Male | 3 | 52 | 55 | >0.999 |
| | | 5.5% | 94.5% | 100.0% | |
| | Female | 0 | 5 | 5 | |
| | | 0.0% | 100.0% | 100.0% | |
| Total | | 3 | 57 | 60 | |
| | | 5.0% | 95.0% | 100.0% | |

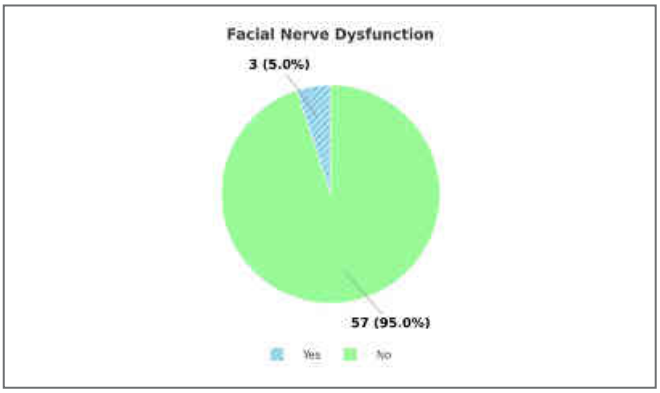


Figure 6: Incidence of Facial Nerve Dysfunction at Three-Month Follow-Up 5 % study population had facial nerve dysfunction

## Discussion

In this descriptive series of 60 patients (mean age 30.5 ± 11.9 years; 91.7% male), we observed a 5% incidence of transient facial nerve dysfunction at three months following ORIF via the retromandibular approach. This incidence closely mirrors Prabhu et al.'s report of 5% buccal or zygomatic branch involvement in 100 cases, all recovering by six months.[25] By contrast, dysfunction rates in the literature span from 0% to 48%, likely reflecting variability in surgical technique, branch-specific vulnerability, and follow-up duration. All three dysfunctions in our cohort involved the buccal (66.7%) and zygomatic (33.3%) branches, suggesting these are most susceptible when dissecting near the parotid capsule. An international study on 100 patients found that 10.7% had temporal branch issues, 16.66% had marginal mandibular involvement, and 5% had buccal or zygomatic branch involvement. All recovered fully within six months.[26]

Comparison with previous literature shows that nerve dysfunction rates vary widely depending on sample size, surgical technique, and follow-up duration. Some studies have reported dysfunction rates as high as 48%, while others have documented much lower incidences.[27-29] This variation highlights the importance of standardized surgical protocols and experienced surgical teams in minimizing complications.

In this study the low incidence of facial nerve dysfunction (5%) following the retromandibular approach suggests this technique is both effective and relatively safe when executed with precision. However, these findings also highlight the vulnerability of the buccal and zygomatic branches which suggests the importance of meticulous dissection in the region of the parotid gland. For surgical training programs, these results emphasize the need for hands-on anatomical orientation, cadaveric simulation, and supervised surgical exposure to minimize iatrogenic injury. Additionally, even a small risk of facial weakness may have psychosocial implications, particularly in younger patients, necessitating a clear preoperative discussion regarding potential nerve-related outcomes. Counseling should include the expected recovery timeline and reassure patients that most dysfunctions are temporary. This can help manage anxiety and set realistic expectations, which is crucial for both informed consent and postoperative satisfaction.

Although operative steps were standardized across all cases, this study did not record individual intraoperative variables such as dissection depth, operative time, or surgeon experience level. These factors are known to influence facial nerve outcomes, particularly in retromandibular transparotid approaches where an extended dissection or prolonged retraction within the parotid region can increase the risk of neurapraxia. Notably, all three cases of nerve dysfunction involved fractures requiring deeper exposure due to displacement, potentially increasing manipulation around the buccal and zygomatic branches. While this trend was observed retrospectively, future studies should quantify intraoperative parameters, as this could refine risk stratification and lead to technical refinements that further reduce complications.

## Conclusion

The retromandibular approach provides excellent access to mandibular condylar fractures while maintaining a low risk of postoperative facial nerve dysfunction. This study supports the continued use of this approach in clinical practice, with proper surgical techniques ensuring minimal complications. Future research should focus on larger-scale studies to reinforce these findings.

## Limitations

The absence of blinded, inter-rater reliability assessment for House-Brackmann grading may limit reproducibility. Moreover, the male-predominant sample (91.7%) restricts applicability to female patients, who may exhibit different nerve resilience or recovery kinetics.

Our three-month follow-up, while practical, risks underestimating late-onset synkinesis or incomplete axonal regeneration. We therefore recommend future multicenter, prospective studies with:

- Standardized, blinded nerve assessments (including EMG confirmation and inter-rater reliability metrics),
- Extended follow-up of 6–12 months to capture delayed recovery or residual weakness,
- Subgroup analyses by fracture pattern, patient age, and sex to refine risk stratification.

Such rigorous designs will consolidate evidence for the retromandibular approach's safety and guide best practices in mandibular condylar fracture management. This study also did not measure intraoperative variables such as dissection extent, operative time, or resident involvement, which may influence the likelihood of facial nerve dysfunction.

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4. Talal Ahmed : Analysis amd interpretation of data, critical review.
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# Prevalence of Occupational Allergies among Dentists of Pakistan: A Cross-Sectional Study

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## Abstract

**Objective:** Occupational allergies pose a serious health risk to dental healthcare professionals, such as physicians, dentists, assistants, and technicians, due to frequent exposure to allergens like latex, chemicals, and dust from various materials. Reactions can range from contact dermatitis to anaphylaxis to severe life-threatening situations. This study aims to evaluate the prevalence, triggering allergens, clinical manifestations, and management of occupational and general allergies among dentists in Pakistan.

**Materials and Methods:** A cross-sectional survey was conducted with 282 dentists across Pakistan using a pre-validated questionnaire focusing on general and occupational allergies, allergens, symptoms, and treatments. Participants included male and female dentists of varied experience levels. Chi square and Fisher's exact tests were used to assess associations with $p < 0.06$ as statistically significant.

**Results:** Among participants, 27% (n=76) reported general allergies while 22.7% (n=64) experienced occupational allergies. Mites (32.89%, n=25) and food (23.68%, n=18) were the most common general allergens. Occupational allergens were dominated by natural rubber latex (65.63%, n=42) and cleaning products (59.38%, n=38). Dermatological manifestations (75%, n=57) were the most frequent, and respiratory issues affected over half (51.32%, n=39) of the allergic participants. Females and those with <10 years of experience were significantly more affected. Treatments primarily included oral antihistamines (53.1%, n=34) and topical corticosteroids (28.1%, n=18).

**Conclusion:** This study emphasizes occupational allergies as a significant issue among Pakistani dentists, predominantly affecting the skin and respiratory systems. Protective measures, alternative materials, and standardized allergy management protocols to safeguard dental professionals' health and productivity should be utilized.

**Keywords:** Occupational Exposure, Dentists, Allergy Medications

## Introduction

Occupational allergies pose a serious health risk to healthcare workers, especially dentists, dental assistants, technicians, and hygienists, as they experience a range of allergic reactions resulting from exposure to various substances in their profession. Dental procedures can lead to allergic reactions such as contact dermatitis, inflammation of the nasal mucous membrane due to dust or airborne allergens, aggravated asthma, and potentially fatal anaphylaxis. Such reactions are especially common among dentists due to frequent hand washing and the use of gloves.[1] Occupational allergies have a dual etiology involving hereditary and environmental components. Workplace allergies affecting dental professionals mostly impact the respiratory system (allergic rhinitis and asthma), the eyes (allergic conjunctivitis), and the skin (e.g., allergic contact urticaria), especially on the fingers and hands, consequently harming an individual's quality of life and productivity at work.[2]

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An allergy is defined by the World Health Organization (WHO) as a hypersensitivity reaction to an allergen, which is otherwise an innocuous environmental antigen, that is triggered by particular immunologic processes. The immunological response can cause various symptoms, ranging from minor ones like sneezing and itching to severe ones like anaphylaxis. This reaction happens when an allergen—a foreign material generally safe to most people—causes the immune system to react inappropriately. According to the WHO, an allergen is any substance that has the potential to cause an allergic reaction. These compounds can be present in food (peanuts, shellfish), the environment (pollen, dust mites), or the workplace (latex, certain chemicals). When an allergic person's immune system perceives some things as hazardous, an improper immune response is triggered.[3,4]

Dental professionals typically experience two forms of allergic reactions connected to their line of work. First, immunoglobulin E (IgE) antibodies are primarily responsible for type I reactions (immediate hypersensitivity), which happen quickly within minutes or hours after interaction with the causal antigen. The latter attach themselves to mast cells and cause them to degranulate, which releases histamine, leukotrienes, and other mediators. They can be more widespread and potentially fatal, resulting in anaphylaxis, or more localized, causing allergic contact urticaria, rhino-conjunctivitis, and asthma.[5]

Second, type IV reactions, also known as delayed hypersensitivity, typically take 24 to 48 hours to manifest

following antigen exposure. The fundamental pathophysiology of allergic contact dermatitis (ACD) is this cell-mediated response, which is dependent on a complicated interaction between antigen-specific T cells and macrophages with dermal and epidermal cells. Type IV reactions are typically confined to the area in contact with the allergen, unlike type I hypersensitivity.[6]

Research has indicated that dentists are frequently exposed to a wide range of occupational allergens. These include the proteins found in latex gloves and dental dams made of natural rubber, (meth)acrylate found in resins, composites, and bonding agents, metals found in prosthetics, restorations, and orthodontic devices, chemicals added to the production of gloves and found in detergents and disinfectants (such as quaternary ammonium compounds), essential oils (such as eugenol), and even lidocaine. Therefore, there is a considerable risk of occupational allergy development connected with several dental operations.[7,8]

Occupational allergies among dentists are a significant health concern, with studies showing that 13.4% of dental professionals in France, 19.23% in the Nordic countries, and 27% in the United Arab Emirates experience work-related skin symptoms. In the Nordic countries, 4.8% of dentists suffer from occupational asthma due to exposure to latex and respiratory irritants.[8-10] In developing countries, the prevalence and impact of these allergies are less well-documented, but studies suggest significant health concerns. This highlights the need for more localized research to understand the specific challenges faced by dental professionals in different regions.[11]

Moreover, there is a critical need for a focused study in Pakistan to address this occupational health concern, even though international literature offers insightful information about the prevalence and causes of occupational allergies among dentists. The socio-economic and healthcare infrastructure context in Pakistan presents unique challenges that could influence the prevalence and management of occupational allergies, such as limited access to high-quality protective equipment, lack of awareness and training on occupational health, and insufficient reporting and monitoring mechanisms.[12]

By investigating the incidence of occupational allergies among Pakistani dentists, this article aims to assess the prevalence, clinical manifestations, and management of occupational and general allergies among dentists in Pakistan, with a particular focus on identifying triggering allergens, their impact on professional work, and the commonly adopted treatment strategies. This will help influence policy and practice targeted at minimizing these risks.

