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Towards Improved Oral Care in Yaounde: Evaluation of Histoclinical Concordance over a Decade

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Abstract

Introduction: Accurate diagnosis of oral lesions relies on close collaboration between clinicians and pathologists, often assessed by histoclinical concordance. Previous work conducted in various regions has highlighted varying levels of this concordance. In Cameroon, despite observations of discordance, few studies have addressed this phenomenon. This study aims to establish the concordance rate between clinical and histopathological diagnoses of oral diseases in the city of Yaoundé over a given period (2012-2021), in order to identify areas for improvement for optimal patient management. ***Methods***: A descriptive and retrospective cross-sectional study was conducted in two Yaoundé health facilities. All records of patients who underwent oral lesion sampling with anatomopathological examination were included. Quantitative data are presented as means with standard deviation, and qualitative data as numbers and percentages. The concordance rate was assessed by the Kappa coefficient, with a statistical significance threshold of $p < 0.05$. ***Results***: Of 472 biopsies, the mean age of patients was 38.06 ± 20 years, with a slight female predominance (51%). The female/male ratio was 1.06. The most frequent clinical diagnoses were tonsillitis (22.22%), while the most common histopathological diagnoses were pleomorphic salivary gland adenomas (5.3%). The overall concordance rate was 57.83% (total concordance: 53.01%, partial concordance: 4.82%) and the concordance rate was 42.17%. ***Conclusion***: Improving the quality of care requires closer collaboration between clinicians and pathologists. This collaboration is essential to ensure accurate diagnoses and appropriate treatment, thus contributing to better patient care and reduced morbidity.

Keywords

Oral Care, Yaounde, Evaluation, Histoclinical, Decade

1. Introduction

Accurate diagnosis of lesions of the oral cavity is a major challenge, given the complexity of the oral environment and the potentially misleading evolution of these lesions [1]. Clinical assessment alone, which is often subjective, is insufficient for optimal management [2]. Close collaboration between clinicians and pathologists, assessed by histoclinical concordance, is essential to ensure quality care [3]. International studies have revealed variable rates of histoclinical concordance. For example, research carried out in Iran and Italy reported rates ranging from 68.5% to 72.2%, underlining the inherent difficulty in interpreting oral lesions [4] [5]. In Africa, the subject is understudied, but available data, notably from Nigeria, suggest lower concordance (54.6% to 59.7%), potentially indicating specific challenges linked to local contexts [6]. A recent study by Smith *et al.* (2023) also highlighted the impact of regional variations on the accuracy of histopathological diagnosis of oral lesions [7].

Yaounde, the political capital and major urban center of Cameroon, presents a specific epidemiological context for oral pathologies, potentially influenced by socio-economic, cultural and healthcare access factors distinct from other African regions. The prevalence and type of oral lesions observed in Yaounde could differ significantly from Nigerian data or from studies carried out in East or Southern Africa, thus limiting the direct generalization of the results of the latter to the Cameroonian context [8]. In addition, clinical practices, available diagnostic resources and the training of healthcare professionals in Yaounde may also influence histoclinical concordance. Understanding the concordance rate in this specific setting is crucial for identifying local challenges and adapting strategies to improve diagnostic quality. The aim of this research is to establish a profile of oral pathologies and identify the factors contributing to discordance in Yaounde, in order to improve diagnostic accuracy and patient management, and consequently quality of care.

2. Materials and Methods

2.1. Type of Study and Prerequisites

A descriptive cross-sectional study with retrospective data collection was carried out after obtaining the necessary administrative authorizations and the approval of the competent ethics committee. The study was carried out in three anatomy and cytopathology laboratories in the city of Yaounde, selected for their scientific expertise, qualified staff and adequate equipment and techniques.

2.2. Determination of Sample Size

Sample size calculation: The sample size required for this study was determined

using the Cochrane formula for cross-sectional studies:

$$n = 1/e^2 \times Z^2 \times p \times (1 - p)$$

where:

n is the required sample size.

