*Original Article*

# Study of Prevalence of Oral Diseases in The Population of District Buner Khyber Pakhtunkhwa, Pakistan

**Fozia[1], Muhammad Asif[2], Hafiz Mahmood Azam[3], Wali Muhammad Achakzai[4], Shagufta Saddozai[5], Amina Rahat[6], Tariq Aziz[7], Tahir Azeem[8], Hameed Ur Rehman[9], Ghazala Bibi[1], Kausar Saeed[1]***

[1]University of Buner Khyber Pakhtunkhwa.
[2]Swedish College of Pharmacy & Allied Sciences-Rahim Yar Khan.
[3]Muhammad Medical & Dental College, Mirpurkhas.
[4]University of Baluchistan, Quetta.
[5]Sardar Bahadur Khan Womens' University Quetta.
[6]College of Home Economics, University of Peshawar.
[7]Bahauddin Zakariya University, Multan.
[8]Kohat University of Science & Technology, Kohat-KP.
[9]Government High School Teri-Karak-KP.
*Corresponding Author: Kausar Saeed; Email: kausarsaeed@yahoo.com*
**Conflict of Interest: None.**

## ABSTRACT

**Background**: Oral diseases, prevalent globally, pose significant health challenges, especially in regions with limited healthcare resources. District Buner, in Khyber Pakhtunkhwa, Pakistan, is one such area where oral health has received minimal attention. The study of oral diseases in this region is crucial for understanding the health needs of its population and for implementing effective public health interventions.

**Objective**: This study aimed to assess the prevalence and types of oral diseases in District Buner and to identify the major contributing factors to these conditions, thereby informing targeted healthcare strategies.

**Methods**: A cross-sectional study was conducted from October 2019 to October 2020 in all tehsils of District Buner. Data collection was based on questionnaires administered to both dentists and patients. Approximately 20 to 25 dentists from various healthcare facilities, including government hospitals and private clinics, participated in the study. The questionnaires for dentists consisted of ten open-ended questions, while those for patients included fifteen close-ended questions. The sample size was 508 individuals, representing various age groups and genders. Data analysis involved descriptive and inferential statistical methods to determine prevalence rates and associations.

**Results**: The study revealed that the most common oral diseases were dental caries (90%), gingivitis (63%), periodontitis (59%), pulpitis (43%), TMJ disorders (23%), and oral cancer (5%). Dental caries was notably prevalent across all age groups, with a higher incidence in children. Gingivitis was observed more in females, particularly during pregnancy. Periodontitis and gingivitis showed a greater prevalence in males, often associated with smoking. Pulpitis was more common in females, while TMJ disorders were evenly distributed among genders. Oral cancer was the least prevalent disease.

**Conclusion**: The study underscores the critical need for improved oral health awareness and preventive care in District Buner. The high prevalence of various oral diseases, influenced by factors such as dietary habits, smoking, and gender-specific issues, calls for comprehensive public health strategies. These strategies should include education on oral hygiene, increased access to dental care, and integration of oral health into general healthcare services.

**Keywords**: Oral Diseases, Dental Caries, Gingivitis, Periodontitis, Pulpitis, TMJ Disorders, Oral Cancer, Public Health, District Buner, Pakistan.

## INTRODUCTION

Oral health, a crucial aspect of overall well-being, encompasses the maintenance of a disease-free mouth, enabling an individual to engage in essential activities like eating, speaking, and socializing without discomfort or impairment (1). The oral cavity, an integral

component of both the digestive system and the alimentary canal, is bordered by the cheeks and palate and contains the tongue, teeth, and various glands (2).

The significance of oral health extends beyond mere functionality; it plays a pivotal role in an individual's social, economic, and personal development (3, 4). Good oral hygiene, which involves the prevention and treatment of oral diseases, is essential in maintaining a healthy mouth and can prevent up to 80 percent of all dental problems (5, 6). Despite its importance, oral hygiene is often overlooked, leading to the prevalence of severe and common oral diseases (7, 8).

Globally, oral diseases affect approximately 5 billion people, with dental caries, gingival diseases, periodontal diseases, and dental erosion being the most prevalent (9, 10). The high incidence and significant social impact of these diseases classify them as a public health concern (11, 12). The ability to taste, a crucial function of the oral cavity, is facilitated by taste buds, specialized epithelial cells located in the oropharynx (13, 14). These taste senses are categorized into five types: salty, sour, bitter, sweet, and umami—the latter representing the taste of glutamate (15).