## Materials and Methods

A cross-sectional questionnaire-based study was conducted to evaluate the prevalence of occupational allergies among dentists in Pakistan. It was a voluntary study for the dentists, including general dentists and specialists. Undergraduate students were not included. and questionnaires with missing data were excluded from the study.

The Institutional Research and Ethics Committee provided ethical approval (UCD/ERCA/24/284). A non-probability convenience sampling technique was utilized to collect data from participants included in this research. A sample size of 279 participants was calculated with a 95% confidence level, 4% margin of error, and by taking the expected percentage of occupational allergies related to dermatology among dental surgeons as 13.4%. A pre-validated self-administered questionnaire was used.[8] There was a total of 14 closed-ended questions spread throughout three sections of the self-administered survey.

General information, such as gender, age, and the number of years spent practicing dentistry, was covered in the first section. The study focused on professional experience rather than age as a variable for statistical analysis. This decision was based on the assumption that experience better reflects prolonged exposure to occupational allergens, which is a critical factor in developing allergies. In the second section, participants were asked to share details on allergies (kind of allergens, clinical symptoms, therapy) that were not necessarily related to dental work. The majority of the questions in this section of the questionnaire allowed respondents to select one or more answers. The participants were not required to respond to the following questions if they replied negatively to the question "Are you allergic?" To be classified as displaying "general allergies," a respondent had to disclose allergies to at least one category of allergy other than "professional allergens." The final segment of the questionnaire was related to occupational pathologies. Data were collected over four months, from April 2024 to July 2024. The questionnaire was distributed simultaneously both via Google Forms and handouts of the survey. Data was gathered anonymously; no names or personal information, including email addresses, were gathered. The study's participants were informed about the study's objective and their anonymous involvement.

Data entry and analysis were done with SPSS version 25. Nominal variables were presented with frequency and percentage. A chi-square test was applied to see the association between qualitative variables (association of general allergy and occupational allergy with age, gender, and working experience of study participants). A p-value ≤0.06 was considered statistically significant.

## Results

In a sample of 288 participants, 27% (n=76) reported having some form of allergy, while 73% (n=206) did not. Among those with allergies, the most common allergens were mites (32.89%, n=25), contact allergies (31.58%, n=24), and food (23.68%, n=18). Drug-related allergies were also notable, affecting 22.37% (n=17). Interestingly, latex and pollen were among the least reported allergens, each accounting for only 2.63% (n=2) of the cases. Clinical manifestations predominantly involved dermatologic reactions in 75% (n=57) of the participants, followed by respiratory symptoms in 51.32% (n=39) and digestive issues in 48.68% (n=37). Notably, multiple symptoms were also common, with 56.58% experiencing two clinical manifestations and 14.47% (n=11) having three. Only 28.95% (n=22) reported a single symptom. Regarding treatment, 42.11% (n=32) relied on medications during acute exacerbation, with 21.06% (n=16) using a maintenance treatment regularly for their allergies. (Table 1)

Table 1: Prevalence of General Allergies and Associated Clinical Manifestations Among Study Participants

| **Allergies** | **n (288)** | **%** |
|---|---|---|
| **Yes** | 76 | 27% |
| **No** | 206 | 73% |
| **Triggering Allergens** | | |
| | **n=76** | **%** |
| Smoke | 1 | 1.32% |
| Food | 18 | 23.68% |
| Drugs | 17 | 22.37% |
| Professional Allergies | 14 | 18.42% |
| Molds | 11 | 14.47% |
| Mites | 25 | 32.89% |
| Animal Dander | 15 | 19.74% |
| Latex | 2 | 2.63% |

| Allergies | n (288) | % |
|---|---|---|
| Insect Venom | 14 | 18.42% |
| Contact Allergies | 24 | 31.58% |
| Dust | 8 | 10.53% |
| Pollen | 2 | 2.63% |
| **Clinical Manifestations** | | |
| Dermatologic | 57 | 75% |
| Ophthalmic | 12 | 15.79% |
| Respiratory | 39 | 51.32% |
| Digestive manifestations | 37 | 48.68% |
| Severe life-threatening | 1 | 1.32% |
| Single Clinical Manifestation | 22 | 28.95% |
| 2 Different Clinical Manifestations | 43 | 56.58% |
| 3 Different Clinical Manifestations | 11 | 14.47% |
| **Treatment** | | |
| I don't need any treatment | 15 | 19.74% |
| I take a maintenance treatment | 16 | 21.06% |
| I take maintenance treatment & medications in case of acute exacerbations | 13 | 17.11% |
| I take medications in case of acute exacerbations only | 32 | 42.11% |

The data revealed that 22.2% (n=64) of participants suffered from occupational allergies with natural rubber latex (65.63%, n=42) and cleaning products (59.38%, n=38) being the most prevalent allergens. In terms of proven allergens, natural rubber latex remained the most significant at 54.69% (n=35), followed by cleaning products at 35.94% (n=23). The impact of these allergies on work was evident, with 28.13% (n=18) requiring temporary work cessation. Additionally, 64.06% (n=41) did not require any work cessation. Management of occupational allergies primarily involved antihistamines (65.63%, n=42) while only a smaller percentage (15.63%, n=10) used maintenance therapy. Corticosteroids were also commonly prescribed, with topical corticosteroids being used by 28.10% (n=18) of participants. (Table 2)

Table 2: Prevalence of Occupational Allergies and Work-Related Allergens Among Study Participants

| Occupational Allergies | | n (288) | % |
|---|---|---|---|
| **Yes** | | 64 | 22.2% |
| **No** | | 218 | 77.3% |
| **Triggering Allergens** | | | |
| | | **n=64** | **n%** |
| Natural Rubber Latex | | 42 | 65.63% |
| Metals | | 5 | 7.81% |
| Resins | | 5 | 7.81% |
| Cleaning Products | | 38 | 59.38% |
| Professional Medications | | 11 | 17.19% |
| **Proven Allergens** | | | |
| Natural Rubber Latex | | 35 | 54.69% |
| Metals | | 9 | 14.06% |
| Resins | | 8 | 12.50% |
| Cleaning Products | | 23 | 35.94% |
| Professional Medications | | 9 | 14.06% |
| **Work stoppage requirement** | | | |
| Definitive work cessation | | 5 | 7.81% |
| No work cessation has been required | | 41 | 64.06% |
| Temporary work cessation | | 18 | 28.13% |
| **Maintenance therapy** | | | |
| Yes | | 10 | 15.63% |
| No | | 54 | 84.38% |
| Avoid contact with Allergens | | 42 | 65.63% |
| Antihistamine | | 42 | 65.63% |
| Desensitization | | 6 | 9.38% |
| Homeopathy | | 4 | 6.25% |
| **Reliever medication** | | | |
| Oral corticosteroids | | 14 | 21.90% |
| Topical corticosteroids | | 18 | 28.10% |
| Nasal corticosteroids | | 11 | 17.20% |
| Inhaled corticosteroids | | 5 | 7.80% |
| Oral antihistamine | | 34 | 53.10% |
| Topical antihistamine | | 3 | 4.70% |
| Oral bronchodilators | | 1 | 1.60% |
| Inhaled bronchodilators | | 3 | 4.70% |
| No reliever | | 13 | 20.30% |
| **Improvement** | | | |
| Spontaneous | | 19 | 29.69% |
| With maintenance therapy | | 20 | 31.25% |
| With reliever medications | | 30 | 46.88% |
| After remoteness from the work environment | No treatment required | 8 | 12.50% |
| | With treatment | 6 | 9.38% |

The results in Table 3 show that oral histamines were the most commonly used treatment, particularly for metals (66.7%, n=6) and cleaning products (56.6%, n=13). Topical corticosteroids were also frequently used, with the highest usage for professional medication (66.7%, n=6) and metals (55.6%, n=5). Nasal corticosteroids were predominantly used for professional medications (66.7%, n=6). In contrast, inhaled bronchodilators and topical antihistamines had minimal usage across all allergens. These findings indicate that oral antihistamines and topical corticosteroids are preferred treatments for most allergens, whereas inhaled bronchodilators are the least utilized.

**Table 3: Prevalence of Medication Use for Different Allergen Exposures**

| Medications | Natural rubber latex | | Metals | | Resins | | Cleaning products | | Professional medications | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| Oral corticosteroids | 8 | 22.90% | 2 | 22.20% | 2 | 25.00% | 7 | 30.40% | 3 | 33.30% |
| Topical corticosteroids | 14 | 40.00% | 5 | 55.60% | 5 | 55.60% | 6 | 26.10% | 6 | 66.70% |
| Nasal corticosteroids | 8 | 22.90% | 4 | 44.40% | 2 | 25.00% | 3 | 13.00% | 6 | 66.70% |
| Inhaled corticosteroids | 5 | 14.30% | 0 | 0.00% | 0 | 0.00% | 1 | 4.30% | 0 | 0.00% |
| Oral antihistamine | 19 | 54.30% | 6 | 66.70% | 4 | 50.00% | 13 | 56.50% | 5 | 55.60% |
| Topical antihistamine | 1 | 2.90% | 0 | 0.00% | 1 | 12.50% | 2 | 8.70% | 0 | 0.00% |
| Oral bronchodilators | 1 | 2.90% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% |
| Inhaled bronchodilators | 2 | 5.70% | 0 | 0.00% | 0 | 0.00% | 1 | 4.30% | 0 | 0.00% |

Allergies and occupational allergies varied significantly with age, gender, and experience. Participants aged <30 years were more likely to experience allergies (80.3%, n=61), with a similar trend observed for occupational allergies, which were significantly higher (78.1%, n=50, p=0.067). There was a statistically significant difference in allergy prevalence based on gender. Females were more prone to have allergies (81.6%, n=62, p=0.001) compared to males (18.4%, n=81). For occupational allergies, 84.4% (n=54) of female participants reported allergies compared to 15.6% (n=10) of males (p<0.001). The odds ratio of 0.348 (95% Cl: 0.183-0.63) for allergies and 0.290 (95% Cl: 0.140-0.600) for occupational allergies indicates that males are less likely to report allergies compared to females. This difference highlights a clear gender disparity, where females are much more affected by allergies both in general and occupational settings. Regarding experience, those with <10 years of professional experience accounted for 91.7% (n=189) of general allergy cases and 90.6% (n=58) of occupational allergy cases, although these differences were not statistically significant. (Table 4)

