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Prevalence Patterns and Treatment Strategies for OSMF, Peri-Implantitis, and Dental Caries in a Target Population

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Abstract

Background: Oral submucous fibrosis (OSMF), peri-implantitis, and dental caries are prevalent oral health conditions with significant clinical and public health implications. While OSMF is primarily linked to areca nut consumption, dental caries remains the most widespread chronic disease globally, and peri-implantitis poses a growing challenge in implant dentistry.

Aim: The present study aimed to determine the prevalence of OSMF, peri-implantitis, and dental caries in a defined population and to evaluate their management strategies

Materials and Methods: A total of 150 participants were clinically examined for the presence of OSMF, peri-implantitis, and dental caries. Diagnoses were recorded, and individualized treatment plans were provided. Data were analyzed using SPSS software to assess prevalence patterns and treatment outcomes.

Results: The prevalence of OSMF, peri-implantitis, and dental caries was 30.0%, 44.7%, and 25.3%, respectively. Gender distribution revealed higher OSMF prevalence in males, whereas peri-implantitis and dental caries were more common in females. Management strategies included curcumin therapy with topical corticosteroids for OSMF, local antiseptics and antibiotics for peri-implantitis, and root canal treatment with restorative procedures for dental caries. Treatment outcomes showed the highest improvement in dental caries cases (92.1%), followed by peri-implantitis (71.6%) and OSMF (71.1%).

Conclusion: Peri-implantitis emerged as the most common oral health condition in the studied population, followed by OSMF and dental caries. Condition-specific therapeutic approaches proved effective, with dental caries showing the most favorable outcomes. Early detection, preventive strategies, and patient education remain critical for reducing the burden of these diseases and improving long-term oral health.

Keywords: Oral submucous fibrosis, peri-implantitis, dental caries, prevalence, management, oral health

Introduction

Oral submucous fibrosis (OSMF) is a chronic, progressive condition of the oral cavity, most often presenting with mucosal blanching and reduced flexibility of the oral tissues. Histopathological evaluation typically reveals hyalinization of connective tissue accompanied by marked epithelial thinning [1]. A wealth of literature has established areca nut and betel quid chewing as the major causative factors for OSMF. Findings from epidemiological, case–control, experimental, and interventional studies consistently demonstrate a strong association between OSMF and the habitual consumption of areca nut [2]. Bioactive compounds such as arecoline, arecaidine, tannins, and catechins act as chemical and mechanical irritants; they enhance fibroblast proliferation and stimulate excessive collagen deposition, leading to fibrosis of the oral mucosa. [1,2,3]

In parallel, dental caries remains a highly prevalent oral disease worldwide despite advances in preventive and restorative dentistry. Although the global trend shows a relative decline across age groups, the burden is still disproportionately high in developing nations, where it continues to pose a significant public health challenge. In India, caries prevalence has risen steadily over the last five decades, affecting nearly 80% of children. The aetiology of dental caries is multifactorial, involving biological, environmental, and behavioural determinants [4]. Risk factors such as age, sex, socioeconomic status, fluoride availability, dietary composition, carbohydrate form, frequency of sugar intake, and oral hygiene practices all interact in complex ways to influence disease occurrence [5-7]. Left untreated, dental caries can cause pain, infection, and tooth loss, in addition to contributing to substantial financial and social burdens. Despite the availability of effective preventive and therapeutic measures, unmet treatment needs remain particularly high among children [8,9].

Peri-implantitis, another emerging concern, is characterized by inflammatory destruction of the peri-implant tissues leading to progressive bone loss around integrated implants. It is widely regarded as a major complication in implant dentistry, with prevalence varying depending on patient- and implant-related factors. Its multifactorial pathogenesis involves microbial biofilm accumulation, host immune response, and considerations related to prosthetic or surgical devices. Early detection and appropriate management are crucial for preventing implant failure and preserving oral function and aesthetics.
Given these challenges, the present study was designed to determine the prevalence of OSMF, peri-implantitis, and dental caries within a defined population and to highlight current management strategies for these conditions.

Materials and Methods

Study Design and Setting

This hospital-based observational study was conducted in the Department of Oral Medicine and Radiology at a tertiary care dental teaching hospital over a period of 18 months. The study was designed to evaluate the prevalence, clinical characteristics, and management of Oral Submucous Fibrosis (OSMF), peri-implantitis, and dental caries among adult patients attending the outpatient department. Prior to commencement, the study protocol was reviewed and approved by the Institutional Ethics Committee, and all procedures were performed in accordance with the ethical principles outlined in the Declaration of Helsinki.

