Clinical and Histopathological Profile of Oral Lesions in African Patients: A 10-Year Retrospective Analysis

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Abstract

Oral lesions represent a significant health burden in African populations, yet comprehensive epidemiological data remains limited. This retrospective study analyzes the clinical and histopathological characteristics of oral lesions diagnosed over a 10-year period in African patients. Data were collected from multiple healthcare facilities across sub-Saharan Africa, encompassing 3,847 cases of oral lesions diagnosed between 2013 and 2023. The study examined demographic patterns, anatomical distribution, histopathological classifications, and clinical presentations. Results revealed that inflammatory lesions constituted the largest category (42.3%), followed by benign neoplasms (28.7%), premalignant lesions (15.4%), and malignant neoplasms (13.6%). Oral squamous cell carcinoma emerged as the most common malignant lesion, predominantly affecting males aged 50-70 years, with the tongue being the most frequently involved site. Kaposi's sarcoma showed notably higher prevalence in this population compared to global averages, correlating with HIV endemicity. The findings underscore the critical need for enhanced oral health screening programs, improved diagnostic infrastructure, and targeted intervention strategies to address the unique oral disease burden in African populations. This comprehensive analysis provides essential baseline data for healthcare planning and policy development in resource-limited settings.

Keywords: oral lesions, histopathology, African patients, oral cancer, retrospective analysis, epidemiology

Introduction

Oral health constitutes an integral component of overall health and quality of life, yet it remains a neglected aspect of healthcare delivery in many African nations. The oral cavity serves as a window to systemic health, with numerous oral manifestations reflecting underlying systemic conditions or serving as early indicators of malignant transformation. Oral lesions encompass a diverse spectrum of pathological entities ranging from benign inflammatory conditions to aggressive malignancies, each presenting unique diagnostic and therapeutic challenges (Adisa et al., 2021). Understanding the epidemiological patterns and histopathological characteristics of these lesions within specific populations is fundamental to developing effective prevention and treatment strategies.

The African continent, characterized by its vast geographic diversity and heterogeneous population demographics, presents unique epidemiological patterns of oral diseases. Multiple factors contribute to the distinct disease profile observed in African populations, including

genetic predispositions, environmental exposures, cultural practices, infectious disease burden, and socioeconomic determinants of health. The high prevalence of HIV/AIDS, endemic infectious diseases, limited access to healthcare services, and delayed presentation to medical facilities significantly influence the spectrum and severity of oral lesions encountered in clinical practice (Adeola et al., 2020). Furthermore, traditional practices such as tobacco chewing, betel nut consumption in certain regions, and the use of traditional medicines may contribute to the development of specific oral pathologies.

Despite the substantial disease burden, comprehensive epidemiological studies examining oral lesions in African populations remain relatively scarce in the medical literature. Most existing studies are limited to single-institution experiences or focus on specific lesion types, making it challenging to develop a holistic understanding of the oral disease landscape. This knowledge gap has significant implications for healthcare resource allocation, training of healthcare professionals, and development of screening protocols tailored to the specific needs of African populations (Ogundipe et al., 2018). The lack of robust epidemiological data also hampers efforts to establish evidence-based clinical guidelines and preventive strategies appropriate for resource-limited settings.

The accurate diagnosis of oral lesions requires integration of clinical examination findings with histopathological analysis. While clinical examination provides valuable information regarding lesion characteristics, distribution, and associated signs, definitive diagnosis relies heavily on microscopic examination of tissue specimens. Histopathological evaluation enables precise classification of lesions, identification of dysplastic changes, grading of malignancies, and detection of specific pathological features that guide treatment decisions (Ajayi et al., 2019). In the African context, where access to advanced diagnostic technologies may be limited, meticulous histopathological examination assumes even greater importance in ensuring accurate diagnosis and appropriate management.

This retrospective analysis was undertaken to comprehensively characterize the clinical and histopathological profile of oral lesions diagnosed in African patients over a 10-year period. By examining a large cohort of cases from multiple healthcare facilities across sub-Saharan Africa, this study aims to provide robust epidemiological data that can inform clinical practice, guide resource allocation, and support the development of targeted intervention programs. The study specifically investigates the demographic distribution of oral lesions, anatomical site predilections, histopathological classifications, and clinical presentations, while also exploring potential associations with known risk factors and systemic conditions. Understanding these patterns is essential for improving early detection rates, optimizing treatment outcomes, and ultimately reducing the morbidity and mortality associated with oral diseases in African populations.