**Table 4: Allergies and occupational allergies in relation to participants' characteristics**

| | | Are you allergic? | | | | Occupational Allergen | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Yes | | No | | Yes | | No | |
| | | n | % | n | % | n | % | n | % |
| | | 76 27% | | 206 73% | | 64 22.7% | | 218 77.3% | |
| Age (Years) | <30 | 61 | 80.3% | 177 | 85.9% | 50 | 78.1% | 188 | 86.2% |
| | 31-39 | 12 | 15.8% | 24 | 11.7% | 11 | 17.2% | 25 | 11.5% |
| | 40-49 | 3 | 3.9% | 1 | 0.5% | 3 | 4.7% | 1 | 0.5% |
| | >50 | 0 | 0.0% | 4 | 1.9% | 0 | 0.0% | 4 | 1.8% |
| Test statistics p-value | | 6.06 0.072(F) | | | | 7.45 0.037*(F) | | | |
| Gender | Male | 14 | 18.4% | 81 | 39.3% | 10 | 15.6% | 85 | 39.0% |
| | Female | 62 | 81.6% | 125 | 60.7% | 54 | 84.4% | 133 | 61.0% |
| Test statistics p-value Odds Ratio | | 10.81 0.001* (C) 0.348* (0.183-0.63) | | | | 12.04 <0.001* (C) 0.290* (0.140-0.600) | | | |
| Experience (Years) | <10 | 70 | 92.1% | 189 | 91.7% | 58 | 90.6% | 201 | 92.2% |
| | 11-19 | 5 | 6.6% | 10 | 4.9% | 5 | 7.8% | 10 | 4.6% |
| | 20-29 | 1 | 1.3% | 5 | 2.4% | 1 | 1.6% | 5 | 2.3% |
| | ≥30 | 0 | 0% | 2 | 1% | 0 | 0 | 2 | 0.9% |
| Test Statistics p-value | | 0.985 0.848(F) | | | | 1.469 0.741(F) | | | |

**Note: (F)**: Fisher Exact test, **(C)**: Chi-Square test, **p-value<0.001** Statistically significant

## DISCUSSION

This study explored the prevalence and clinical characteristics of general and occupational allergies among dental professionals in Pakistan. The prevalence of allergies accounted for 27% (n=76), while occupational allergies were experienced by 22.7% (n=64) of the participants. In contrast to our study, a significant number of dental professionals, 64% in Iran, reported allergic reactions to at least one dental material. However, the study sample of the comparative study included Dental students and Postgraduate students who were still in the learning phase of handling the sensitive allergens.[13]

Mites were the most common allergen for the general allergic reaction (32.89%, n=25). Similar findings were observed in a past study conducted on the Pakistani population, where the prevalence of allergies due to dust mites was 44.6%.[14] However, the German population showed 15.9% sensitization to domestic mites.[15] The variation in results could reflect the environmental factors associated with different geographical locations, lifestyle changes, and ventilation of the indoor environment. The significant number of sensitizations reported by the subjects emphasizes the need for improved ventilation methods, the use of vacuum cleaners, less exposure to furniture and carpets harboring domestic mites, the use of HEPA filters, and regular dust removal protocols in the dental clinics.

Natural rubber latex (NRL) was the most frequently reported allergen(65.63%, n=42) in occupational allergies, followed by cleaning products(59.38%, n=38) in this study. Jaber M. also reported that Natural rubber latex is the leading cause of contact dermatitis among dental professionals.[16]

In contrast to our findings, Warshaw et al. conducted an epidemiological study in North America from 2001-2018, where they determined that 13.1% of the participants were allergic to sterilization solution.[7] However, the increased use of chemical disinfectants in dental practices post-COVID-19 could explain the high sensitization rates in our study.[17] Current findings highlight the importance of awareness about the biological risks and long-term effects of these frequently used chemical products on the local and systemic health of dental personnel.

Regarding clinical manifestations, dermatological symptoms were most common (75%, n=57) among those with occupational allergies, 56.58% (n=43) of the participants reported that they are experiencing at least 2 different clinical manifestations of occupational allergies, closely followed by respiratory symptoms (51.32%, n=39). This distribution aligns with the previous findings, which showed skin manifestations, especially contact dermatitis, are often the first manifestation of occupational allergy due to Natural rubber products in healthcare workers.[18] Thus, the high prevalence of latex-induced allergies needs prioritized efforts to implement alternative materials such as polyvinyl and nitrile gloves among susceptible individuals.

Additionally, respiratory symptoms, experienced by over half (51.32%, n=39) of the allergic participants (22.7%, n=64) in the current study, highlighted the vulnerability of dental professionals to inhaled allergens. Comparable findings were noted in a study where 20.7% of dental professionals reported work-related respiratory symptoms.[19]

The majority of the participants (64.06%, n=41) did not require work cessation, while 28.13% (n=18) experienced temporary work stoppages due to allergy-related issues. A French study reported that around 10.3% of dental professionals experienced temporary work cessation due to allergic reactions.[15] The past survey suggested that general allergic reactions were more common in developing countries.[20] The same factor might be responsible for the difference in the results among comparative studies, where the Dental healthcare workers of underdeveloped countries have limited resources and access to alternative protective equipment.

In terms of treatment, the data indicates that the majority of participants opted for oral antihistamines (53.10%, n=34) and topical corticosteroids (28.10%, n=18) as their primary reliever medications, which is consistent with standard treatment protocols for allergic reactions. Evidence has suggested that the adoption of allergy management protocols should be encouraged in the dental office, which can facilitate awareness, minimize unnecessary exposures, and encourage early treatment.[21] There should be Active involvement of physicians within the health care system, primarily dermatologists and occupational medicine specialists, for effectively diagnosing and managing occupational diseases among dental health care workers.[22]

The study was conducted using online survey forms that have the potential limitation of self-reporting bias. Moreover, the sample was inclined to the younger generation, thus having less experience and working exposure to allergens, which can limit the generalizability of the results. There might be chances that older people are less apt to use the technology and the internet, and may fail to report allergic reactions in the online survey. Future studies with larger sample sizes and balanced stratification of subjects, having more experience, and middle to older age groups could reflect the population appropriately.

## CONCLUSION:

This study highlights a notable prevalence of occupational allergies among Pakistani dentists, with 22.7% (n=64) affected primarily by latex and cleaning products, leading to dermatological and respiratory symptoms that impair quality of life and productivity. Females and those with less than ten years of experience reported the highest rates of allergy, pointing toward a need for targeted intervention. Our study advocates for introducing alternative materials, such as nitrile gloves, enhancing clinical ventilation, and establishing training programs on allergy prevention and management, ultimately supporting the safety and productivity of dental professionals in Pakistan.

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**Author Contributions**

1. Tayyaba Nayab : Conception of the research project, Literature search, Data collection, Write-up of research article, Agree to be accountable.
2. Anam Imtiaz: Literature search, Write-up of research article, Data collection, Data analysis, Agree to be accountable.
3. Malik Adeel Anwar: Literature search, Write-up of research article, Data analysis, Data collection, Agree to be accountable, Critical reading and revision.
4. Tooba Saeed: Literature search, Data collection, Write-up of research article, Agree to be accountable, Critical reading and revision.
5. Ayesha Kayani: Data analysis, Data collection, Write-up of research article, Agree to be accountable.
6. Minahil Amir: Literature search, Data analysis, Data collection, Agree to be accountable.

# Association Between Work-Related Musculoskeletal Symptoms (WMSs) and Quality of Life of Dental Practitioners in Peshawar City: A Cross-sectional Study

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## Abstract

**Introduction:** The frequency of Work-related musculoskeletal symptoms (WMSs) is high among dentists. WMSs such as pain can have adverse effects on the quality of life (QoL) of dental practitioners but very few studies have been conducted on it.

**Objectives:** The main purpose of this research study was to determine the frequency of WMSs i.e. pain in different body regions and also its effect on the physical and psychological aspects of the quality of life of dental practitioners in Peshawar city.

**Materials and Methods:** A cross-sectional study was conducted between January 2023 and April 2023 in dental teaching institutes of Peshawar city. Data was collected from 163 dental practitioners, recruited through the convenience sampling method. Basic demographics, dentistry work experience, and health-related characteristics were recorded. WMSs of the participants were scored with the Nordic Musculoskeletal Questionnaire (NMQ). A self-structured questionnaire was used to evaluate the physical and psychological aspects of QoL.

**Results:** Multiple linear regression analysis was used to reduce confounding bias and assess the association between predictor variables and QoL. The body regions with the most WMSs were the neck and lower back (56.4 % each) in the last 12 months while the most painful body region in the last 7 days was the lower back (46 %). A significant association was found between the most prevalent WMSs i.e. lower back pain and physical health (β= -0.234, p value =0.002) and psychological aspects (β= -0.205, p value= 0.008) of QoL.

**Conclusion:** We can conclude that the lower back was the most commonly affected body regions due to WMSs. WMSs have a negative impact on the physical and psychological aspects of QoL. However, we only evaluated the association of WMSs with physical and psychological aspects of QoL and future studies should try to overcome this gap.

**Keywords:** Work-related musculoskeletal symptoms, Dental practitioners, Quality of life

## Introduction

Work-related Musculoskeletal symptoms(WMSs) can be defined as any injury to the human support system that includes the bones, cartilage, muscles, ligaments, tendons, blood vessels, or nerves, caused or aggravated mainly by performing work-related tasks or as a consequences of the working environment [1].The most common work-related musculoskeletal symptom (WMSs) experienced by a healthcare professional is found to be pain [2,3]. Apart from pain, some of the other commonly experienced WMSs are stiffness, swelling, weakness, redness, or paresthesia [4]. Among all the healthcare professionals, general dentists are at particularly higher risk for developing these problems [5,6]. This is because of the high-risk factors involved with the profession of dentistry, including lengthy treatment sessions, constant pressure on the hand-wrist area, prolonged immobility and/or improper posture of the practitioner, the use of vibrating tools, and psychomotor abilities[3]. From the outset of the COVID-19 pandemic, the use of some up-to-date protective tools has become crucial . This has caused increased risks of imbalanced postures and limited mobility. In order to accommodate these positions, muscles extend or shorten, which causes structural damage and pain and results in muscular imbalances [7].

Musculoskeletal disorders are considered a principal cause of disability all around the globe which can range from intermittent pain that does not affect work efficacy to pain that affects day-to-day activities including work[8]. According to various studies, the prevalence of WMSDs showed wide variation between 10.8% to 97.9% among dentists worldwide[7,9–13]. The most frequently reported sites of WMSs are the lower back, neck, shoulders, and upper extremities[4,6,12,14].