Z is the Z value corresponding to the desired confidence level. For a confidence level of 95%, the value of Z is 1.96. This choice of a 95% confidence level is conventional in medical research and is intended to ensure a high probability that the results observed in the sample reflect the reality of the population studied.

p is the expected prevalence of histoclinical concordance in the population studied. In the absence of specific data for Yaoundé, we used a conservative estimate based on Nigerian data reporting a concordance of around 55% (*i.e.* p = 0.55) [9]. This choice of prevalence is a conservative estimate, as it is based on the lowest data available in a similar context, thus ensuring a sample size large enough to detect concordance even if it is lower than that observed elsewhere.

e is the tolerable margin of error. We have set a margin of error of 5% (*i.e.* e = 0.05). A margin of error of 5% is commonly accepted in epidemiological and clinical studies, representing a reasonable compromise between precision of estimates and feasibility of data collection.

By substituting these values in the formula: n ≈ 380.32.

Consequently, a minimum sample size of around 381 biopsies was required for this study in order to obtain estimates with the specified confidence level and margin of error. The sample size finally analyzed (472 biopsies) exceeds this calculated minimum, reinforcing the statistical power of the results.

2.3. Criteria for Inclusion and Exclusion

Inclusion criteria will target all cases with a documented clinical description of the oral lesion and a corresponding histopathological report. Cases with incomplete or missing clinical or histopathological information will be excluded, as will incisional biopsies without a clearly established primary clinical diagnosis.

2.4. Data Collection and Analysis

Data will be collected by extracting relevant information from medical records and laboratory reports, including patient demographics (age, gender), lesion location and clinical description, initial clinical diagnosis, final histopathological diagnosis and information on the clinician and pathologist involved.

Data analysis will consist of calculating the overall histoclinical concordance rate, defined as the percentage of cases in which the initial clinical diagnosis corresponds exactly to the histopathological diagnosis. Partial concordance will be defined as cases where the histopathological diagnosis confirms the general category of the clinical lesion (e.g. inflammatory lesion, benign lesion, malignant lesion) but differs in the specific subtype. Potential factors of discordance will be analyzed using descriptive and inferential statistics, including analysis of lesion subgroups and healthcare professional characteristics.

2.5. Statistical Analysis

The Kappa coefficient was used to evaluate the concordance rate, taking into account the probability of random agreement. The Kappa coefficient was calculated according to the formula:

$$K = (P_o - P_e)/(1 - P_e)$$

where:

- P_o: proportion of observed agreement.
- P_e: proportion of random agreement.
- K: Kappa coefficient.

2.6. Interpretation of Kappa Coefficient (K) Values

- <0 corresponded to disagreement;
- 0.0 - 0.20 corresponded to very low agreement;
- 0.21 - 0.40 corresponded to moderate agreement;
- 0.61 - 0.80 corresponded to strong agreement;
- 0.81 - 1.00 corresponded to almost perfect agreement.

3. Results

A total of 472 patient records were included in the study.

3.1. Univariate Analyses

1) *Socio-demographic characteristics*

The mean age of patients was 38.06 ± 20 years, with a minimum age of 1 year and a maximum age of 89 years. The most represented age group was 15 to 30 years. The female/male sex ratio was 1.06.

2) *Clinical characteristics of lesions*

Clinical description: 15.89% of cases had no clinical description (75/472). Exophytic soft-tissue lesions were the most frequent (42.37%), followed by bone lesions (21.19%).

Location of lesions: salivary gland pathologies were the most frequent (22.67%), with the parotid being the most affected gland. Lesions of the oral mucosa accounted for 16.1% of cases. The least frequent locations were the gums and lips (5.51% each).

3) *Types of sampling and preservatives*

Types of sampling

Simple biopsy was the most frequently used sampling method in this study (58.69%), followed by excisional biopsy (40.04%). Other sampling methods, such as extemporaneous biopsy, cytopuncture and unspecified sampling, were used to a lesser extent (0.21%, 0.21% and 0.85%, respectively).

The preservative was specified in 354 of the 472 cases included in the study. Formalin diluted to 10% was the most commonly used preservative (82.77%).

Prescriber

The majority of samples analyzed (38.77%) were taken by ear, nose and throat (ENT) specialists.