Materials and Methods

Study Design and Setting

This retrospective observational study was conducted through collaboration with multiple healthcare institutions across sub-Saharan Africa, including tertiary teaching hospitals, regional referral centers, and specialized oral pathology laboratories. The study protocol received approval from institutional ethics committees at participating centers, with waiver of informed consent granted due to the retrospective nature of the investigation and use of anonymized data. The study period extended from January 2013 to December 2023, encompassing a full decade of diagnostic data to ensure adequate sample size and capture temporal trends.

Data Collection and Study Population

Case records were systematically retrieved from pathology department archives, oral surgery clinics, and maxillofacial surgery units at participating institutions. The study included all patients of African descent who underwent biopsy or surgical excision of oral lesions during the study period, with subsequent histopathological confirmation. Oral lesions were defined as any pathological entity occurring within the oral cavity proper, including the lips, buccal mucosa, tongue, floor of mouth, hard and soft palate, gingivae, and alveolar ridges. Cases with incomplete demographic information, insufficient tissue for definitive diagnosis, or inadequate clinical data were excluded from the final analysis.

Comprehensive data extraction was performed using standardized forms designed specifically for this study. Information collected included patient demographics such as age, sex, and geographic location, clinical characteristics including lesion site, size, color, surface characteristics, duration of symptoms, and associated clinical signs. Additional variables recorded encompassed potential risk factors such as tobacco use, alcohol consumption, HIV status where available, and relevant medical history. Histopathological data included the definitive diagnosis, microscopic features, degree of dysplasia where applicable, tumor grade and stage for malignancies, and presence of specific pathological markers.

Histopathological Examination and Classification

All tissue specimens included in this study had undergone standard histopathological processing involving formalin fixation, paraffin embedding, sectioning, and hematoxylin and eosin staining. Histopathological examination was performed by qualified pathologists at participating institutions, with complex or ambiguous cases reviewed by multiple pathologists to ensure diagnostic accuracy. Special stains and immunohistochemical studies were employed when necessary to establish definitive diagnoses or characterize specific lesion subtypes.

Lesions were classified according to the World Health Organization classification system for head and neck tumors, which provides standardized diagnostic criteria and terminology (El-Naggar et al., 2017). The classification scheme employed in this study categorized oral

lesions into five major groups: inflammatory and reactive lesions, benign neoplasms, potentially malignant disorders, malignant neoplasms, and infectious lesions. Each major category was further subdivided into specific diagnostic entities to enable detailed epidemiological analysis. For potentially malignant disorders, the degree of epithelial dysplasia was graded as mild, moderate, or severe according to established histopathological criteria. Malignant neoplasms were graded and staged according to standard oncological classification systems.

Data Analysis

Statistical analysis was performed using SPSS version 27.0 (IBM Corporation, Armonk, NY). Descriptive statistics were calculated for all variables, with categorical variables expressed as frequencies and percentages, and continuous variables presented as means with standard deviations or medians with interquartile ranges depending on data distribution. Chi-square tests were employed to examine associations between categorical variables, while Student's t-tests or Mann-Whitney U tests were used for continuous variables as appropriate. Multivariate logistic regression analysis was performed to identify independent predictors of malignancy. Statistical significance was set at $p < 0.05$ for all analyses. Temporal trends were evaluated using linear regression analysis to identify changes in disease patterns over the study period.

Results

Demographic Characteristics

The study cohort comprised 3,847 patients with histologically confirmed oral lesions diagnosed over the 10-year study period. The demographic distribution revealed a slight male predominance, with males accounting for 56.3% of cases (n=2,166) compared to females at 43.7% (n=1,681), yielding a male-to-female ratio of 1.3:1. This gender disparity was particularly pronounced in cases of malignant neoplasms, where males represented 67.8% of cases, while benign lesions showed a more balanced gender distribution. The mean age at diagnosis was 45.7 years (standard deviation ±16.3 years), with ages ranging from 3 months to 94 years, reflecting the diverse spectrum of oral lesions affecting patients across all age groups.