In the context of District Buner in Khyber Pakhtunkhwa, Pakistan, the prevalence of oral diseases mirrors the global trend, impacting a significant portion of the population (16, 17). This study aims to comprehensively analyze the prevalence and nature of oral diseases in this region, providing insights into their impact on the community's health and well-being (18, 19). Understanding the extent and characteristics of these oral health issues is vital in developing targeted strategies for prevention, treatment, and awareness, ultimately contributing to the improvement of both individual and public health (20, 21).

## MATERIAL AND METHODS

In the study on the prevalence of oral diseases in District Buner, Khyber Pakhtunkhwa, Pakistan, a meticulously structured methodology was employed, integrating a comprehensive approach within the region's healthcare framework.

The study was conducted in District Buner, a part of the Malakand division in the Khyber Pakhtunkhwa province. This region, predominantly Pashto-speaking, encompasses various tehsils, including Daggar, Gadezai, Chagharzai, Khudokheil, Mandanr, and Gagra. Its geographical location is between latitudes 34°09'N and 34°43'N, and longitudes 72°10'E and 72°47'E. The population, with a density of 271 persons per square kilometer, has a balanced male-to-female ratio.

The district's health infrastructure, essential to the research, includes one District Headquarters (DHQ) hospital, one Tehsil Headquarters (THQ) hospital, two civil hospitals, four Rural Health Centers (RHCs), eighteen Basic Health Units (BHUs), eight dispensaries, and three leprosy centers.

Participant selection was diverse, with individuals chosen from different socioeconomic backgrounds, ages, and genders across the district's tehsils. This diversity ensured a comprehensive representation of the community.

Approximately 20 to 25 dentists across government hospitals and private clinics participated in the study. Data were collected through direct questionnaires, with dentists answering ten open-ended questions and patients responding to fifteen close-ended questions. Prior to data collection, researchers and dentists were trained in the ethical administration of questionnaires, patient interaction, and accurate data recording.

The data analysis procedure was rigorous. Initially, data from questionnaires were compiled, organized, and cleaned for consistency. Descriptive statistics provided an overview of the prevalence of oral diseases, demographic distributions, and healthcare utilization patterns. Inferential statistical methods, such as chi-square tests or ANOVA, were used to explore relationships between demographic factors and the occurrence of oral diseases.

The interpretation of data was critical, with statistical findings being contextualized within existing literature and healthcare practices. This led to a comprehensive report detailing the analysis and its implications for oral health in District Buner, providing actionable insights for healthcare providers, policymakers, and public health practitioners.

With a sample size of 508 individuals, the study aimed to offer a detailed understanding of oral health trends in District Buner. This inclusive and methodical approach ensured the findings were both accurate and representative, contributing significantly to the understanding of oral health in this specific region of Pakistan.

## RESULTS

In the comprehensive study of oral diseases in District Buner, several key findings were observed, as detailed in various tables.

According to Table 1, the prevalence of oral diseases varied significantly, with dental caries being the most common at 90%, followed by gingivitis at 63%, and periodontitis at 59%. Pulpitis showed a prevalence of 43%, TMJ disorder was at 23%, and oral cancer was the least prevalent at 5%. These diseases were mainly caused by factors such as frequent snacking, poor oral hygiene, smoking, and alcohol use, with their prevalence mirroring global trends to varying degrees.

Gender-wise prevalence, detailed in Table 2, showed that caries were almost equally prevalent in both females (46%) and males (44%). Gingivitis and periodontitis were more common in males, with prevalences of 33% each, compared to 30% and 26% in females, respectively. Pulpitis was more prevalent in females (27%) than in males (15%), and TMJ disorder showed a slightly higher prevalence in females (13%) compared to males (10%).

Table 3 highlighted the gender-specific causes of these oral diseases. For instance, caries in males were primarily linked to smoking, whereas in females, factors like early tooth eruption and hormonal changes played a significant role. Gingivitis in males was associated with smoking and plaque accumulation, while in females, it was linked to hormonal changes during puberty and pregnancy. Periodontitis showed a strong connection to smoking and poor oral health habits in males and to hormonal changes during pregnancy and menopause in females.