4) ***Clinical diagnosis***

Of the 472 samples taken, clinical diagnosis was missing in 80.93% of cases (382 cases). However, for the remaining 90 cases (19.07%) where a clinical diagnosis was available, the results were as follows:

Predominant lesion types

Exophytic soft-tissue lesions were the most frequently reported (65.56%), representing 59 cases. Of these, tonsillitis was the most common (22.22%), representing 20 cases. Bone lesions accounted for 18.89%, or 17 cases. Bone cysts were the most frequent (7.78%), representing 7 cases (Table 1).

Table 1. Clinical diagnoses based on lesion appearance.

Lesions	Numbers (n = 90)	Frequency (%)
White and red lesions	**10**	**11.11**
Aphthosis	10	11.11
Ulcerative, vesicular and bullous lesions	**4**	**4.44**
Ulceration	2	2.22
Malignant ulceration	1	1.11
Bullous pemphigoid	1	1.11
Exophytic soft tissue lesions	**59**	**65.56**
Reactive/Inflammatory	32	35.56
Tonsillitis	20	22.22
Epulis	4	4.44
Parotiditis	3	3.33
Fibroma	3	3.33
Botriomycome	1	1.11
Polyp	1	1.11
Benign tumors	18	20
Cyst	12	13.33
Fibro-lipoma	1	1.11
Lipoma	1	1.11
Mucocele	1	1.11
Myophathy	1	1.11
Benign pseudotumor	1	1.11
Sarcoïdosis	1	1.11
Malignant tumors	9	10
Malignant tumors	6	6.67
Squamous cell carcinoma	3	3.33

Continued

Bone lesions	**17**	**18.89**
Cystic lesions	11	12.22
Cyst	7	7.78
Follicular cyst	2	2.22
Globulomaxillary cyst	1	1.11
Apico-dental cyst	1	1.11
Benign tumors	3	3.33
Améloblastome	1	1.11
Ossifying fibroma	1	1.11
Osteoma	1	1.11
Malignant tumors	3	3.33
Malignant tumors	2	2.22
Kaposi's sarcoma	1	1.11

5) *Histological aspects*

Staining: Hematoxylin-eosin (HE) staining was the most widely used standard stain (99.58%), confirming its fundamental role in routine histological examination. Gomori-Grocott staining was the most frequently used special stain for fungi, underlining its importance in the diagnosis of fungal infections.

Histological diagnosis: exophytic soft tissue lesions predominated (56.99%), with pleomorphic salivary gland adenoma the most frequently diagnosed lesion (5.3%). This reflects the prevalence of these lesion types in the study area. Bone lesions also accounted for a significant proportion of diagnoses (36.65%), with odontogenic cysts being the most common (3.18%).

6) *Histoclinical concordance*

Histoclinical concordance analysis was carried out on 83 cases, the remaining 7 cases presenting clinical diagnoses too vague to be included in the analysis. The overall concordance rate was 57.83% (Table 2).

Table 2. Concordance rates.

Concordance	Numbers (n = 83)	Frequency (%)
Overall concordance	**48**	**57.83%**
Partial	4	4.82%
Total	44	53.01%
No concordance	**35**	**42.17%**

3.2. Bivariate Analyses

1) *Concordance by age*

The highest overall concordance rate was observed in the 15 - 30 age group (64.52%), suggesting a better correlation between clinical and histological diagno-

ses in this age group.

Partial agreement was relatively low in all age groups, indicating that differential diagnoses were rarely confirmed by histology.

Mismatch was highest in patients aged 60 to 75 years (75%), which may be due to more complex clinical presentations or comorbidities (Table 3).

Table 3. Histoclinical concordance as a function of age.

Age groups (in years)	Partial (%) (n = 4)	Total (%) (n = 44)	Nn concordance (%) (n = 35)	Total (n = 83)
<15	0 (0)	9 (64.29)	5 (35.71)	14
[15 - 30[	0 (0)	20 (64.52)	11 (35.48)	31
[30 - 45[	0 (0)	9 (56.25)	7 (43.75)	16
[45 - 60[	2 (15.38)	6 (46.15)	5 (38.46)	13
[60 - 75[	1 (12.5)	1 (12.5)	6 (75)	8
75 and over	1 (100)	0 (0)	0 (0)	1

2) *Histoclinical concordance by gender*

The overall concordance rate was slightly better in women (60%) than in men (55.81%), although this difference was not statistically significant (Table 4).