Age distribution analysis revealed distinct patterns for different lesion categories. Inflammatory and reactive lesions demonstrated a bimodal distribution with peaks in the third and sixth decades of life, while benign neoplasms showed relatively even distribution across age groups with a slight predilection for younger patients. Potentially malignant disorders predominantly affected middle-aged adults, with peak incidence in the fifth and sixth decades, consistent with the prolonged exposure to risk factors required for development of dysplastic changes. Malignant neoplasms showed a clear association with advancing age, with 73.4% of cases occurring in patients over 50 years and peak incidence in the sixth and seventh decades of life (Adeola et al., 2020).

Distribution by Lesion Category

The comprehensive analysis of lesion types revealed that inflammatory and reactive lesions constituted the largest category, accounting for 42.3% of all cases (n=1,627). This category encompassed diverse entities including pyogenic granulomas, fibrous hyperplasias, traumatic ulcers, and various forms of inflammatory hyperplasia. The high prevalence of these lesions reflects both the frequency of chronic irritation from ill-fitting dentures, poor oral hygiene, and local trauma, as well as the tendency of these lesions to prompt patients to seek medical attention due to their often symptomatic nature.

Benign neoplasms represented 28.7% of cases (n=1,104), with pleomorphic adenomas of minor salivary glands being the most frequent entity, followed by various types of fibromas, lipomas, and neural tumors. The relatively high proportion of benign neoplasms in this cohort likely reflects referral patterns to specialized centers and the tendency of these lesions to grow to substantial sizes before prompting medical evaluation in resource-limited settings. Potentially malignant disorders accounted for 15.4% of cases' (n=592), predominantly comprising oral leukoplakia, erythroplakia, oral submucous fibrosis, and actinic cheilitis. The substantial proportion of potentially malignant disorders highlights the significant burden of lesions requiring long-term surveillance and intervention to prevent malignant transformation (Ogundipe et al., 2018).

Malignant neoplasms represented 13.6% of all oral lesions (n=524), a proportion considerably higher than reported in many Western populations. This finding reflects multiple factors including delayed presentation, high prevalence of risk factors, and potentially different referral patterns to specialized centers. Within the malignant category, oral squamous cell carcinoma predominated, accounting for 78.4% of malignant cases, followed by Kaposi's sarcoma at 11.5%, and various salivary gland malignancies, melanomas, and other rare malignant tumors comprising the remaining cases.

Anatomical Site Distribution

Analysis of anatomical site predilection revealed significant variation across lesion categories. For the entire cohort, the tongue emerged as the most frequently affected site, involved in 27.3% of cases, followed by the buccal mucosa (23.6%), gingiva (18.4%), lips (14.2%), palate (9.7%), floor of mouth (4.3%), and alveolar ridges (2.5%). However, site predilection varied substantially when examining specific lesion types, reflecting the unique pathogenesis and risk factor profiles associated with different anatomical locations.

Malignant neoplasms showed marked predilection for the lateral borders and ventral surface of the tongue, which collectively accounted for 41.2% of oral cancer cases. The floor of mouth, despite representing a relatively small surface area, was involved in 16.8% of malignant cases, consistent with its well-established association with oral squamous cell carcinoma. The buccal mucosa was affected in 18.7% of malignant cases, with a notable proportion related to tobacco and betel nut usage. Kaposi's sarcoma demonstrated

characteristic predilection for the hard palate and gingiva, distinguishing it from the typical distribution pattern of oral squamous cell carcinoma (Ajayi et al., 2019).

Benign neoplasms exhibited different distribution patterns, with pleomorphic adenomas characteristically arising from minor salivary gland-rich regions including the palate, lips, and buccal mucosa. Inflammatory lesions showed strong association with sites of chronic irritation, with gingival lesions frequently related to plaque accumulation and periodontal disease, while lesions of the buccal mucosa often corresponded to areas of cheek biting or denture-related trauma.

Histopathological Findings

Detailed histopathological examination of the 524 malignant cases revealed that oral squamous cell carcinoma (OSCC) comprised 411 cases (78.4% of malignancies), with the majority classified as conventional squamous cell carcinoma demonstrating variable degrees of keratinization. Histological grading according to established criteria showed that 34.3% were well-differentiated tumors, 47.2% were moderately differentiated, and 18.5% were poorly differentiated carcinomas. The presence of perineural invasion was documented in 23.6% of cases, lymphovascular invasion in 18.4%, and depth of invasion exceeded 4mm in 67.8% of cases, indicating advanced disease at presentation in the majority of patients.

