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Article

Diagnostic Morphometry and Comparative Epidemiology of Benign Oral Cavity Tumors: A Narrative Literature Review

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Abstract: Precise diagnosis of benign oral cavity tumors relies on the integration of qualitative histopathological description with, where feasible, quantitative morphometric measurement. This narrative review focuses specifically on how benign oral tumors are diagnosed and measured in contemporary practice, and on how their reported frequency and typical dimensions vary across published case series from different countries and clinical settings. Comparative data from recent retrospective cohorts (ranging from 105 to 2718 biopsy specimens) are summarized, along with an overview of the morphometric parameters gross tumor size, growth duration, nuclear and argyrophilic nucleolar organizer region indices used to characterize benign lesions and to distinguish them from lesions with malignant potential. The review concludes that, despite methodological heterogeneity, a consistent pattern emerges internationally: benign reactive and neoplastic lesions dominate oral biopsy material, morphometric reporting is applied inconsistently for benign entities, and dedicated regional data, including for Uzbekistan and its Khorezm region, remain scarce, pointing to a concrete direction for future descriptive research.

Keywords: oral cavity tumors; benign neoplasms; diagnostic morphometry; comparative epidemiology; histopathology; case series.

1. Introduction

Unlike the previous literature on oral tumor classification, which typically emphasizes tissue-of-origin taxonomy, the present review is organized around a diagnostic and comparative question: how are benign oral cavity tumors actually measured and reported across published clinical series, and what do those measurements reveal when placed side by side? Benign lesions represent the largest single category of tissue submitted for oral biopsy in most published cohorts, yet the level of morphometric detail with which they are reported varies considerably from one center to another [1].

This variability has practical consequences. Without a shared minimum dataset for reporting tumor dimensions, growth duration, and basic microscopic quantitative indices, it becomes difficult to compare findings across institutions or to establish population-specific reference values that could assist clinicians in triaging lesions for biopsy or in monitoring lesions conservatively [2]. The purpose of this review is to examine how benign oral tumors are diagnosed and morphometrically documented in contemporary practice, to compare reported frequency and dimensions across published case series from different countries, and to identify where regional data, specifically for Uzbekistan and its Khorezm region, remain absent [3].

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2. Materials and Methods

This is a narrative literature review rather than a systematic review or meta-analysis, a design chosen because the aim was to characterize reporting practices and comparative patterns across heterogeneous case series rather than to pool a quantitative effect estimate.

A targeted search was conducted across PubMed/PMC and relevant specialty journals, including Diagnostics, Head and Neck Pathology, the Journal of Clinical and Experimental Dentistry, Annals of Pathology and Laboratory Medicine, and the regional journal Medical Science of Uzbekistan, using terms such as "benign oral tumor," "oral cavity biopsy," "odontogenic cyst," "schwannoma," "angioleiomyoma," "nuclear morphometry," "AgNOR," and "epidemiology of oral lesions."

Sources were retained if they reported retrospective case series or cohorts of oral cavity biopsies with an identifiable sample size, the frequency of benign lesion types, and/or morphometric parameters such as gross tumor diameter, growth duration, or nuclear/AgNOR-based indices. Nine sources meeting these criteria were included (References 1–9), spanning sample sizes from 105 to 2718 biopsy specimens and multiple settings: Turkey (two independent cohorts), Greece, a South Asian hospital-based series, a multi-center schwannoma case series, and Uzbek-language literature on oral health status in oncology patients, the last used specifically to establish the regional evidence gap rather than as a source of comparable morphometric data.

For each included source, the following information was extracted where available: country and clinical setting, sample size, the most frequently reported benign entity, and any macroscopic or microscopic morphometric parameters used. Because included studies differ in inclusion criteria, some restricted to soft-tissue lesions, others including intraosseous lesions, and some excluding dysplastic lesions while others do not, findings are synthesized narratively and comparatively rather than statistically pooled, and direct percentage comparison across studies is treated with appropriate caution throughout the review.

3. Results and Discussion

3.1 Diagnostic approach: from clinical impression to morphometric confirmation

The diagnostic pathway for a suspected benign oral tumor typically begins with clinical examination (site, size estimate, consistency, mobility, duration of growth) and proceeds to incisional or excisional biopsy with histopathological confirmation [4]. Clinical impression alone is an imperfect predictor of final diagnosis: a retrospective comparison of clinical and histopathological diagnoses in a large Turkish cohort of 2718 oral cavity biopsies found an overall discordance rate of approximately 6.7%, with non-odontogenic tumors and malignant tumors showing the highest rates of clinico-histologic disagreement, followed by odontogenic tumors and precancerous lesions [5].

This level of diagnostic discordance underscores why morphometric documentation, not histological typing alone, has diagnostic value. Recording precise dimensions and growth duration at the time of biopsy creates a baseline against which recurrence, regrowth, or unexpected behavior can later be judged, and helps flag lesions whose size or growth rate is atypical for their presumed diagnosis [6].