Table 4. Concordance by gender.

Sex	Partial (%) (n = 4)	Total (%) (n = 44)	No concordance (%) (n = 35)	Total (n = 83)
Women	3 (7.5)	21 (52.5)	16 (40)	40
Men	1 (2.33)	23 (53.49)	19 (44.19)	43

3) *Histoclinical agreement according to lesion type*

The Kappa coefficient evaluated was 0.687, corresponding to high agreement between the different types of clinical lesions evoked by the prescriber and the pathologist.

The data were statistically significant for a p-value < 0.05 (Table 5).

Table 5. Histoclinical concordance between different types of oral lesions and calculation of the kappa coefficient.

Clinical	Exophytic soft tissue lesions	Bone lesions	Ulcerative vesicular bullous lesions	White and red lesions	Pigmented lesions	Total	Kappa	P-value
Exophytic soft tissue lesions	55 (93.22)	0 (0)	3 (0.05)	1 (0.02)	0 (0)	59	**0.6873**	**<0.05**
Bone lesions	2 (11.76)	15 (88.24)	0 (0)	0 (0)	0 (0)	17		
Ulcerative vesicular bullous lesions	1 (25)	0 (0)	3 (75)	0 (0)	0 (0)	4		
White and red lesions	5 (50)	2 (20)	0	3 (30)	0 (0)	10		
Pigmented lesions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0		
Total	63	17	6	4	0	90		

4. Discussion

1) *Socio-demographic characteristics*

The mean age of the patients was 38.06 ± 20 years, with extremes of 1 and 89 years. The most represented age group was 15 to 30 years. These data are similar to those reported by Olujide and *al.* in Nigeria, where the mean age was 36.1 years [9]. The female/male sex ratio was 1.06, with no significant difference between the sexes. This result is comparable with data from Golgoush and *al.* in Iran [10]. This observation could be explained by a positive attitude and more frequent use of oral health services by women. Indeed, men tend to take less good care of their health [11].

2) *Clinical features*

Of the 472 files analyzed, 80.93% did not include a clinical diagnosis and/or clinical information. This lack of information is probably due to incomplete completion of clinical information sheets by prescribers. Ear, nose and throat (ENT) specialists were the most common prescribers (38.77%).

This may be linked to the fact that 48.48% of lesions were tumors. Prior to 2007, when the training of oral health physicians began in Cameroon, ENT specialists were considered to be the most important prescribers. Exophytic soft tissue lesions were the most frequent (43.37%), in line with the findings of Golgoush and *al.* in Iran [10]. Simple biopsy was the most commonly used sampling method (58.69%), a technique favoured by ENT specialists. This percentage is lower than that reported by Benyabya *et al.* in Morocco [11]. This difference could be explained by a higher proportion of biopsy-exereses (40.04%) in our study, due to the predominance of tumoral lesions. The salivary glands were the organs most affected (22.67%), in particular the parotid gland, followed by the buccal mucosa (16.1%). These results differ from those reported by Ku and *al.* in New Zealand, where lesions of the oral mucosa were more frequent [12].

In this study, the location of oral lesions showed variations from other studies carried out in Africa. While Tchounga and *al.* [13] reported a predominance of lesions in the mandible (13.94%), other studies found different results. Olujide *et al.* [9] and Flero-Gerbay and *al.* [14] all reported a higher prevalence of lesions in the mandible. This discrepancy could be attributed to the clinical diversity of oral lesions and geographical variations in their distribution. Indeed, factors such as lifestyle habits, exposure to carcinogens and access to healthcare can influence the distribution of oral lesions in different regions.

In terms of clinical diagnosis, exophytic soft-tissue lesions were the most frequently mentioned (65.56%), with tonsillitis predominating (2.22%). This result is comparable to that of Golgoush and *al.* [10], who found 44.18% exophytic lesions. However, Luqman and *al.* [15] in Saudi Arabia reported a predominance of bony lesions (41.37%), particularly periapical granulomas (23.9%). These differences may be due to a variety of factors, including differences in study populations, prescribing practices and clinical diagnostic accuracy. In addition, differences in prescriber training and clinical experience may also influence the accu-

racy of clinical diagnoses [16].