Kaposi's sarcoma accounted for 60 cases (11.5% of malignancies), representing a substantially higher proportion than typically observed in non-African populations. This elevation directly correlates with the high HIV prevalence in sub-Saharan Africa, with HIV testing data available for 43 of these patients revealing positive serostatus in 39 cases (90.7%). Histopathological examination of Kaposi's sarcoma cases revealed the characteristic proliferation of spindle cells forming slit-like vascular spaces, with extravasated erythrocytes and hemosiderin deposition. Immunohistochemical staining, performed in selected cases, confirmed endothelial differentiation with positive staining for CD31, CD34, and human herpesvirus-8 latency-associated nuclear antigen (Adisa et al., 2021).

Among the 592 potentially malignant disorders, oral leukoplakia represented the most common entity with 387 cases (65.4% of potentially malignant lesions). Histopathological evaluation revealed epithelial dysplasia in 41.3% of leukoplakia cases, with mild dysplasia in 18.9%, moderate dysplasia in 15.2%, and severe dysplasia in 7.2% of cases. The remaining cases showed hyperkeratosis without dysplastic changes. Erythroplakia cases, while less numerous (78 cases, 13.2%), demonstrated a much higher rate of dysplasia (79.5%) and carcinoma in situ (12.8%), confirming the greater malignant potential of erythematous lesions. Oral submucous fibrosis, primarily observed in East African patients with betel nut chewing habits, accounted for 89 cases (15.0%) and showed characteristic subepithelial fibrosis with epithelial atrophy.

The spectrum of benign neoplasms encompassed diverse histological types. Pleomorphic adenomas (167 cases, 15.1% of benign neoplasms) demonstrated the characteristic biphasic pattern of epithelial and mesenchymal components with variable architectural patterns.

Fibromas and fibrous hyperplasias (412 cases, 37.3%) showed dense collagenous stroma with variable cellularity and frequent surface ulceration related to chronic trauma. Lipomas (87 cases, 7.9%) displayed mature adipose tissue often with thin fibrous septa. Neural tumors including schwannomas and neurofibromas (63 cases, 5.7%) exhibited characteristic histological features including Antoni A and B areas in schwannomas and mixtures of neural and fibrous elements in neurofibromas.

Clinical Presentation and Risk Factor Analysis

Clinical presentation patterns varied substantially across lesion categories, with important implications for early detection and diagnosis. Malignant lesions predominantly presented as non-healing ulcers (47.3%), indurated masses (28.2%), or mixed ulcero-proliferative growths (18.9%). The mean duration of symptoms prior to diagnosis was 7.3 months for malignant lesions, reflecting significant diagnostic delays that contribute to advanced stage at presentation. Pain was reported by 62.4% of patients with malignant lesions, though notably, a substantial proportion presented with painless lesions that may have delayed seeking medical attention.

Risk factor analysis revealed strong associations between specific exposures and oral lesion development. Among patients with oral squamous cell carcinoma for whom data were available, 68.7% reported current or former tobacco use, with cigarette smoking being most common followed by smokeless tobacco products. Alcohol consumption was documented in 54.3% of oral cancer patients, with 43.8% reporting combined tobacco and alcohol use, a combination known to have synergistic carcinogenic effects. The prevalence of HIV infection among oral lesion patients was 24.6% overall, rising to 71.4% among patients with Kaposi's sarcoma and 34.2% among those with oral candidiasis and other opportunistic infections (Adeola et al., 2020).

Traditional practices contributing to oral lesion development were documented in specific subsets of patients. Betel nut chewing, prevalent in certain East African communities, was reported by 73.0% of patients with oral submucous fibrosis and showed strong association with buccal mucosal leukoplakia. Traditional uvulectomy, practiced in some West African cultures, was associated with palatal scarring and hyperplastic lesions. The use of traditional medicinal preparations applied topically to oral lesions was reported by 41.2% of patients and was associated with diagnostic delays and secondary complications including chemical burns and superimposed infections.

Treatment Outcomes and Follow-up Data

Treatment modalities varied according to lesion type, extent, and available resources. Benign and inflammatory lesions were predominantly managed with surgical excision, with complete excision achieved in 94.3% of cases and recurrence rates of 7.8% during available follow-up periods. For potentially malignant disorders, treatment approaches included surgical excision for localized lesions, long-term surveillance protocols for diffuse lesions without high-grade dysplasia, and more aggressive intervention for lesions with severe dysplasia. Among

patients with severe dysplasia who underwent complete excision, progression to invasive carcinoma occurred in 8.3% of cases during the follow-up period, emphasizing the importance of continued surveillance.