The World Health Organization defines quality of life "individuals' perceptions of their position in life in relation to their goals, expectations, standards, and concerns, as well as the culture and value systems in which they live"[11,15]. The high frequency of WMSDs and the stress they cause in terms of absence from work, reduction in productivity, and early retirement are some of the main challenges faced by the dental community which ultimately has an adverse outcome on the quality of life of dentists [11,13,16].

Ergonomics takes into account how workers interact with their workplace, including how workspace, equipment, and body posture are modified based on the type of job being done, in order to preserve workers' health and productivity [8,17]. It was reported factors like improvements in work posture, instruments used, physical activity, mental stress level, appointment scheduling, and work environment to be effective in preventing WMSDs and as a result, improving quality of life[1,18].

Despite the widespread consequences of WMSs on the quality

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of life of dental practitioners, Past studies have mainly focused on the prevalence of WMSDs in dentists, and very few studies and almost none in the South Asian region are conducted about its impact on quality of life of dentists[3,13]. The primary aim of this study is to evaluate the impact of WMSs on the physical and psychological aspects of quality of life, in order to raise awareness and implement the appropriate programs for proper ergonomics to help reduce these challenges faced by the dental community worldwide.

## Materials and Methods

A cross-sectional and questionnaire-based study was conducted from January 2023 to April 2023 at Khyber College of Dentistry, Rehman College of Dentistry, Peshawar Dental College, and Sardar Begum Dental College, Peshawar, Pakistan. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline was followed.

A questionnaire with three separate portions was used. Section one was used to collect complete demographic information about the participants. Section two comprising of Standard Nordic Musculoskeletal Questionnaire (NMQ) [19]was used to record data about WMSs during the last 12 months and last 7 days in the nine body regions i.e. neck, shoulders, elbows, wrists, and hands, upper back, lower back, hips and thighs, knees, ankles, and feet. Section three used to record the Quality of Life of dental practitioners consisted of a self-structured questionnaire that was formulated by taking help from the World Health Organization Quality of Life-Brief Form (WHOQOL-BREF) [11]. It consisted of a total of ten close-ended questions that mainly recorded the physical and psychological aspects of the quality of life (QoL).

Physical Health Section: Consisted of 6 questions regarding day-to-day activities, energy level, quality of sleep, working capacity, ability to perform leisure activities, and use of medications for WMSs with a score ranging from 1 to 12 where a score of 1 indicated poor and 12 indicated good physical health.

Psychological Health Section: Consisted of 4 questions about experiencing positive and negative feelings, concentration level, self-esteem, and body appearance. The psychological aspect score ranged from 1 to 8 with 1 indicating poor and 8 indicating good psychological health.

The research subjects were dental practitioners. The term dental practitioners in this study refers to dentists (general practitioners and dental specialists), postgraduate dental trainees, and faculty members of dental teaching institutes who were included in this study. Exclusion criteria comprised of participants with incomplete questionnaires or any kind of congenital disorders. The reliability and validity of the questionnaire was confirmed by conducting a pilot study on 40 individuals, these individuals were not part of the original study to minimize the risk of potential bias. The validity and reliability of the questionnaire was evaluated by Cronbach's alpha. Validity was acceptable having a Cronbach's Alpha value of 0.677 for physical health section and 0.712 for psychological health section The questionnaire was also verified by a group of public health specialists.

A minimum of 149 sample size was required according to OpenEpi software to achieve a 5% margin of error with a 95% confidence interval and a frequency outcome factor of 10.8% [14,20]. A convenience sampling method which is a type of non-probability sampling, was used for this study. Keeping in view the minimum sample size of 149 calculated for our desired confidence interval, a total of 169 individuals who met the inclusion criteria were invited to participate in the study ,to increase the power and adjust for the 10% dropout rate/non-response rate anticipated which is calculated through the following formula[21]:

Adjusted sample size = Estimated Sample size/ (1- anticipated non-response rate).

The information about the research study was given verbally to the study groups. Informed consent was obtained and the questionnaires with instructions to fill them out correctly were distributed among participants. The questionnaire was in English language. The responses were kept incognito by not collecting any identifying information like email addresses or names of the participants.

Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 24.0. The Kolmogorov-Simonov test was used to check the normality Study variables were age, gender, dental specialty, years of practice, WMSs, physical health, and psychological health. Descriptive statistics were used for categorical variables and presented as frequencies and percentages. In the case of continuous variables, Mean ± Standard Deviation was used for normally distributed data, and median and range were used to report data that was non-normally distributed. A linear regression test was run by using physical and psychological health as dependent variables and WMSs, age, gender, practice hours, dental specialty, and physical activity as independent variables. Multiple Linear regression analysis was used to adjust for confounding factors and to verify the statistical significance of our results. A p-value $\leq 0.05$ is considered statistically significant.

## Result

Out of 169 participants recruited, 5 participants did not consent to participate and also one participant returned an incomplete questionnaire and was therefore excluded from the study. Among 163 dental practitioners included, 63.2% of participants were female and 36.8% were male. The age of participants ranged from 23- 61 years with a mean age of 30.39±7.30 years.

The majority of the participants (60.1%) had a normal BMI score with 37.4% having a BMI score above the normal range. Only 9.4% of the participants had a BMI score below the normal range.

Only 5.5% of the participants were diagnosed with a musculoskeletal disorder (non-disabling) indicating that the majority of the participants (94.5%) were not yet diagnosed.

Most of the participants were from the prosthodontics department (26.4%) followed by OMFS, (17.8%), General dentistry (16.6%), orthodontics (14.7%), operative dentistry (13.5%), and so on.

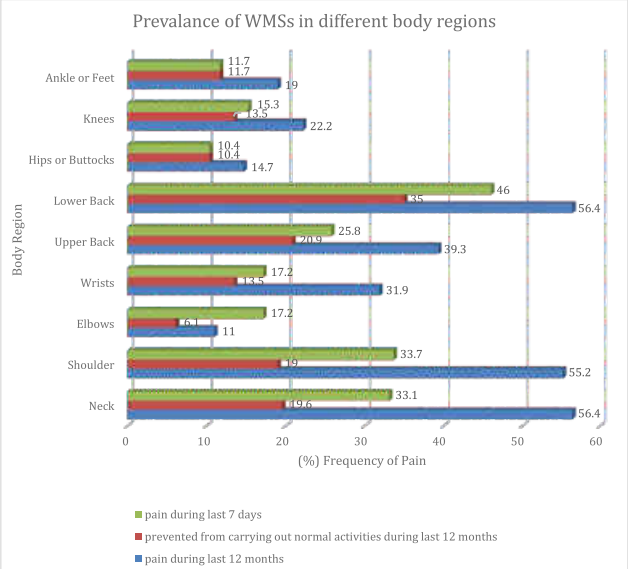
More than half (64.4%) of the participants had work experience ranging from 0 to 5 years with 15.3% having work experience of 5 to 10 years and 13.5 % with work experience of 10 to 15 years. Table 1 displays the basic demographics and health-related baseline variables of the participants.

**Table 1 displays the basic demographics and health-related baseline variables of the participants.**

| Variables | N (%) |
|---|---|
| **Gender** | |
| Female | 103 (63.2) |
| Male | 60 (36.8 ) |
| **Body Mass Index (BMI)** | |
| Underweight | 9 (5.6) |
| Normal | 98 (60.1 ) |
| Obese | 48 (29.4) |
| Overweight | 8 (4.9 ) |

| | |
|---|---|
| **Presence of a diagnosed systematic problem** | |
| Yes | 13 (8) |
| No | 150 (92) |
| **Presence of a diagnosed musculoskeletal disorder (except disabilities)** | |
| Yes | 9 (5.5) |
| No | 154 (94.5) |
| **Regular physical sports activity** | |
| Yes | 98 (60.1) |
| No | 65 (39.9) |
| **Dental Specialty** | |
| Operative dentistry | 22 (13.5) |
| Prosthodontics | 43 (26.4) |
| Orthodontics | 24 (14.7) |
| OMFS | 29 (17.8) |
| Periodontics | 6 (3.6) |
| General Dentistry | 27 (16.6) |
| Basic Sciences | 9 (5.5) |
| Pediatric Dentistry | 3 (1.8) |
| **Years of Practice** | |
| Less than 5 years | 105 (64.4) |
| 5 to 10 years | 25 (15.3) |
| 10 to 15 years | 22 ( 13.5) |
| 15 to 20 years | 2 (1.2) |
| more than 20 years | 9 (5.5) |
| **Most Common Position During Dental Procedure** | |
| Standing | 70 (42.9) |
| Sitting | 93 (57.1) |

In the last 12 months, musculoskeletal pain was prevalent in both the neck and lower back with a frequency of 56.4 % each. Females reported the highest frequency of pain in the neck and lower back region in the last 12 months with a frequency of 65.2 % respectively. Whereas, in the last 7 days the most painful body region was lower back (46 %). The participants were prevented from doing normal activities in the last 12 months mostly due to pain in the lower back (35 %). The frequency of pain in various bodily parts designated with NMQ is displayed in Figure 1.




The frequency of pain in various bodily parts designated with NMQ is displayed in Figure 1.

**Table 2: Association between WMSs and QoL using linear regression model**

| Variables | QoL Physical Health | | QoL Psychological Health | |
|---|---|---|---|---|
| | β | P-value | β | P-value |
| **Constant** | | 0.130 | | 0.061 |
| **Age** | 0.255 | 0.191 | 0 .033 | 0.870 |
| **Gender** | 0.226 | 0.008 | 0.105 | 0.220 |
| **Systematic Illness** | 0.198 | 0.014 | -0.153 | 0.063 |
| **Physical activity** | 0.055 | 0.474 | 0.030 | 0.702 |
| **Position while doing dental Procedures** | 0.013 | 0.859 | 0.004 | 0.956 |
| **Lower back trouble last 12 months** | 0.234 | 0.002 | -0.205 | 0.008 |
| **Years of practice** | 0.389 | 0.048 | -0.088 | 0.661 |
| **Specialty** | 0.080 | 0.300 | 0.071 | 0.374 |
| **Practice hrs. per week** | 0.01 | 0.209 | -.0016 | 0.843 |
| **R2** | 0.429 | | 0.141 | |
| **F** | 3.378 | 0.001 | 2.466 | 0.009 |
| | | | | |

The median score for physical health was 9 while for psychological health was 6. A significant association between gender and physical health was found (p-value = 0.008) while no significant association with psychological health was seen (p-value = 0.220). After adjusting for age, gender, physical activity, years of practice, dental specialty, practice hours and systemic illness, a significant association was found between the most prevalent WMSs i.e. lower back pain with physical (β= -0.234, p value =0.002) and psychological aspects (β= -0.205, p value= 0.008) of quality of life(Table 2).