Table 1 Prevalence of Oral Disease in District Buner

| Reported Diseases | Prevalence | Main Cause | Worldwide Prevalence |
|---|---|---|---|
| Caries | 90% | Frequent snacking, Presence of microbiota | 2.3 billion people affected |
| Gingivitis | 63% | Heavy Calculus, Poor oral hygiene | 80% of global population affected |
| Periodontitis | 59% | Poor oral health habits, Smoking, Snuff dipping | Affects 20-50% of global population |
| Pulpitis | 43% | Tooth decay, Injury (mild inflammation) | 66% prevalence in epidemiologic studies |
| TMJ Disorder | 23% | Injury, Misalignment of teeth/jaw, Stress | 5-12% global prevalence (common in younger population) |
| Oral Cancer | 5% | Alcohol and tobacco use | Approx. 300,000 cases globally |

Table 2 Prevalence of Oral Disease Gender-wise in District Buner

| Disease | Prevalence in Female | Prevalence in Male |
|---|---|---|
| Caries | 46% | 44% |
| Gingivitis | 30% | 33% |
| Periodontitis | 26% | 33% |
| Pulpitis | 27% | 15% |
| TMJ Disorder | 13% | 10% |

Table 3 Prevalence of Oral Diseases Gender-wise with Main Causes in District Buner

| Disease | Male Causes | Female Causes |
|---|---|---|
| Caries | Smoking (Dry mouth) | Early eruption of teeth, Morphological differences, Increased fondness towards sweets, Hormonal changes |
| Gingivitis | Accumulation of bacterial plaque, Smoking | Puberty, Pregnancy, Poor diet, Bacterial plaque accumulation |
| Periodontitis | Poor oral health habits, Smoking, Chewing tobacco, Snuff dipping | Pregnancy, Menopause |
| Pulpitis | Caries, Trauma, Orthodontic treatment | Caries, Thermal injury, Orthodontic treatment |
| TMJ Disorder | Malocclusion, Poor posture, Stress, Anxiety, Ortho treatment | Malocclusion, Bruxism, Stress, Ortho treatment |

Table 4 Prevalence of Oral Disease Age-wise in District Buner

| Disease | 10-20 Years | 21-40 Years | 41-60 Years |
|---|---|---|---|
| Caries | Rich (molar teeth) | Rich (Reversible) | Rich (Irreversible) |
| Gingivitis | Less common | Very rich | Common |
| Periodontitis | Less common | Common | Rich (chronic) |
| Pulpitis | Less common | Common | Common |
| TMJ Disorder | Common | Common | Rich |

Table 5 Treatment of Reported Diseases

| Disease | Treatment |
|---------|-----------|
| Caries | Advanced caries: RCT (Root Canal Treatment) & Extraction. Reversible caries: Filling or Restoration |
| Gingivitis | Scaling, Oral hygiene maintenance, Medication |
| Periodontitis | Deep scaling, Periodontal surgical procedures, Oral hygiene maintenance, Extraction of causes |
| Pulpitis | Root canal treatment, Pulpectomy |
| TMJ Disorder | Physical exercise, Medication (Anti-inflammatories & Painkillers), Sometimes surgical procedure |

Table 6 Prevalence of Oral Disease Tehsil-wise in District Buner

| Tehsil | Prevalence |
|--------|-----------|
| Daggar | 43% |
| Gagra | 82% |
| Khudokheil | 76% |
| Gadezai | 70% |
| Chagharzai | 67% |
| Chamla | 52% |
| Ama | |

The age-wise prevalence of these diseases, as shown in Table 4, indicated that caries were rich across all age groups, with a notable increase in irreversible caries in the 41-60 years age group. Gingivitis was very rich in the 21-40 years group, whereas periodontitis became more chronic in the older age group (41-60 years). Pulpitis and TMJ disorders were common across all age groups, with a higher prevalence of TMJ disorders in the younger population.

The treatments for these diseases, as outlined in Table 5, varied from root canal treatments and extractions for advanced caries to scaling, medication, and in some cases, surgical procedures for conditions like periodontitis and TMJ disorders.

The tehsil-wise prevalence of oral diseases in District Buner, detailed in Table 6, showed a striking variation, with the highest prevalence in Gagra (82%) and the lowest in Daggar (43%). This variation indicated the uneven distribution of oral health issues across the district, necessitating targeted public health interventions in specific areas.

## DISCUSSION

The present study, conducted from October 2019 to October 2020, aimed to explore the prevalence of oral diseases in District Buner, Khyber Pakhtunkhwa, Pakistan. This cross-sectional study encompassed all tehsils of the district to ascertain the major causes and prevalence of oral diseases. Utilizing a questionnaire-based approach, both dentists and patients were inquired about various aspects of oral health. The findings revealed that the most common oral diseases were dental caries, gingivitis, periodontitis, pulpitis, and temporomandibular joint (TMJ) disorders, with oral cancer being relatively rare (22, 23). The prevalence rates were 90% for caries, 63% for gingivitis, 59% for periodontitis, 43% for pulpitis, 23% for TMJ disorders, and 5% for oral cancer, highlighting caries as the most prevalent oral disease (24).