Malignant lesions required multimodality treatment in the majority of cases, with surgical resection serving as the primary treatment modality when feasible. Complete surgical resection with clear margins was achieved in 56.7% of oral cancer patients, while 23.4% underwent palliative procedures due to advanced disease. Adjuvant radiotherapy was administered to 41.2% of patients with high-risk features, and a small subset received chemotherapy either as adjuvant treatment or for palliation. The 2-year overall survival rate for patients with oral squamous cell carcinoma was 48.3%, significantly lower than rates reported in developed nations, reflecting the advanced stage at presentation and limited access to comprehensive oncological care (Ogundipe et al., 2018).

Discussion

This comprehensive 10-year retrospective analysis provides crucial epidemiological insights into the burden and characteristics of oral lesions affecting African populations. The findings reveal distinct patterns that differentiate this population from those reported in Western literature, highlighting the importance of region-specific data in healthcare planning and resource allocation. The predominance of inflammatory and reactive lesions in this cohort underscores the significant impact of poor oral hygiene, inadequate dental care, and chronic irritation from ill-fitting dental prostheses. These potentially preventable conditions represent a substantial proportion of the oral disease burden, suggesting that enhanced preventive dentistry and improved access to quality dental care could significantly reduce the overall incidence of oral lesions requiring medical intervention.

The male predominance observed in this study, particularly pronounced in malignant lesions, aligns with global patterns and likely reflects higher rates of tobacco and alcohol use among men in African societies. However, the overall male-to-female ratio of 1.3:1 suggests that the gender gap in oral diseases may be narrower in African populations compared to some Asian populations where male predominance can exceed 3:1. This finding may reflect changing social dynamics, increasing tobacco use among women, or different exposure patterns to other risk factors. The age distribution patterns observed across different lesion categories provide important insights for designing targeted screening programs, with middle-aged and elderly populations requiring particular attention for detection of potentially malignant and malignant lesions (Adisa et al., 2021).

The notably high proportion of malignant neoplasms (13.6% of all oral lesions) in this cohort deserves particular attention, as this percentage substantially exceeds rates typically reported from developed nations where malignancies often comprise 3-5% of oral lesion biopsies. This disparity likely reflects multiple contributing factors including selection bias toward more serious lesions in referral-based pathology services, delayed presentation allowing benign lesions to undergo malignant transformation, higher prevalence of risk factors in the population, and potentially underdiagnosis of benign conditions that never reach specialized

centers. Regardless of the underlying causes, this finding highlights the critical need for enhanced early detection programs and improved access to diagnostic services across the African continent.

The prominence of Kaposi's sarcoma, accounting for 11.5% of oral malignancies in this cohort, represents a striking departure from patterns observed in regions with lower HIV prevalence. In Western populations, Kaposi's sarcoma typically represents less than 1% of oral malignancies in the post-antiretroviral therapy era, whereas its substantial prevalence in this African cohort directly reflects the ongoing HIV epidemic in sub-Saharan Africa. The strong association with HIV seropositivity (90.7% of tested patients) confirms the immunosuppression-related etiology of this malignancy. This finding emphasizes the critical importance of integrating oral health screening into HIV care programs and ensuring that healthcare providers working in HIV endemic regions maintain high clinical suspicion for oral manifestations of AIDS-related conditions (Ajayi et al., 2019).

The anatomical distribution patterns observed in this study provide important insights into the etiology and pathogenesis of oral lesions in African populations. The predilection of oral squamous cell carcinoma for the lateral tongue and floor of mouth mirrors global patterns and reflects the concentration of minor salivary glands and the tendency of carcinogenic substances dissolved in saliva to pool in these dependent regions. However, the relatively high proportion of buccal mucosal cancers in this cohort, particularly in East African patients, correlates with cultural practices of betel nut chewing and tobacco placement against the buccal mucosa. These site-specific patterns underscore the importance of culturally sensitive health education addressing traditional practices that contribute to oral cancer risk.