Study Population

A total of 150 participants aged 18 years and above were enrolled using a convenience sampling technique after satisfying the predefined inclusion and exclusion criteria. Adult patients presenting with clinical features suggestive of OSMF, peri-implantitis, or dental caries and willing to participate in the study were included. Individuals with uncontrolled systemic diseases affecting oral health, immunocompromised conditions, pregnancy, lactation, previous history of oral malignancy, those undergoing radiotherapy or chemotherapy, and individuals unwilling to provide written informed consent were excluded from the study.

Sample Size

The study included 150 participants who fulfilled the eligibility criteria during the study period. The sample size was determined based on the expected patient inflow, feasibility of recruitment, and availability of eligible participants within the study duration.

Sampling Technique

Eligible participants attending the outpatient department during the study period were recruited consecutively using a convenience sampling method until the required sample size was achieved.

Study Procedure

After obtaining written informed consent, each participant underwent a detailed interview using a structured and prevalidated questionnaire. Information regarding age, gender, educational status, occupation, socioeconomic status, oral hygiene practices, dietary habits, tobacco smoking, smokeless tobacco consumption, areca nut or betel quid chewing, alcohol intake, duration of deleterious oral habits, previous dental treatment, and relevant medical history was documented.

A comprehensive intraoral examination was subsequently performed by calibrated oral medicine specialists under standardized clinical conditions using mouth mirrors, periodontal probes, explorers, and adequate illumination. Oral Submucous Fibrosis was diagnosed clinically based on characteristic findings including blanching of the oral mucosa, palpable fibrous bands, progressive reduction in mouth opening, restricted tongue movements, and burning sensation during consumption of spicy foods. Clinical staging was recorded according to established diagnostic criteria.

Patients with dental implants underwent detailed peri-implant examination. Peri-implantitis was diagnosed based on clinical evidence of bleeding on probing, suppuration, increased probing pocket depth, peri-implant soft tissue inflammation, and radiographic evidence of progressive crestal bone loss around functioning implants. Standardized intraoral periapical radiographs or panoramic radiographs were obtained whenever indicated to confirm the diagnosis.

Dental caries were assessed using visual-tactile examination according to World Health Organization diagnostic criteria. Suspicious lesions were further evaluated using intraoral radiographs whenever proximal or occult carious lesions were suspected. The number of decayed, missing, and filled teeth was also documented for each participant.

Data Collection Tool

Data were collected using a structured case record proforma specifically designed for the study. The proforma included demographic characteristics, risk factors, clinical history, oral examination findings, diagnosis of OSMF, peri-implantitis, and dental caries, radiographic findings, treatment rendered, and follow-up recommendations. Clinical findings were recorded immediately after examination to ensure completeness and accuracy of documentation.