## Discussion

The primary objective of this study was to find the association of work-related musculoskeletal symptoms with two main aspects of quality of life: physical health and psychological well-being.

There are numerous studies conducted that discusses the prevalence, frequency, and distribution of work-related musculoskeletal symptoms in dentists. According to the literature search done no study of its kind was found that could detect an association of WMSs and the psychological and physical health subscales of dental practitioners' quality of life while a study that was done on dental students found a negative impact of WMSs on quality of life[3] .Therefore ,this study provides an insight on how the prevalence of work-related musculoskeletal symptoms among dentists can affect the two main aspects of quality of life that is physical health and psychological health .

Our research revealed that the neck and lower back were the most painful body regions throughout the previous 12 months. A systematic review also revealed that the lower back was found to be the area with the highest prevalence of musculoskeletal disorders among dental workers (29% to 94.6%) followed by shoulders and neck [22]. In senior dental students WMSs in the last 12 months was prevalent in the neck region[3]. In a meta-analysis conducted discussing the prevalence of work-related musculoskeletal symptoms and pain in Western countries neck was also reported as the body region affected the most followed by lower back[20] . Additionally, in our study, the lower back was the most painful region in the previous seven days, which significantly affected the capacity to perform tasks .In a study conducted in India, the most affected body region with WMDS was also found to be lower back among different healthcare professionals [23].However a study in Iran revealed that the musculoskeletal pain was prevalent in the shoulders, which was not in accordance with our study[24,25]. According to Botta et all. several factors, including prolonged periods of unilateral bending, inadequate lumbar support during prolonged work times, and dental stool designs that are not ergonomically designed, have been linked to the prevalence of lower back pain[26].

When WMSs are assessed based on quality of life, engaging in regular physical sports activity has a significant impact on physical health as expected. It is well-recognized that people

with chronic musculoskeletal discomfort have long-term limitations to their activities[27]. Studies do suggest a decrease in quality of life due to work-related musculoskeletal disorders among healthcare professionals[3,28]. WMSs can have a significant impact on people's quality of life as well as the continuity of employment and services which can have detrimental effect at both individual and community levels. Brown et al. noted that the leading cause of ill health retirement among dental practitioners was musculoskeletal disorders [29].

According to numerous research findings, WMSs were found to have a negative impact on people's quality of life across a variety of occupations apart from dentistry[30–32].While on the other hand, a study conducted in India revealed that Quality of Life was not affected by WMSDs in nurses [33]. In our study majority of the participants who had work experience of less than five years reported the presence of pain(WMS) revealed in such a short period after graduation is quite alarming which is parallel with the Italian dentists having work experience of 2-5 years had the most prevalence of WMSs [10]. WMDs are preventable in dental practitioners, as yoga in particular is useful for MSDs when it comes to stretching activities [34–38] by easing muscle tension and increasing blood flow to the body regions. Yoga was found to be effective for back and neck pain[39,40] shoulder pain, wrist and forearm disorders[35,37] and tension headache, and cervicogenic headache[37]. Recent studies have examined yoga-based movements that can be performed at work to aid with painful ailments of the muscles, tendons, and nerves (such as tendinitis, thoracic outlet syndrome, tension neck syndrome, and carpal tunnel syndrome). [37,38].

In our study, female participants had a higher prevalence of pain due to WMDs which was also noted to be prevalent in female dentists in Iran [24,41], Italy[10], and Colombia [42]as compared to males. A relationship between dental work and the reported sexual dimorphism for pain perception could offer a plausible explanation for this higher occurrence. Dental work often requires extended durations of head tilting, which can result in the overworking of neck muscles and cervical spine joints whereas the cause for lower back pain is due to incorrect posture [43].

The implementation of the ergonomic intervention was seen as successful in reducing WMDs in office workers [44] who like the majority of dental practitioners spend most of their time sitting during their work. Campaigns could be launched to raise awareness with the aid of physiotherapists and chiropractors to implement ergonomic training like frequent breaks, avoiding stiff postures for a prolonged period of time, using magnification to prevent neck bending, focusing on strengthening the body's muscles through weight training and exercise, and occasionally using nerve flosses to prevent irritation. Continuing Professional Development (CPD) courses could also be offered to dentists to ease the physical strain of the workplace.

The limitations of this study were that it only evaluated the association of WMSs with physical and psychological aspects of QoL leaving out two other important aspects i.e. social aspect and the environmental aspect. This study was limited to only a single region so the results can cause a limitation of generalization of the results to a larger population and restrict the outcomes' relevance to certain racial groups. As the responses were self-reported by the participants, subjective bias could have been introduced. Also, as we used the convenience sampling method therefore selection bias can also be found in this study which can be seen in terms of the female majority and most of the participants having less than 5 years of experience. It is possible to assess the effects of numerous sociodemographic and sociocultural factors on WMSs and associated QoL. Therefore, this study cannot be used to determine the direct causal relationship as possible confounding factors might be present due to the cross-sectional study design.

## Conclusion

Our study highlights that dentists' lower back and neck are the regions most commonly affected by WMSs. WMSs have a negative impact on the physical and psychological aspects of the quality of life of dental practitioners.

## Recommendations

Dental professionals should observe the precautionary measures that reduce the risk of WMSs. The dentist should make an effort to develop the habits of keeping optimal posture with precise supervision and prompt interventions, taking breaks, and receiving the right amount of rest while working and improving the working environment. At the workplaces, the emphasis should extend to continuing professional development courses on how to improve workplace ergonomics. Now, more clinical research is required to evaluate the effects of WMSs on the social and environmental aspects of quality of life and to formally assess if preventative factors, such as ergonomics education and prompt treatments can be applied as WMSD precautionary measures to improve the quality of life of dental practitioners.

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## Author Contributions

1. Amna Amjad: Data Collection and Analysis.
2. Hafsa Rehman: Study design and article writing.
3. Aliya Khan: Analysis and Interpretation

# Clinical and Medicolegal Significance of Variations in the Nutrient Foramen of the Adult Dry Human Tibia

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## Abstract

**Background**: The long bones receive their blood supply through the nutrient artery. The nutrient foramina of the tibia are commonly located on the posterior surface, near the soleal (popliteal) line, in the proximal third of the bone. However, variations in their number and position have been observed, which hold clinical and medicolegal significance. In the medical profession, anatomical knowledge and variations of the nutrient foramen is crucial, particularly for forensic and bone transplant applications.

**Material and Methods**: A total of 180 fully ossified dry tibiae were obtained from the bone bank of the Anatomy Department, Khyber Girls Medical College, for this study. Bones without any pathological abnormalities, such as fractures or structural deformities were selected.

**Results:** Out of a total of 180 tibiae studied, 58 had a length of ≥1.27 mm, while 55 measured at least 1.27 mm. The average length of the left tibia was 37 cm, and the right tibia measured 36.2 cm. The mean distances of the nutrient foramina were 13.6 cm in the left tibia and 13.4 cm in the right tibia. Additionally, eight tibiae exhibited double the usual number of nutrient foramina. In the upper third region of the tibia, 72 foramina were observed on the left side and 76 on the right side.

**Conclusion:** The study's findings are helpful in both surgical operations and the resolution of medical malpractice claims. The study's findings add to the body of knowledge regarding the changes in the nutrient foramen of the arid human tibia and their potential therapeutic consequences. The surgeons can better grasp the variances with the use of this data, leading to improved surgical treatment outcomes.

**Key Words:** Tibia, Diaphysis, Forensic medicine, Nutrient foramen.

## Introduction

The main blood supply to the long bone is through the nutrient artery. Anatomically,the nutrient artery of the tibia is most commonly a branch of the posterior tibial artery however it may occasionally arise from the peroneal artery. The most significant artery supplying the cortical bone is the nutrition artery.[1] The nutritive artery has a vital function, particularly fetal development and the onset of bone ossification, since it is the only source of blood supply to the tibia.[2]

The nutrient foramen serves as an entry point for the nutrient artery into the long bone. The top portion of the shaft of long bones is where the nutrient artery enters. In clinical anatomy, this is significant. The lower parts of the shaft will receive less nourishment since the most common point of entry of the artery is through the upper one third of the shaft, the lower end gets less blood supply particularly in cases of bone fractures.[2]. Given that anatomy is the foundation of all surgeries, it is imperative that a clinician must have a thorough knowledge about the potential sites and variations of the nutrient artery in the long bones. This makes it possible for surgical treatments involving long bones, particularly those involving bone fractures, to have a higher success rate.[3-6] The clinicians will benefit from having more information about the number and location of the nutrient arteries throughout the transplant procedure.[7] It is also beneficial in handling medico legal situations as in medicolegal cases, identifying variations in the nutrient foramen can assist forensic experts in determining the cause of bone damage, differentiating between ante-mortem and post-mortem fractures, and providing critical evidence in trauma or assault cases.

Therefore, one of the main areas of interest for medical professionals is understanding the shape and variability of the nutrient foramen. The current study sought to determine the quantity, location, and variations of the tibia's nutrient foramen, as well as its orientation, which was assessed based on the obliquity of the foramen in relation to the longitudinal axis of the bone.

## Material and Methods

180 fully ossified, dry tibia obtained from the bone bank of Anatomy Department Khyber Girls Medical College Peshawar. Bones with normal anatomical features were selected that showed no signs of pathology, including fractures or bone deformities. The size, length, quantity, orientation, position, and changes in the tibia's nutrient foramen were among the observations made in the chosen bones. To prevent observer bias, two different observers made each observation.

**Size of the foramen:** The foramen's size was measured using a hypodermic needle.[8] The foramen was separated into main and secondary foramen based on size. According to the criteria listed in the literature, a foramen was classified as secondary nutrient foramen if its size was below needle 24, and as primary or dominating foramen if it was more.[9]

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**Number of foramen:** The bones were divided into single and multiple nutrient foramen based on the number of foramen that were observed. A single foramen was referred to as a single nutrition foramen bone. Numerous foramena are referred to as numerous nutrient foramen bones. In order to identify the bones lacking the nutrition foramen, observation was also carried out.

**Size of foramen**: syringe needle of various gauges was used to measure the foramen size.

**Location of the foramen:** by using the conventional foraminal index as described in the literature, the location of the nutrient foramen was evaluated in relation to the soleal line .[10]

**Other observations:** According to the usual technique described in the literature, the direction and variances were noted.[11] The orientation of the nutrient foramen was vertically downhill across Tibia.