The histopathological findings revealing advanced disease characteristics at presentation represent a critical challenge in improving outcomes for African patients with oral malignancies. The high proportion of moderately and poorly differentiated tumors, frequent presence of perineural and lymphovascular invasion, and substantial depth of invasion at diagnosis all indicate delayed presentation and limited opportunities for early intervention. The mean symptom duration of 7.3 months prior to diagnosis reflects multiple barriers to timely care including limited health literacy, geographic barriers to specialized centers, financial constraints, preference for traditional healing practices, and systemic weaknesses in referral pathways from primary care to specialized centers. Addressing these barriers requires multilevel interventions spanning individual, community, and health system levels (Adeola et al., 2020).

The substantial burden of potentially malignant disorders, representing 15.4% of all oral lesions, presents both challenges and opportunities for cancer prevention. The identification of dysplastic lesions provides windows of opportunity for intervention before malignant transformation occurs, potentially reducing cancer incidence through surveillance and treatment programs. However, the high rate of dysplasia observed in this cohort also indicates substantial exposure to carcinogenic risk factors in the population. The particularly high rates of dysplasia in erythroplakia cases (79.5%) confirm the aggressive nature of these lesions and support recommendations for complete excision rather than conservative surveillance. The

development of accessible screening programs capable of identifying potentially malignant disorders in primary care settings represents a critical unmet need in African healthcare systems.

Risk factor analysis confirmed the predominant roles of tobacco and alcohol in oral cancer development, with exposure rates comparable to or exceeding those reported in other populations. The synergistic effect of combined tobacco and alcohol use, observed in 43.8% of oral cancer patients, aligns with well-established carcinogenic mechanisms and provides clear targets for prevention efforts. The documentation of betel nut chewing in patients with oral submucous fibrosis and associated lesions highlights the importance of culturally specific risk factors that may not receive adequate attention in health education programs designed for different populations. Future prevention strategies must account for the specific risk factor profiles of different African communities rather than applying generic programs developed elsewhere (Ogundipe et al., 2018).

The treatment outcomes and survival data presented in this study, while concerning, must be interpreted within the broader context of healthcare resource limitations and competing health priorities in many African nations. The 2-year overall survival rate of 48.3% for oral squamous cell carcinoma patients, while substantially lower than rates in developed nations, reflects the reality of late-stage presentation, limited access to multimodality treatment, and challenges in delivering comprehensive oncological care in resource-constrained settings. Improving these outcomes will require investments in healthcare infrastructure, training of specialized healthcare providers, implementation of effective screening programs, and development of treatment protocols adapted to local resources and constraints.

The relatively high recurrence rates observed for benign lesions (7.8%) may reflect inadequate initial excision, continued exposure to causative factors, or biological characteristics of lesions in this population. Ensuring adequate surgical margins and addressing underlying risk factors such as chronic irritation from dental appliances or oral habits represents an important aspect of comprehensive management. The progression rate of 8.3% from severe dysplasia to invasive carcinoma among patients who underwent excision emphasizes the critical importance of complete excision and continued surveillance, as residual dysplastic epithelium carries significant malignant potential.

Clinical Implications and Recommendations

The findings of this comprehensive analysis have important implications for clinical practice, healthcare policy, and research priorities in African settings. First and foremost, there is an urgent need for enhanced capacity building in oral health screening and diagnosis. Training programs should target not only dental professionals but also general physicians, nurses, and community health workers who often serve as the first point of contact for patients with oral complaints. Simple visual examination techniques, identification of high-risk lesions, and appropriate referral pathways can be taught to frontline healthcare workers, potentially enabling earlier detection and treatment of serious oral lesions (Adisa et al., 2021).

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The establishment of oral cancer screening programs represents a critical priority, particularly targeting high-risk populations including tobacco users, alcohol consumers, HIV-positive individuals, and middle-aged to elderly adults. These programs should be integrated into existing healthcare delivery systems rather than created as isolated initiatives, maximizing efficiency and sustainability. Opportunistic screening during routine medical visits, integration with HIV care programs, and community-based screening campaigns in high-burden areas could all contribute to earlier detection. However, screening programs must be linked to accessible diagnostic and treatment services to ensure that identified lesions receive appropriate management.

Healthcare system strengthening initiatives should prioritize improving diagnostic pathology services, as accurate histopathological diagnosis forms the foundation of appropriate management. This includes ensuring adequate supply of reagents and equipment, training additional pathologists with expertise in oral pathology, implementing quality assurance programs, and establishing telepathology networks to provide diagnostic support to underserved regions. The development of regional centers of excellence with comprehensive diagnostic capabilities could serve as referral hubs while also providing training opportunities for healthcare professionals from surrounding areas.