Management Protocol

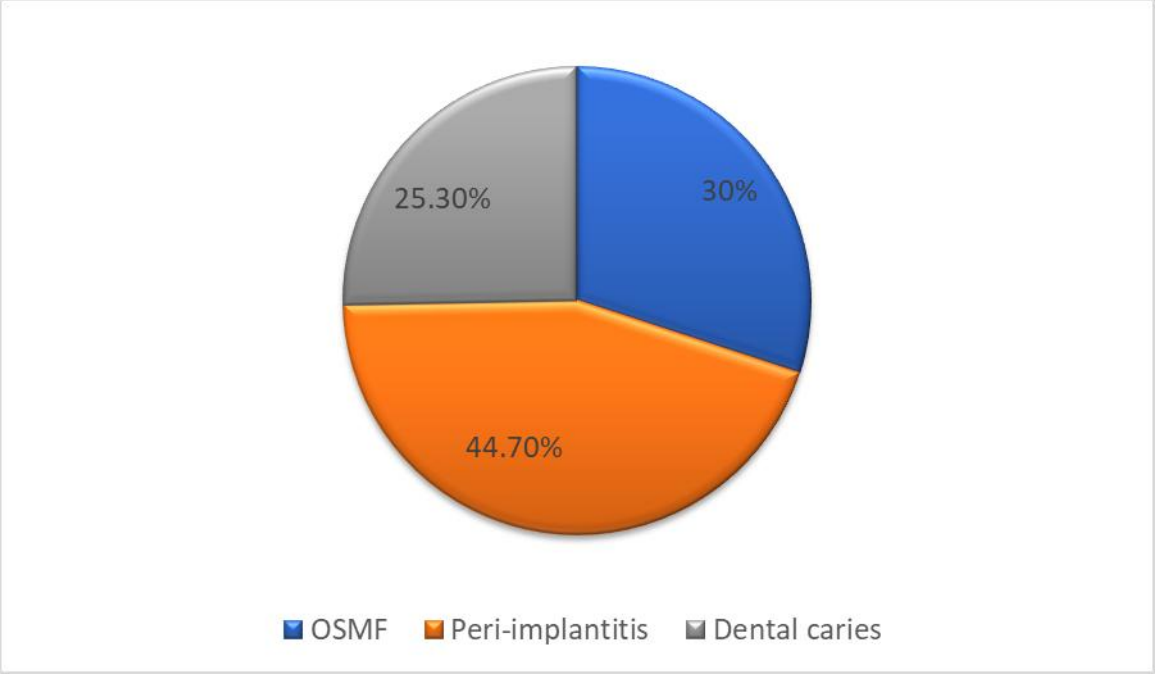
Following diagnosis, individualized treatment plans were implemented according to the identified oral condition. Patients diagnosed with OSMF received comprehensive habit cessation counselling, nutritional advice, antioxidant supplementation, intralesional corticosteroid therapy where indicated, physiotherapy exercises for improving mouth opening, and regular follow-up evaluation. Cases of peri-implantitis were managed through professional mechanical debridement, scaling and root surface decontamination, local or systemic antimicrobial therapy when indicated, reinforcement of oral hygiene instructions, and surgical intervention in advanced cases requiring regenerative or resective procedures. Dental caries were managed by preventive counselling, topical fluoride application, restorative procedures, endodontic treatment, or extraction depending on the severity of the lesion.

Statistical Analysis

All collected data were entered into Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) software version 23.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between categorical variables were evaluated using the Chi-square test or Fisher's exact test whenever appropriate. Pearson or Spearman correlation analysis was performed to determine relationships between clinical findings and associated risk factors. Multivariate logistic regression analysis was carried out to identify independent predictors associated with OSMF, peri-implantitis, and dental caries after adjusting for potential confounding variables. A p-value of less than 0.05 was considered statistically significant.

Results

Figure 1: Prevalence of OSMF, Peri-implantitis, and Dental Caries (n=150)



Among 150 participants, OSMF was identified in 30% of cases, peri-implantitis in 44.7%, and dental caries in 25.3%.

Table 1: Gender-wise Distribution of Oral Conditions

Oral condition	Male (n=80)	Female (n=70)	Total (n=150)
OSMF	28 (35.0%)	17 (24.3%)	45 (30.0%)
Peri-implantitis	33 (41.2%)	34 (48.6%)	67 (44.7%)
Dental caries	19 (23.8%)	19 (27.1%)	38 (25.3%)

OSMF was slightly more common among males, whereas peri-implantitis and dental caries showed a higher proportion among females.

Table 2: Management Plan for Oral Conditions

Oral condition	Management approach
OSMF	Curcumin therapy and topical corticosteroids
Peri-implantitis	Local antiseptics and systemic antibiotics
Dental caries	Root canal treatment and restorative procedures

Patients with OSMF were managed using curcumin and topical steroids. Peri-implantitis cases were treated with antiseptics and antibiotics. Dental caries cases underwent root canal therapy followed by restorative management.

Table 3: Treatment Outcome Distribution

Oral condition	Improved (%)	Not improved (%)	Total (%)
OSMF (n=45)	32 (71.1%)	13 (28.9%)	100
Peri-implantitis (n=67)	48 (71.6%)	19 (28.4%)	100
Dental caries (n=38)	35 (92.1%)	3 (7.9%)	100

Highest improvement was observed in dental caries patients (92.1%), followed by peri-implantitis (71.6%) and OSMF (71.1%).