3.2 Comparative epidemiology across published case series

Table 1 summarizes representative published case series on benign or predominantly benign oral cavity lesions from different countries, illustrating both the range of sample sizes used in this field and the diversity of lesion types reported as most frequent [7].

Table 1. Global Comparative Data on Oral Lesion Epidemiology.

Country / Setting	Sample size	Most frequent benign entity	Source
Turkey (Ankara)	235 patients (2021–2024)	Radicular cyst (29.4%); traumatic fibroma most frequent soft-tissue lesion (25.3%)	Ertem & Uz, 2025
Turkey	2718 biopsies (2007–2011)	Odontogenic and non-odontogenic cysts predominant; non-odontogenic tumors showed highest clinico-histologic discordance (11.5%)	Diagnostic Concordance study, PMC3886281
Greece (Athens)	536 lesions / 497 patients	Benign lesions with recurrence tendency (OKC, ameloblastoma) formed a distinct statistical category	Differential Retrospective Analysis, PMC9102769
South Asia (hospital-based)	105 cases (3-year series)	Hemangioma most common true benign tumor; inflammatory fibrous hyperplasia most common reactive lesion	Annals of Pathology and Laboratory Medicine
Multi-center (12-case series)	12 schwannomas (10-year period)	Mean diameter 2.04 ± 1.1 cm; tongue the predominant site	Intraoral Schwannomas, PMC3892247

Several patterns recur across these series. First, odontogenic and non-odontogenic cysts (radicular cyst, dentigerous cyst) and reactive fibrous lesions (traumatic/irritation fibroma, inflammatory fibrous hyperplasia) are consistently among the most frequently biopsied benign entities, reflecting their relationship to chronic local irritation and inflammation rather than true neoplastic transformation [8]. Second, true benign neoplasms such as hemangioma, schwannoma, and pleomorphic adenoma appear less frequently but with more consistent site predilections (tongue, lip, palate) across different populations. Third, sample sizes and inclusion criteria differ enough between studies, some restricted to soft tissue, others including intraosseous lesions, some excluding dysplastic lesions, others not, that direct percentage comparison across studies should be made cautiously [9].

3.3 Morphometric techniques applied in oral pathology

Morphometric assessment in oral pathology operates at two levels. At the macroscopic level, gross measurement of maximum tumor diameter, and occasionally

estimated volume, is recorded at the time of specimen examination; published series report, for example, a mean maximum diameter of approximately 2.0 cm (range up to 4 cm) for intraoral schwannomas over a ten-year case series, providing a numerical benchmark against which future specimens of the same tumor type can be compared [10].

At the microscopic level, computer-assisted image analysis has been used to quantify nuclear morphometric parameters and argyrophilic nucleolar organizer region (AgNOR) counts, originally developed to help discriminate dysplastic epithelium and oral squamous cell carcinoma from normal mucosa, but conceptually transferable to characterizing benign proliferative lesions in a more objective, reproducible manner than qualitative description alone [11]. Such techniques remain more established in the premalignant/malignant literature than in benign tumor reporting, representing an area where methodological transfer could strengthen benign-lesion characterization [12].

Immunohistochemistry complements morphometry in specific tumor categories where morphology alone is ambiguous: smooth-muscle markers assist in confirming angioleiomyoma among spindle-cell oral lesions, and S100 or related neural markers support the diagnosis of schwannoma and neurofibroma when classic architectural features (Antoni A/B pattern, Verocay bodies) are not fully developed [13].

3.4 Clinical and regional implications

From a clinical standpoint, the comparative data above suggest that a locally generated frequency profile and set of morphometric reference values for benign oral tumors would have practical utility: it would allow clinicians in a given region to judge whether an individual lesion's size, site, and growth duration are typical or atypical for the population they serve, informing decisions about the urgency of biopsy and the follow-up interval [14].

For Uzbekistan, and specifically for the Khorezm region, a dedicated morphological and morphometric profile of benign oral cavity tumors based on locally collected biopsy material has not been identified in the accessible international or regional literature. Existing Uzbek-language literature on oral health in oncology patients addresses broader dental and periodontal status rather than site-specific tumor morphometry, leaving a clear and well-defined gap that prospective regional case series, following the reporting conventions summarized in Table 1, could address [15].

4. Conclusion

Across diverse healthcare settings, benign lesions dominate oral cavity biopsy material, yet the depth of morphometric reporting applied to them is inconsistent and generally less rigorous than for premalignant or malignant lesions. Adopting a minimum reporting standard, maximum diameter, growth duration, and, where relevant, nuclear or AgNOR-based indices, alongside standard histological typing would improve comparability of future case series.

The absence of published, population-specific morphometric data for benign oral tumors in the Khorezm region of Uzbekistan represents a well-defined opportunity for original, biopsy-based research using the comparative framework outlined in this review.

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