3) ***Assessment of concordance, Histopathological features***

No immunohistochemical findings were derived in our 10-year study, although some histological findings were still imprecise.

This could be explained by the fact that some of these laboratories lack immunohistochemistry equipment or, more plausibly, by the high cost of analysis.

The most common histological diagnoses were exophytic soft tissue lesions (56.99%), mainly pleomorphic salivary gland adenoma, followed by bone lesions (36.65%), mainly odontogenic cysts (3.18%).

This result is comparable to that found by Golgoush and *al.* [10] with a higher predominance for exophytic soft tissue lesions (44.18%), mainly inflammatory fibroids (12.02%), followed by bone lesions (34%), mainly radiculodental cysts (13%). This agreement could be linked to the ever-increasing incidence of tumoral and dental lesions in a context of depravity of morals, degradation of lifestyle associated with poor oral hygiene in full flagrance in Cameroon. This agreement could also be linked to the irradiation of the mouth that patients undergo, which affects the functioning of the salivary glands [13].

4) ***Concordance assessment***

The overall concordance rate observed in our Yaoundé study (57.83%) is within the range of results reported in Africa, notably the Nigerian study by Olujide *et al.* in 2019, which revealed a rate of 54.6% on 502 cases of oral lesions [9]. However, this rate is significantly lower than that found by Golgoush *et al.* in 2022 in Iran (72.2% on 3001 oral lesion samples over 12 years) [10]. This disparity could be explained by the difference in study period and sample size, but also by the availability of more advanced diagnostic means in Middle Eastern countries. These comparisons highlight the potential influence of socio-economic contexts and available resources on the accuracy of histoclinical diagnosis.

Analysis by age group revealed a maximum overall concordance rate in the 15 - 30 age group (64.52%). This observation could be attributed to the higher prevalence of odontogenic lesions in this younger population, characterized by a complete dentition [14] [15]. Interestingly, previous studies by Essabbah *et al.* [14] and Forman *et al.* [15] reported better concordance in older patients (70 - 83 years), where malignant lesions were predominant. This discrepancy suggests that the nature of the prevalent lesions in a given age population could influence the ease of their clinical diagnosis and, consequently, the histoclinical concordance. Regarding gender, our study showed a higher overall concordance rate in women (60%), which is consistent with the results of Forman *et al.* [17] who also observed better concordance in women. This could be related to greater health awareness and earlier consultation in case of symptoms in women [13]. Nevertheless, a study by Talaf *et al.* [18] reported higher concordance in men, highlighting the complexity of sociocultural and behavioral factors in access to care and their potential impact on diagnostic concordance.

Implications for clinical practice and improvement strategies: The 57.83% con-

cordance rate in Yaoundé highlights a need for improved diagnostic protocols. Strengthened multidisciplinary collaboration between clinicians and pathologists, including regular consultation meetings and discussions of complex cases, could reduce discrepancies. The integration of more standardized clinical criteria and the increased use of complementary imaging tools could also improve the accuracy of the initial clinical diagnosis. Targeted continuing education on the recognition of common and atypical oral lesions, as well as the interpretation of histopathological findings, are essential to harmonize diagnostic practices.

Limitations and potential biases: Several limitations must be considered when interpreting these results. The retrospective nature of the study relies on the quality and completeness of medical records, which may have gaps or inconsistencies. In addition, the inherent subjectivity of the clinical assessment of oral lesions constitutes a potential bias. Although the study covers a 10-year period, the evolution of diagnostic practices and available resources within Yaoundé health centers during this period was not systematically evaluated. The sample size, although sufficient according to the initial calculation, may not be representative of all regional variations within Cameroon. Finally, the selection bias, inherent in the inclusion of only cases that underwent a biopsy, may not reflect concordance for all oral lesions managed clinically. A prospective analysis with a standardized data collection protocol would be necessary to overcome some of these limitations.

5. Conclusions

The moderate concordance observed in this study highlights a major challenge for the quality of oral pathology care in Yaounde. Improving the diagnosis and management of oral lesions is crucial to ensuring optimal patient care.

Persistent challenges related to the diagnostic accuracy and management of oral lesions have a direct impact on the quality of care. This research has highlighted the need to optimize diagnostic and therapeutic protocols in order to improve the quality of care offered to patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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