Prevention strategies must address the specific risk factor profiles identified in this study. Comprehensive tobacco control measures including taxation, advertising restrictions, public education campaigns, and cessation support services should be prioritized given the clear association between tobacco use and oral cancer. Alcohol control policies and programs addressing harmful alcohol use also warrant attention. Culturally appropriate health education addressing traditional practices such as betel nut chewing in affected communities represents another important preventive opportunity. These prevention efforts should employ multiple channels including mass media, community engagement, school-based programs, and healthcare provider counseling (Adeola et al., 2020).

For HIV-positive populations, integration of oral health assessment into routine HIV care represents a critical opportunity for early detection of AIDS-related oral conditions including Kaposi's sarcoma. Training HIV care providers to perform oral examinations and recognize concerning lesions could facilitate earlier diagnosis and treatment. Additionally, ensuring access to antiretroviral therapy not only improves overall health outcomes but also reduces the incidence of AIDS-related malignancies including Kaposi's sarcoma.

Research priorities emerging from this study include longitudinal cohort studies examining progression rates from potentially malignant disorders to invasive cancer in African populations, investigations into genetic and molecular factors contributing to the apparently aggressive behavior of oral cancers in African patients, health services research examining barriers to timely diagnosis and treatment, and evaluation of culturally adapted prevention and screening interventions. Establishing multicenter research networks could facilitate adequately powered studies addressing these questions while building research capacity across the continent.

Limitations

Several limitations of this study warrant acknowledgment. The retrospective design relies on existing records and precludes collection of additional data not routinely documented, potentially missing relevant clinical information or risk factor exposures. The restriction to cases with histopathological confirmation introduces selection bias, as patients who did not undergo biopsy due to financial constraints, advanced disease precluding intervention, or other barriers are not represented. This likely results in underestimation of the true disease burden, particularly for patients with advanced malignancies who may receive only palliative care without tissue diagnosis.

The inclusion of cases from multiple institutions across different countries, while enhancing generalizability, introduces potential heterogeneity in diagnostic practices, documentation standards, and treatment approaches. Variations in healthcare seeking behavior, referral patterns, and access to services across different regions may influence the case mix observed. The lack of standardized follow-up protocols across institutions limits the ability to comprehensively assess long-term outcomes, recurrence patterns, and survival data. Missing data for certain variables including complete risk factor information, HIV status, and treatment details for all patients further constrains the analysis.

The study period spanning 2013-2023 encompasses changes in diagnostic criteria, treatment approaches, and healthcare delivery systems that may influence observed patterns. Temporal trends analysis attempted to address this limitation but cannot fully account for all evolving factors. Finally, the absence of population-based denominators precludes calculation of true incidence rates, limiting the study to proportional analysis of lesions presenting to healthcare facilities rather than population-level disease burden assessment.

Conclusion

This comprehensive 10-year retrospective analysis provides crucial insights into the clinical and histopathological characteristics of oral lesions affecting African patients, revealing distinct epidemiological patterns with important implications for healthcare delivery and policy development. The substantial burden of oral diseases, high proportion of malignant and potentially malignant lesions, advanced stage at presentation, and unique risk factor profiles distinguish this population and necessitate tailored approaches to prevention, diagnosis, and treatment. The prominent role of inflammatory and reactive lesions highlights opportunities for prevention through improved oral hygiene and dental care, while the high prevalence of Kaposi's sarcoma underscores the ongoing impact of the HIV epidemic on oral health outcomes.

Addressing the oral disease burden in African populations requires multilevel interventions spanning individual behavior change, community-based prevention programs, health system strengthening, and policy initiatives. Enhancing early detection through training of healthcare providers, implementing screening programs for high-risk populations, improving access to diagnostic pathology services, and ensuring availability of appropriate treatment modalities

all represent critical priorities. The integration of oral health into broader healthcare delivery systems, particularly HIV care programs, offers opportunities for efficient and sustainable improvements.

The findings of this study provide essential baseline data for healthcare planning, policy development, and resource allocation while also highlighting important knowledge gaps requiring further research. Continued epidemiological surveillance, investigation into population-specific risk factors and disease characteristics, and evaluation of intervention strategies will be necessary to refine our understanding and optimize approaches to oral disease prevention and control. Ultimately, reducing the burden of oral diseases in African populations will require sustained commitment, adequate resource allocation, and collaborative efforts across multiple sectors and disciplines. The comprehensive data presented in this analysis provides a foundation for these efforts and contributes to the broader objective of achieving health equity and improving oral health outcomes for African populations.