## Results

There are 180 bones in all, with 90 left and 90 right. Table 1 displays the foramen (right) size (N = 90). Out of 90 bones, 58 measured ≥1.27 mm. Table 2 displays the foramen size on the left side for N = 90 people. 55 of the 90 bones on the left side measured ≥1.27 mm. Table 3 shows the tibia's entire length as well as the distance between the nutrient foramina and the upper end of the tibia. The average tibial length is 37 cm on the left and 36.2 cm on the right. The left and right NFs (nutrient foramina) are 13.6 and 13.4 cm apart from the top end.Tibia's anterior edge has a single foramina. (Figure 1). Eight tibiae were discovered to have doubled the typical amount of nutrient foramen. Nutrient foramina are absent in two Tibiae (Fig. 2). The nutrient foramina were most commonly located along the posterior surface of the tibia, near the soleal line. In the upper third of the tibia, 72 foramina were observed on the left and 76 on the right, while in the middle third, 14 foramina were found on the right and 18 on the left. (Fig. 3).

**Foramen index (FI) Calculations**

Foramen index FI = (DNF/TL) x100

DNF = the distance of the nutrient foramina to the upper end of tibia.

TL = total length of bone.

| | Table 1: showing Size of the right foramen (N=90) | |
|---|---|---|
| | foramen size | No of Bones |
| 1 | (≥1.27 mm) | 58 |
| 2 | (≥ 0.90mm to < 1.27mm) | 21 |
| 3 | (≥ 0.71mm to < 0.90 mm) | 6 |
| 4 | (≥ 0.55mm to < 0.71 m) | 0 |

| | Table 2: showing Size of the left foramen (N=90) | |
|---|---|---|
| | foramen size | No of Bones |
| 1 | (≥1.27 mm) | 55 |
| 2 | (≥ 0.90mm to < 1.27mm) | 15 |
| 3 | (≥ 0.71mm to < 0.90 mm) | 7 |
| 4 | (≥ 0.55mm to < 0.71 m) | 10 |

| | Table 3: Tibia's length and the distance between its upper end and the NF | | | |
|---|---|---|---|---|
| | | Right | Left | Foramen (FI) index |
| 1 | Tibia's Length | 36.2 cm | 37 cm | 37.32 |
| 2 | Distance between the upper end and NF | 13.4 cm | 13.6cm | 37.26 |

| Table 4: Distribution of Nutrient Foramina in the Tibia: Location and Direction | | | |
|---|---|---|---|
| Parameter | Right Tibia (N=90) | Left Tibia (N=90) | Total (N=180) |
| Foramen Location (Upper Third) | 76 | 72 | 148 |
| Foramen Location (Middle Third) | 14 | 18 | 32 |
| Foramen Direction (Downward Oblique) | 90 | 90 | 180 |

## Discussion

The nutrient artery provides the majority of the long bone's nutrition. The posterior tibial artery gave rise to this nutrient artery that supplies the long bones. There are 180 bones in all. of which 90 were left and 90 were right. On the right 58 bones were ≥1.27 mm. On the left side 55 bones had size of ≥1.27 mm. The left and right NFs (nutrient foramina) are separated by 13.6 and 13.4 cm, respectively, from the top end. One or two foramen were found in earlier research, but a different study by Mazengenya et al. described a bone with six foramen.[12]

Our findings are in line with the study performed by Roy PP et.al. On Indian population who has reported similar results.[11]

The bulk of research on the placement of NF indicated that it is located in the middle one third of the tibial shaft. [12,13] The current study supports previous research. According to a research, radiographs may appear to show bone fractures due to the linear appearance of the nutrient foramen. Examining the anterior nutritive foramen should also be done with caution since osseous disease may be misinterpreted by it.[14]

This information is crucial for managing surgically the long bones that have undergone surgery. All of the nutrient arteries run caudally during development, and their continued path is determined by how both ends of the long bones get matured. [15]

Further researches, meantime, suggested that this theory might not always apply to people.[16–17] Remarkably, a different study found that the foramen of nutrients is located far from the knee joint.[18–20]

**Clinical significance** Maintenance of blood flow to the bones is crucial while doing the procedures needed to treat bone fractures. Similarly, this is used when performing grafting and joints replacements. Maintenance of blood supply is crucial, since it speeds up the healing process. Therefore, the current work contributes to the body of literature about our understanding of nutrient foramen.

**Forensic implications** In terms of the forensic implications, there could be situations in which a forensic physician must distinguish between human and non-human bone, even in cases when a little piece of long bone may be present. In these situations, macroscopical and computed tomography (CT) examination of the nutrition foramina is essential.[21–22.]

Forensic implications can be helpful in creating biological profiles and enabling individual identification. The potential for these findings to contribute to the development of forensic osteological databases enhancing identification capabilities, supporting research, and improving the overall efficiency of forensic investigations.[23]

## Conclusions

The results of the study are useful for both surgical procedures and the settlement of medical malpractice lawsuits. The results of the study broaden our understanding of the modifications to the nutrient foramen of the arid human tibia and the possible therapeutic implications of these changes. With the use of this data, the surgeons can better understand the variances, improving the results of surgical therapy.

The variability of the tibial nutrient foramen holds significance in both clinical and forensic applications. Understanding its anatomical variations may enhance forensic identification techniques and improve surgical precision.

The results of the study are useful for both surgical procedures and the settlement of medical malpractice lawsuits. The results of the study broaden our understanding of the modifications to the nutrient foramen of the arid human tibia and the possible therapeutic implications of these changes. With the use of this data, the surgeons can better understand the variances, improving the results of surgical therapy.

The variability of the tibial nutrient foramen holds significance in both clinical and forensic applications. Understanding its anatomical variations may enhance forensic identification techniques and improve surgical precision.

FIG 1: Foramen in anterior border of tibia

FIG 2: Double nutrient foramina

FIG 3: Absent nutrient foramen

## Discussion


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# Time Management and Urgency Index of Medical and Dental Students and Factors associated with Urgency Addiction

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## Abstract

**Introduction:** Time management is considered a significant skill for medical students, it has a direct impact on their academic performance and future careers. The urgency index, adapted from Covey et al.'s Time Management Matrix, provides a quantitative measure of students' tendency to prioritize urgent over important tasks, identifying patterns such as urgency addiction that may contribute to stress and reduced productivity. The study's aim is to determine the urgency index among medical and dental students and identify the demographic, familial, and educational factors contributing to their urgency addiction.

**Materials and Methods:** This cross sectional study was conducted on 1st and final year MBBS and BDS students. The urgency index questionnaire was used to categorize students into low urgency index, high urgency index, and urgency addiction. Urgency index for each student was calculated and they were categorised as low urgency if the score is <25, high urgency if the score is 26-45 and urgency addiction if they scored >45. Associations with gender, year of study, maternal employment, background education (FSc vs. A levels), and program (MBBS vs. BDS) were analyzed using chi-square tests. Data was analysed by SPSS 29.

**Results:** Out of 306 students, 76.8% (n=235) were from MBBS, 57.5% (n=176) were females and from first year each. Of all, 12.7% (n=39) students had low urgency index, 49.7% (n=152) had a high urgency index, while 37.6% (n=115) had urgency addiction Urgency addiction was more in first-year students (44.9%; n = 79) than final-year students (p = 0.002) Females suffered significantly more level of urgency index 43.8%(n=77) than males.( p value 0.01). Students whose mothers were non-working also had higher urgency addiction rates (40.0% n=100) than those with working mothers (26.8% n=14; p=0.04).

**Conclusion:** Around half of participants had high urgency index. Urgency addiction was significantly more in females, 1st year students and students whose mothers were working ladies.

**Key words:** Medical student, Stress, Time management, Time Pressure

## Introduction:

Time management is widely recognized as an essential skill for medical and dental students to balance demanding coursework, clinical responsibilities, and personal commitments. Ineffective time management can lead to missed deadlines, increased stress, reduced productivity, and ultimately impact academic success and career development.[1,2]

The urgency index, adapted from Covey et al.'s (1994) Time Management Matrix, offers a focused, quantitative way to assess students' tendency to prioritize urgent tasks over important, long-term goals.[3,4] Unlike broader tools, it highlights "urgency addiction": a reactive habit of responding impulsively to immediate demands, often at the expense of strategic planning and self-regulation.[3]

This index also helps identify whether students are achieving meaningful long-term goals or remain caught in short-term, reactive cycles. A high urgency index may suggest difficulties in emotional regulation, greater vulnerability to stress and burnout, and the influence of external pressures such as peer expectations.[3,5]

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Urgency addiction is especially relevant in medical and dental education, where academic pressures and time-sensitive tasks can drive students toward urgency-focused behaviors.[5] Gender differences further play a role, with female students often showing higher urgency tendencies, possibly linked to greater social and personal expectations.[6]

Despite its practical value, few studies have used the urgency index as a standardized tool among medical and dental students. This limited use underscores the novelty of this study, which aims to explore how urgency-driven behaviors manifest and which demographic, familial, or educational factors influence them.

Despite the recognized importance of time management in medical education, there is limited empirical data exploring how urgency-driven behaviors (captured through the Urgency Index) manifest in this population and what demographic, familial, or educational factors may influence them. Identifying these patterns is important because persistent urgency addiction can contribute to burnout, stress, and reduced academic effectiveness. This knowledge of urgency scores can be used to guide interventions in improving time management and focus on long-term outcomes for medical and dental students. The students can recognize if they are overly reliant on the adrenaline rush that comes with handling urgent tasks, leading to a proactive change in their behavior. Furthermore, it can assist education providers with developing initiatives that help reduce burnouts and promote a better work-life balance, eventually improving the student's productivity and mental health.

## Objectives

To determine the urgency index of medical and dental students and to identify demographic, familial, and educational factors (e.g., gender, year of study, basic education, parental profession) associated with urgency addiction.

## Materials and Methods

This cross-sectional observational study was conducted at Rehman medical Institute, Peshawar. Ethical approval was taken from RMI-REC referenced RMC/CMPH-REC/Approval 25-02. Written informed consent was also taken from the study participants.

This cross-sectional observational study was conducted over a period of one month following the issuance of ethical approval. The study population included first-year and final-year students enrolled in the MBBS and BDS programs. All students actively enrolled in their first or final year were considered eligible for participation, while those detained in the same academic year were excluded from the study. All students in these academic years were invited to participate, using a consensus sampling technique, where every eligible student within the defined population is approached for inclusion. Different study groups were formed for analysis purpose.