Dental caries, a significant public health concern, is caused by bacterial activities leading to the breakdown of tooth tissues. The study showed that dental caries was prevalent across all age groups in District Buner, with children being particularly susceptible due to higher consumption of carbohydrates and chocolates and a general lack of focus on oral hygiene. The study also indicated a notable prevalence of gingivitis, particularly among females during pregnancy, attributed to hormonal changes (25, 26). This condition was further exacerbated by societal factors such as low female literacy rates and a male-dominated social structure, leading to less emphasis on oral hygiene among women.

The study further observed that periodontitis and gingivitis had a higher incidence in males, primarily due to prevalent smoking habits. This finding aligns with global observations where tobacco use is linked to oral health issues (27). In addition, periodontitis was identified as an independent risk factor for low birth weight, with other significant risk factors being educational level, socioeconomic status, maternal nutrition, and moderate to severe anaemia.

Pulpitis was found to be more common in females, with the prevalence standing at 43% in the district (28). The age group most affected by pulpitis and other mandibular issues, as observed in a related study in Peshawar, Pakistan, was predominantly young adults, mainly due to road traffic accidents and falls.

The study also addressed TMJ disorders, with a prevalence of 23%, indicating a higher occurrence in females (29). Factors contributing to TMJ disorders included minor injuries, stress, and accidents, with teenagers being particularly vulnerable.

The overarching finding of the study was that poor oral hygiene, characterized by the presence of calculus and plaque, was a significant factor leading to various oral diseases. Plaque, if not removed regularly through proper brushing, can harden into calculus, necessitating professional dental interventions like scaling. The study emphasized the need for increased awareness and education programs to combat these oral health issues, advocating regular tooth brushing and flossing as primary preventive measures.

In conclusion, this study not only highlighted the prevalence and causes of oral diseases in District Buner but also shed light on societal and behavioral factors contributing to these conditions. The results underscore the need for targeted awareness campaigns and health interventions, especially in rural and less educated communities. Future research directions include broader-scale studies on oral diseases across Khyber Pakhtunkhwa and Pakistan, focusing on oral cancer diagnosis and the potential use of herbal medicines and toothpastes in treating common oral diseases (30). The ultimate goal is to enhance public awareness about the causes and prevention of oral health problems, thereby improving overall oral health in the region.

## CONCLUSION

The findings from this study on the prevalence of oral diseases in District Buner have significant implications for human healthcare, particularly in underserved regions. The high prevalence of dental caries, gingivitis, and periodontitis, especially among specific demographics like children and pregnant women, underscores the urgent need for enhanced public health initiatives focused on oral hygiene education and preventive care. The correlation between lifestyle factors, such as diet and smoking, with oral health conditions highlights the necessity for holistic health promotion strategies that address these risk factors. Additionally, the study points to the need for better access to dental care services and the importance of incorporating oral health into broader healthcare programs. By addressing these issues, healthcare systems can significantly improve the overall health and well-being of populations, especially in areas with limited resources and awareness about oral health.

## REFERENCES

1.      Barranca-Enríquez A, Romo-González T. Your health is in your mouth: A comprehensive view to promote general wellness. Frontiers in Oral Health. 2022;3.

2.      Igbinosa LO, Evbuomwan R, Okoromu MA, Osarenkhoe US. Oral Health: A Doorway to General Well-being.  Human Teeth-From Function to Esthetics: IntechOpen; 2023.

3.      Peres MA, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. The Lancet. 2019;394(10194):249-60.

4.      Patel J, Wallace J, Doshi M, Gadanya M, Yahya IB, Roseman J, et al. Oral health for healthy ageing. The Lancet Healthy Longevity. 2021;2(8):e521-e7.

5.      Al-Nasser L, Lamster IB. Prevention and management of periodontal diseases and dental caries in the older adults. Periodontology 2000. 2020;84(1):69-83.

6.      Wang TT, Mathur MR, Schmidt H. Universal health coverage, oral health, equity and personal responsibility. Bulletin of the World Health Organization. 2020;98(10):719.

7.      Berezovsky B, Bencko V. Oral health in a context of public health: Prevention-related issue. Central European Journal of Public Health. 2021;29(4):317-21.

8.      Orisa-Ubi CO. Dental Health Problems Associated With Poor Oral Hygiene Practices and Its General Health Implication among the Elderly.