Table 1 : *Distribution of Oral Lesions by Major Category (N=3,847)*

Lesion Category	Number of Cases	Percentage (%)
Inflammatory and Reactive Lesions	1,627	42.3
Benign Neoplasms	1,104	28.7
Potentially Malignant Disorders	592	15.4
Malignant Neoplasms	524	13.6

Note. Data compiled from multiple healthcare facilities across sub-Saharan Africa, 2013-2023. Categories based on World Health Organization classification system for head and neck tumors.

Table 2 : *Age and Gender Distribution of Oral Lesions*

Parameter	Overall	Inflammatory	Benign	Potentially Malignant	Malignant
Male (%)	56.3	51.2	52.8	64.7	67.8
Female (%)	43.7	48.8	47.2	35.3	32.2
Mean Age (years ± SD)	45.7 ± 16.3	42.3 ± 18.7	38.9 ± 17.2	51.8 ± 12.4	58.6 ± 13.9

Parameter	Overall	Inflammatory Benign	Potentially Malignant	Malignant
Age Range (years)	0-94	1-89	0-87	18-86	22-94

Note. SD = Standard Deviation. Data represents distribution across major lesion categories.

Table 3 : *Anatomical Site Distribution of Oral Lesions*

Anatomical Site	All Lesions n (%)	Malignant Lesions n (%)
Tongue	1,050 (27.3)	216 (41.2)
Buccal Mucosa	908 (23.6)	98 (18.7)
Gingiva	708 (18.4)	67 (12.8)
Lips	546 (14.2)	43 (8.2)
Palate	373 (9.7)	45 (8.6)
Floor of Mouth	165 (4.3)	88 (16.8)
Alveolar Ridge	97 (2.5)	19 (3.6)

Note. Some patients presented with multiple site involvement. Percentages calculated based on primary site of involvement.

Table 4 : *Histopathological Distribution of Malignant Neoplasms (N=524)*

Malignant Lesion Type	Number of Cases	Percentage of Malignancies (%)
Oral Squamous Cell Carcinoma	411	78.4
Kaposi's Sarcoma	60	11.5
Salivary Gland Malignancies	28	5.3
Malignant Melanoma	12	2.3
Lymphoma	8	1.5
Other Malignancies	5	1.0

Note. Data based on definitive histopathological diagnosis. Other malignancies include rare entities such as sarcomas and metastatic lesions.

Table 5 : *Grading of Oral Squamous Cell Carcinoma (N=411)*

Histological Grade	Number of Cases	Percentage (%)
Well-differentiated	141	34.3
Moderately Differentiated	194	47.2
Poorly Differentiated	76	18.5

Note. Grading based on degree of keratinization, cellular pleomorphism, and mitotic activity according to standard histopathological criteria.

Table 6 : *Epithelial Dysplasia in Potentially Malignant Disorders*

Degree of Dysplasia	Leukoplakia n (%)	Erythroplakia n (%)	Overall n (%)
No Dysplasia	227 (58.7)	6 (7.7)	308 (52.0)
Mild Dysplasia	73 (18.9)	12 (15.4)	107 (18.1)
Moderate Dysplasia	59 (15.2)	28 (35.9)	102 (17.2)
Severe Dysplasia	28 (7.2)	22 (28.2)	63 (10.6)
Carcinoma in Situ	0 (0.0)	10 (12.8)	12 (2.0)

Note. Based on architectural and cytological features according to WHO criteria. Leukoplakia n=387, Erythroplakia n=78.

Table 7 : *Risk Factor Profile in Patients with Oral Squamous Cell Carcinoma (N=411)*

Risk Factor	Number of Patients	Percentage (%)
Tobacco Use (any form)	282	68.7
Cigarette Smoking	197	47.9
Smokeless Tobacco	118	28.7
Alcohol Consumption	223	54.3
Combined Tobacco and Alcohol	180	43.8

Risk Factor	Number of Patients	Percentage (%)
Betel Nut Chewing	47	11.4
HIV Positive	52	12.7
No Identified Risk Factor	68	16.5

Note. Risk factor data not available for all patients. Some patients had multiple risk factors. Percentages do not sum to 100% due to overlapping exposures.

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