- Group 1 (MBBS): further divided into first and final year sub-groups.
- Group 2 (BDS): further divided into fist and final year sub-groups.

After taking informed written consent, the students were asked to fill a proforma containing their demographics and urgency index questionnaire.

To assess urgency-oriented time-management behaviors among medical and dental students, we used the **Urgency Index questionnaire**, which was conceptually based on the Time Management Matrix described by Covey et al. (1994) in First Things First. It highlights a common behavioral pattern known as "urgency addiction"—a tendency to over-prioritize tasks that are urgent but not necessarily important, at the expense of long-term, meaningful goals.[3]

The Urgency Index questionnaire consists of 16 items scored on a 0–4 Likert scale (0 = never; 4 = always). Participants rate the frequency of behaviors reflecting urgency-driven patterns, such as feeling pressure to act immediately or frequently prioritizing urgent deadlines over important but non-urgent tasks. Total scores are calculated by summing individual item responses. Following the original scoring method, students are categorized into three groups:

- **0-25:** low urgency
- **26-45:** high urgency
- **>46:** urgency addiction

Urgency index for each student was calculated and they were categorised accordingly to the above score.

The data was entered in SPSS 29. Frequencies and percentages were calculated for quantitative variables, while the t-test and chi-square test were applied to the qualitative variables. Both groups and subgroups were compared for having low, high urgency index, and urgency addiction.

The frequency of urgency addiction was calculated and its association with gender, background education program (FSc Vs A levels) year of education, basic education program (MBBS or BDS), parental profession, were noted. A p value of less than 0.05 was considered statistically significant.

## Results

A total of 306 students participated in the study, comprising 42.5% (n=130) males and 57.5% (n=176) females. Of these, 76.8% (n=235) were enrolled in MBBS and 23.2% (n=71) in BDS. Overall, 57.5% (n=176) were from first year and 42.5% (n=130) from final year.

Based on the urgency index, 12.7% (n=39) of students had a low urgency index, 49.7% (n=152) had a high urgency index, and 37.6% (n=115) were classified as having urgency addiction. Figure 1 describes urgency scores in gender, academic year and program.

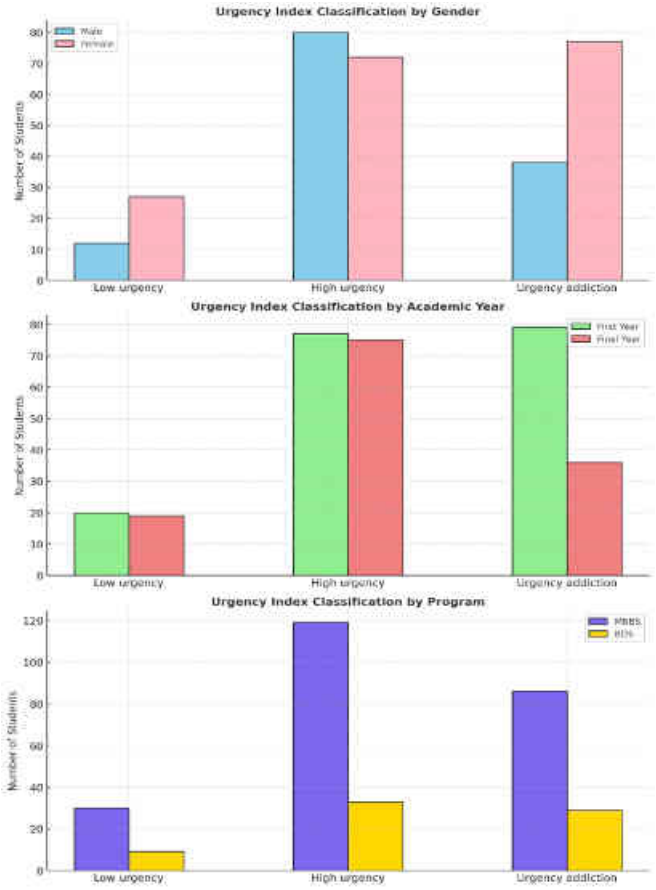


Figure 1: Distribution of Urgency Index Categories by Gender, Academic Year, and Program

Urgency addiction was significantly more prevalent among first-year students (**44.9%**, n=79) than final-year students (**27.7%**, n=36) (p=0.002). These findings suggest that urgency addiction is more prevalent among first-year students than final-year students, indicating that time management behaviors and urgency patterns may improve as student progress through the medical/dental curriculum.

Similarly, it was more common among female students (**43.8%**, n=77) compared to male students (**29.2%**, n=38) (p=0.010). This suggests female students may be more prone to urgency-driven time-management behaviors

Students whose mothers were non-working also had a higher prevalence of urgency addiction (**40.0%**, n=100) than those with working mothers (**26.8%**, n=15) (p=0.040). This may reflect differences in early time-management learning, where students with working mothers might develop stronger self-regulation due to greater household responsibilities and structured routines.

Urgency addiction was significantly more common among female students [43.8% (n=77)] than male students [29.2%

(n=38)] giving p value 0.010.

Other factors like academic program (MBBS vs. BDS), educational background (FSc vs. A Levels), residence status (hostelite vs. day scholar), and father's profession (doctor Vs non-doctor) showed no statistically significant association with urgency addiction.

Details of factors associated with urgency addiction are described in table 1.

| Factors | | Urgency addiction %(n) | P value |
|---|---|---|---|
| Academic year | 1st year | 44.9(79) | 0.002 |
| | Final year | 27.7(36) | |
| Gender | Female | 43.8(77) | 0.01 |
| | Male | 29.2(38) | |
| Program | MBBS | 36.6(86) | 0.51 |
| | BDS | 40.8(29) | |
| Background educational status | FSC | 38.1(104) | 0.59 |
| | A level | 33.3(11) | |
| Residence | Hostelite | 35.6(37) | 0.26 |
| | Day scholar | 42.5(78) | |
| Father's profession | Doctor | 36.1(73) | 0.46 |
| | Non doctor | 40.4(42) | |
| Mother's profession | Working | 26.8(15) | 0.04 |
| | Non-working | 40(100) | |

**Table 1: Factors associated with urgency addiction**

## Discussion

Multiple factors contribute to the trait of urgency addiction in a person which further leads to poor time management and burnout. Prior research indicates that women typically experience burnout, problems balancing work and family life, and a greater sense of urgency than men. This is caused by a number of variables, including some risk factors associated with sex, such as unequal compensation, a lack of mentorship, limited leadership chances, time restrictions, increased childcare or household obligations, and mother age. Additionally, burnout appears to be triggered differently in men and women; for men, depersonalization is typically the major driver, but for women, emotional weariness is the key one [7].

Our study resonates with previous studies regarding more urgency addiction in first year versus final year students. According to earlier research, reason for this could be that first-year medical students experience more time management problems than other students. They lack proficiency in time management techniques such as setting priorities, breaking down work into manageable chunks, creating a time limit plan, eliminating unnecessary tasks, and planning ahead [8].

In our study, BDS students had a greater urgency addiction than mbbs students, in contrast to earlier studies where students of both programs have the same stress and time management problems [9]. The shift in organizational culture or faculty attributes could be one of the cause. Numerous research have looked into the connection between students' academic stress and their parents' employment position. Children of professionals frequently face increased pressure to perform well academically, especially in high-status occupations like medicine [10,11]. The effects aren't always obvious, though, and this pressure can show up as anxiety, perfectionism, and possibly urgent addiction-related behaviors (such as procrastination followed by frenzied last-minute activity). According to certain studies, professional children might also gain from stress-reduction tools and supportive surroundings [12]. Although it didn't directly test for urgency addiction, a study by lee et al. (2018) discovered that children of doctors reported higher levels of academic pressure than children of non-physicians [13].

Compared to children of non-working mothers, children of working mothers experience higher levels of stress. Our findings are consistent with earlier research from both domestic and foreign sources. Studies conducted in pakistan and around the world both lend credence to this theory[14, 15]. According to the study, there are notable differences between the problem-focused coping mechanisms utilized by children of working and non-working mothers. It has been discovered that children of non-working mothers put effort into identifying the issues, coming up with potential solutions, weighing the advantages and disadvantages of each option, and then acting on their decision.the study also shows that there are notable differences in the emotion-focused coping mechanisms utilized by children of working and non-working mothers. Children cannot reach working mothers; instead, they seek solace in avoiding the issue rather than facing it head-on. Children of working mothers employ emotion-focused coping mechanisms as a result of less mother-child interaction [14, 16]. Despite the aforementioned conclusions, some research also suggests that children of working mothers are better organized, disciplined, and have better time management skills because they have a positive role model in their lives [17]

Our findings resonates with earlier research, which also shows that day scholars are more likely than hostelite college students to face peer pressure and academic stress, as well as to set feasible goals rather than unachievable ones[18].

Our study reveals that fsc students have more stress related issiues as compared to a levels. One possible explanation for this discrepancy is that fsc students typically deal with more stress and deadline pressure, whilst a level students have a more flexible learning environment and choose a more conceptual approach to learning [19, 20]

## Limitations

To obtain a comprehensive perspective, multicenter research would be advantageous. Second, our analysis may be biased due to differences in the sample sizes of MBBS and BDS as well as student years.

## Conclusion

This study highlights that urgency addiction is relatively common among medical and dental students, affecting over a third of participants. The prevalence was significantly higher among first-year students, female students, and those whose mothers were non-working, suggesting that both demographic and family factors may influence urgency-driven time management behaviors. These findings underline the need for targeted interventions and structured time-management training, particularly early in the medical and dental curriculum, to help students adopt more proactive and balanced approaches to managing academic demands.

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4. Zakia Shaheen : Analysis and interpretation of data, critical reveiw.
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# Frequency of Trauma Associated Pain Among other Orofacial Pain in Patients Attending Dental And Maxillofacial Outpatient Clinics of a Tertiary Care Hospital

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**Abstract**

**Background:** Orofacial pain is a multifactorial complaint frequently encountered in dental and maxillofacial outpatient clinics. The causes range from dental pathologies to trauma and neuralgias and understanding their distribution is essential for efficient clinical management and planning.

**Objective:** To evaluate how often different types of orofacial pain occur and how are they distributed among patients visiting dental and maxillofacial outpatient clinics of a tertiary care institution ;with the aim of supporting targeted care and enhancing preparedness in specialized domains of orofacial pain management.