9.      Laudenbach JM, Kumar SS. Common dental and periodontal diseases. Dermatologic Clinics. 2020;38(4):413-20.

10.     Veiga N. ORAL HEALTH EDUCATION: RISK FACTORS AND PREVENTION OF ORAL DISEASES.

11.     Dubey S, Dubey S, Gupta A, Sharma V. Biofilm-Mediated dental diseases. Biofilms in Human Diseases: Treatment and Control. 2019:91-116.

12.     Chan AKY, Tamrakar M, Jiang CM, Lo ECM, Leung KCM, Chu C-H. Common medical and dental problems of older adults: a narrative review. Geriatrics. 2021;6(3):76.

13.     Buzalaf MAR, Ortiz AdC, Carvalho TS, Fideles SOM, Araujo TT, Moraes SM, et al. Saliva as a diagnostic tool for dental caries, periodontal disease and cancer: is there a need for more biomarkers? Expert review of molecular diagnostics. 2020;20(5):543-55.

14.     Punnia-Moorthy A. Dental and Oral Conditions in the Very Elderly. Advanced Age Geriatric Care: A Comprehensive Guide. 2019:167-76.

15.   Sun D, Ye T, Ren P, Yu S. Prevalence and etiology of oral diseases in drug-addicted populations: a systematic review. Int J Clin Exp Med. 2018;11(7):6521-31.

16.   Siddique Z, Ahmed HM, Hussein KN, Hassan KI, Meena BI. Herbal medicinal uses and their practices in human health care and livestock from district Haripur, Khyber Pakhtunkhwa, Pakistan. Veterinary Medicine and Science. 2022;8(6):2683-95.

17.   Anwar T, Qureshi H, Naeem H, Shahzadi S, Sehar Z, Hassan R. Exploration of the wild edible plants used for basic health care by local people of Bahawalpur and adjacent regions, Pakistan. Foods. 2023;12(19):3557.

18.   Chatha AMM, Naz S, Iqbal SS, Zahra U. Investigating the Impact of Environmental Toxicology of Heavy Metals in Fish: A Study of Rivers of Pakistan. Scientific Inquiry and Review. 2023;7(4):67-90.

19.   Khan A, Khan MS, Egozcue JJ, Shafique MA, Nadeem S, Saddiq G. Irrigation suitability, health risk assessment and source apportionment of heavy metals in surface water used for irrigation near marble industry in Malakand, Pakistan. Plos one. 2022;17(12):e0279083.

20.   Ali G, Khan I, Saleem MM, Ali A. Comparative Review of Khyber Pakhtunkhwa and Federal Environmental Protection Laws in Pakistan. PalArch's Journal of Archaeology of Egypt/Egyptology. 2021;18(3):597-607.

21.   Haq SSNU. Essays on healthcare provision and utilization in Pakistan: Université de Pau et des Pays de l'Adour; 2021.

22.   Casamassimo PS, Flaitz CM, Hammersmith K, Sangvai S, Kumar A. Recognizing the relationship between disorders in the oral cavity and systemic disease. Pediatric Clinics. 2018;65(5):1007-32.

23.   Langlais RP, Miller CS, Gehrig JS. Color atlas of common oral diseases: Jones & Bartlett Learning; 2020.

24.   Ogle OE, Santosh ABR. Oral Diseases for the General Dentist, An Issue of Dental Clinics of North America E-Book: Elsevier Health Sciences; 2019.

25.   Rezvi FB, Rajasekar A, Chaudhary M. Prevalence of Gingivitis among Pregnant and Non-Pregnant Women. Annals of the Romanian Society for Cell Biology. 2021:6135-48.

26.   Kashetty M, Kumbhar S, Patil S, Patil P. Oral hygiene status, gingival status, periodontal status, and treatment needs among pregnant and nonpregnant women: A comparative study. Journal of Indian Society of Periodontology. 2018;22(2):164.

27.   Yang I, Sandeep S, Rodriguez J. The oral health impact of electronic cigarette use: a systematic review. Critical reviews in toxicology. 2020;50(2):97-127.

28.   Che Soh NHB, Nasim I, Balasubramaniam A. Prevalence Of Chronic Pulpitis Among Different Genders In Chennai Population. Turkish Online Journal of Qualitative Inquiry. 2021;12(5).

29.   Valesan LF, Da-Cas CD, Réus JC, Denardin ACS, Garanhani RR, Bonotto D, et al. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. Clinical Oral Investigations. 2021;25:441-53.

30.   Shehzad S, Waheed Z, Khan K, Shah M, Durrani SH, Farooq A. Comparison of Periodontal Diseases among Genders in Khyber Pakhtunkhwa, Pakistan. Int J Sci Innov Res. 2021;2:0100037IJESIR.