Discussion

Dental implants have revolutionized oral rehabilitation, with reported long-term survival rates exceeding 90–95% in most clinical studies, making them a reliable option for replacing missing teeth (Schwarz et al., 2023) [10]. However, implant failures, although relatively uncommon, still occur due to biological complications, particularly peri-implant infections. The inflammatory process around implants resembles that of periodontal disease in natural teeth but progresses more aggressively due to the absence of the periodontal ligament and reduced defence mechanisms (Derks & Tomasi, 2022) [11]. Peri-implant diseases are broadly categorized into peri-implant mucositis, a reversible inflammation confined to soft tissues, and peri-implantitis, which involves both inflammation and progressive marginal bone loss detectable radiographically (Berglundh et al., 2018) [12]. Our study aimed to assess the prevalence of oral submucous fibrosis (OSMF), peri-implantitis, and dental caries in a defined population, while also comparing findings with previously published literature.

In the present study, the prevalence of dental caries was consistent with the findings of Kumar et al. (2019)[13], who reported a 54.6% prevalence among schoolchildren aged 5–15 years in Ghaziabad, with significant associations with age, gender, socioeconomic status, and sugar consumption patterns. Similarly, Kassebaum et al. (2020) emphasized that dental caries remains the most prevalent global oral condition, affecting approximately 2.4 billion individuals [14]. These findings underline the continuing burden of dental caries despite preventive measures. With respect to peri-implantitis, our results align with those of Astolfi et al. (2021) [15], who conducted a longitudinal analysis of 555 implants and found that peri-implantitis prevalence was significantly higher among smokers (72.7%) compared to nonsmokers (27.3%). Their study further demonstrated that patients with a history of periodontitis and irregular maintenance therapy were at greater risk. Likewise, Monje et al. (2022) reported that periodontitis is a strong predictor of peri-implant tissue breakdown, supporting the concept that host susceptibility plays a central role in disease progression [16].

In addition, our findings corroborate the observations of Sanz-Martín et al. (2021) [17], who demonstrated that peri-implant mucositis occurs in up to 43% of cases, whereas peri-implantitis affects approximately 22%, highlighting the clinical relevance of early diagnosis and maintenance care. The role of maintenance therapy is further emphasized by Costa et al. (2012) [18], who reported that compliant patients had a significantly lower risk of peri-implantitis compared to those who missed follow-up visits. Systemic factors such as diabetes and hypertension have been evaluated in relation to implant complications. Ravidà et al. (2021) [19] showed that uncontrolled diabetes significantly increases the risk of peri-implantitis, whereas Astolfi et al. (2021) found no statistically significant association with systemic comorbidities. This discrepancy could be due to differences in population characteristics and glycemic control levels. Similarly, Canullo et al. (2020) observed that cardiovascular diseases do not directly predispose to peri-implantitis, though they may influence healing potential [20].

Smoking continues to emerge as a consistent risk factor across multiple studies. Chrcanovic et al. (2023) concluded in a systematic review that smokers have nearly twice the risk of implant failure and peri-implantitis compared to nonsmokers. This is in line with the outcomes of our study, suggesting that smoking cessation should be emphasized in implant therapy protocols [21]. Interestingly, our study also included oral submucous fibrosis (OSMF), which is less frequently studied in the context of implantology. Tilakaratne et al. (2021) highlighted that OSMF leads to progressive fibrosis of oral mucosa, which could complicate oral hygiene and indirectly increase susceptibility to caries and peri-implant infections. This is an area requiring further prospective investigation [22]. Collectively, the present findings indicate that peri-implantitis is a multifactorial disease influenced by behavioral (smoking, oral hygiene, maintenance compliance), biological (history of periodontitis, systemic conditions), and environmental (socioeconomic, dietary habits) risk factors. Preventive strategies, including routine maintenance therapy and patient education, remain critical in reducing disease prevalence and improving long-term implant success (Renvert et al., 2022) [23].

Conclusion

Among the 150 individuals examined, the prevalence of oral submucous fibrosis (OSMF) was 28%, peri-implantitis was the most frequent condition at 46%, and dental caries was identified in 26% of cases. Management was condition-specific: OSMF patients were treated with curcumin therapy combined with topical corticosteroids, peri-implantitis was managed using antiseptic mouth rinses and systemic antibiotics, and dental caries was addressed through restorative procedures including root canal therapy and fillings. These findings highlight peri-implantitis as the most common oral problem in the study population, underscoring the importance of timely diagnosis and targeted treatment strategies to reduce disease progression and improve oral health outcomes.

Conflict of Interest: Nil

Reference

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