**Materials and Methods:** This cross sectional study was conducted in the oral and maxillofacial surgery outpatient department of Abbasi Shaheed Hospital, Karachi from 30th June 2016 till 30th December 2016. A total of 289 patients satisfying inclusion and exclusion criteria were randomly selected. Among the total,100 patients were diagnosed with trauma -associated orofacial pain ,including cases linked to road traffic accidents, sports injuries, fall and interpersonal violence and abuse.The age, duration and severity noted and pattern diagnosed.

**Result:** Trauma -associated orofacial pain was identified as the most frequently observed category among patients seeking care at the dental and maxillofacial outpatient department of Abbasi Shaheed Hospital. This pattern was especially notable in younger age groups and male patients, highlighting trauma as a major contributor to orofacial pain burden in the tertiary care setting.

**Conclusion:** Trauma emerged as the most frequent cause of orofacial pain among outpatient attendees. Maxillofacial clinics and wards routinely manage a high volume of trauma related orofacial pain cases, ranging from minor soft tissue injuries to complex maxillary and mandibular fractures. This pattern highlights the need for sustained trauma focused infrastructure, training and resource allocation within public sector maxillofacial units.

**Key words:** Pattern, Orofacial Pain, Visual Analogue Pain Scoring System

## Introduction:

Orofacial pain refers to discomfort occuring in areas above the neck, specifically in front of the ears and beneath the orbitomeatal line, also within the oral cavity.[1,2,3] Orofacial pain includes odontalgia,neuralgia, psychogenic, traumatic, vascular, myofacial joint related or other idiopathic variants.Persistent orofacial pain is often linked to mental stress, Social dysfunction and diminished life quality, economic crisis and high disease burden.[3,4]

With regards to gender, a greater proportion of females have been observed to persue treatment for orofacial pain as compared to their male counterparts.[5] Many common and severely disabling pain conditions originates from structures supplied by the trigeminal nerve (head, face, masticatory musculature, temporomandibular joint and associated structures).As per the Okeson Classification of Orofacial Pain, is categorized into physical causes (Axis 1) and psychological origins(Axis 2) conditions. Physical conditions covers conditions related to the Temporomandibular joint (TMJ) and disorders of the Musculoskeletal systems (masticatory muscles and cervical spine); Neuropathic pains, episodic (trigeminal neuralgia [TN]) and continuous (peripheral/ centralized mediated) pains and neurovascular disorders (migraine). Psychological (Axis 2) conditions include mental health related causes primarily involving anxiety and mood disturbances.[1,2,3]. Myofacial pain syndromes, tempor-omandibular disorders (TMD), neuralgias, ENT diseases, dental pain, tumors, neurovascular pain or psychiatric diseases commonly exhibit overlapping symptoms making precise diagnosis more difficult due to their varied clinical features. Identifying the actual cause of pain therefore plays a key role in reaching actual diagnosis and shaping the treatment strategy.[4]

Most studies revealed that the major reason for Orofacial pain was pulpitis, secondary to periodontal pain and pericoronitis. There were few patients who suffered from TMJ disorders, dysfunction and neuralgia. Other causes were least observed, like tumors and carcinoma (Oral Squamous Cell Carcinoma or salivary neoplasm etc.).[6] According to a population based study published in August 2013 in South east Iran, out of 1800 interviewees 55.1% reported toothache [7]. D.E Peterson in the year 2011 in his study says that the incidence of oral mucositis in patients receiving high dose head and neck radiation has

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approached 85% according to WHO stats. [8]
The cause salivary gland obstruction is either strictures or calculi. Strictures within the ducts are a more frequent cause responsible for approximately 25% of benign salivary obstruction while calculi account for the majority at 73.2% [9]
Temporomandibular joint associated pain was mild in 48.2%, moderate in 11.3% and severe in 3%in a study involving 2507 college students with a total sample of 336 students carried out on Brazil in July 2012.

The purpose of this research is to identify the most frequently enncountered types of Orofacial pain within our local context,as well as the patterns in which they typically occur. This will help to allocate the budget for patients suffering from Orofacial pain and will greatly aid in the management protocol that is both crucial for treatment planning in hospital setting and will be serviceable in the best interest of the patients. The outcome of such a study will help in establishing a more targeted or focused approach towards the management of Orofacial Pain in future.

## Materials and Methods

This was a descriptive Cross sectional study carried out in the Outpatient clinics of Oral and Maxillofacial Surgery Department at Abbasi Shaheed Hospital, Karachi for six months between, 30th June 2016 to 30th December 2016.By using WHO sample size calculator, with a 5% margin of error and prevalence of benign salivary gland obstruction = 25% with 95% confidence interval, a total sample size of 289 was obtained. The Sampling Technique used was Non probability Consecutive Sampling.
A total of 289 individuals were enrolled based on predefined inclusion and exclusion criteria. All adult patients ranging between 18 and 70 years were included in the study, complaining of Pain in the Orofacial region after experiencing physical trauma anytime between 1 day and 1 year in the head and neck region only. Patients whose presenting complaint did not include Orofacial Pain were excluded from the study. Patients with neurological deficit or speech problems, and patients who have been undergoing chemotherapy or radiotherapy have also been excluded from this study. After obtaining institutional review board approval, the study was carried out for a period of 6 months in the Oral and Maxillofacial Department of Abbasi Shaheed Hospital Karachi. All patients were treated by same surgeon, the same set of questions were asked for pain in history taking and on the basis of clinical examination specific radiographic investigation were carried out if at all necessary to confirm the diagnosis. Each participant rated the intensity of their pain using the VAS (Visual Analogue Scale) a standardized chart ranging from 1 (mild) to 10 (most severe) type of pain.
The collected data analyzed using SPSS version 17. Quantitative variables including pain, age,duration and VAS (Visual Analogue Score) scores were assessed through mean and standard deviation. Qualitative factors such as gender and pain severity were expressed using frequencies and percentages. Stratification was applied to control effect modifiers such as age, gender, duration and pain intensity. A Chi square test was then performed considering a P value less than or equal to 0.05 considered as statistically significant.

## Results

A total of 306 students participated in the study, comprising 42.5% (n=130) males and 57.5% (n=176) females. Of these, 76.8% (n=235) were enrolled in MBBS and 23.2% (n=71) in BDS. Overall, 57.5% (n=176) were from first year and 42.5% (n=130) from final year.
Based on the urgency index, 12.7% (n=39) of students had a low urgency index, 49.7% (n=152) had a high urgency index, and 37.6% (n=115) were classified as having urgency addiction. Figure 1 describes urgency scores in gender, academic year and program.
Table I:

**STRATIFICATION OF TRAUMA ASSOCIATED PAIN ACCORDING TO AGE:**

| | | trauma | | Total | |
|---|---|---|---|---|---|
| | | no | yes | | p value |
| what is age of the patient | 15-30yrs | 136 | 78 | 214 | |
| | 31-45yrs | 28 | 17 | 45 | |
| | 46-60yrs | 19 | 3 | 22 | 0.163 |
| | 61-70yrs | 6 | 2 | 8 | |
| Total | | 189 | 100 | 289 | |

Table II:

**SRATIFICATION OF TRAUMA ASSOCIATED PAIN ACCORDING TO GENDER:**

| | | trauma | | Total | |
|---|---|---|---|---|---|
| | | no | yes | | p value |
| what is the gender of the patient | male | 90 | 80 | 170 | |
| | female | 99 | 20 | 119 | 0 |
| Total | | 189 | 100 | 289 | |

## DISCUSSION

Patients presenting in clinics complaining of orofacial pain with trauma as the etiological factor usually give a positive history of recent trauma. Road traffic accidents in teens and above account for the most number of cases[10,11], falls in children and interpersonal violence are less observed in this study. Fractures due to pathological reasons were excluded from study.
Altered occlusion is frequently associated with fractures of the mandible, but may also occur due to soft tissue trauma in the TMJ, or fractures of the alveolus, teeth or maxilla[10].
If a mandibular fracture affects the course of the inferior alveolar nerve,it may lead to neurosensory impairment such as altered sensation or paresthesia. Limited mandibular movement or noticeable deviation can also suggest an underlying fracture.Such limitations may also be caused by internal injuries to the TMJ or the presence of a hematoma. The patient will complain of joint pain and localize at the same site as TMJ but the only factor that demarcates pain arising in TMJ due to other reasons will be a positive history of trauma[12].
The diagnosis can only be reached after complete history taking, psychosocial evaluation and physical examination. The physical examination includes intra oral examination of dental hard and soft tissues, buccal and vestibular mucosa, lips, tongue, gingivae ,salivary glands, tonsils and faucial pillars[13].
Extra oral examination comprises of detailed muscle examinations, assessment of the temporomandibular joint , alongwith cranial nerve examination. Diagnostic confirmation involves investigations such as blood tests,local anaesthetic trials,biopsies of suspected lesions,ultrasound imaging and basic radiographic views. [14]
Orofacial pain is uniquely difficult to diagnose due to the dense and overlapping innervation of the region by the trigeminal nerve,which dominates the somatosensory system of the face.[15] Multiple orofacial structures share similar nociceptive

pathways leading to referred pain, overlapping systems, and a lack of precise localization. This complex interplay within the trigeminal system often obscures the exact source of pain, making differential diagnosis challenging.[16,17] Prompt intervention is essential for cases involving severe pain and anxiety as they provoke cardiovascular complications due to stress. Very few patients scored a 9 or 10 on the Visual Analogue Score. After ensuring airway, breathing and circulation are stable, a brief neurologic assessment is recommended. Elective trauma cases which present in the outpatient department usually do not need emergency protocols and advanced trauma life support. Individuals with mandibular fracture commonly experience paresthesia or describe the discomfort as unusual or unfamiliar. The patient's past medical and surgical history, medication use and known drug allergies should also be reviewed.[10]

## Conclusion

1. Trauma associated orofacial pain is the most frequent pattern 34.6% recorded at Dental and Maxillofacial outpatient department of Abbasi Shaheed, a tertiary care hospital located in District North,Karachi.
2. The study generated evidence that major bulk of trauma patients with injuries associated with head and neck region ranging from minor injuries to major trauma leading to complaints of mild to severe orofacial pain are being presented more in the maxillofacial outpatient clinics both directly and after emergency treatment for follow up reasons than other causes related to orofacial pain ( 65.4%).

## Recommendations

1. This study will be of use in establishing audit and preference- based treatment protocol for orofacial pain, improving orofacial trauma care set ups, establishing hospital finances targeted to trauma care and upgrading rehabilitation of severely injured patients.
2. Establishing a Visual Analogue Pain Score measuring system in dental and maxillofacial outpatient clinics instead of the conventional set of interrogatories predicting severity from clinicians perspective.

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**Author Contributions**

1. Saqba alam: Data Collection and Analysis.
2. Shazia shah: Study Design and Article Writing.