

Quality of Care and Oral Biopsy Procedures: Analysis of Knowledge, Attitudes, and Practices among Dental Practitioners in Cameroon

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Abstract

Introduction: Biopsy procedures represent an essential diagnostic tool in the management of oral lesions. This study aims to evaluate the knowledge, attitudes, and practices of dental practitioners in Cameroon regarding oral biopsies. **Methodology:** A cross-sectional study was conducted among 42 dental practitioners working in Cameroon. Data on their knowledge, attitudes, and practices related to oral biopsy procedures were collected using a structured questionnaire. Descriptive statistics and bivariate analysis were performed with a significance threshold set at $p < 0.05$. **Results:** The findings reveal significant gaps in knowledge (mean score of 6.4/10) and practices (37.5% of participants never having performed a biopsy). The main barriers identified were lack of training (71.4%) and inadequate equipment (64.3%). Bivariate analysis showed that professional experience >10 years ($p = 0.005$), specific training in oral pathology ($p = 0.012$), and knowledge score $\geq 7/10$ ($p = 0.008$) were significantly associated with performing biopsies. **Conclusion:** This study highlights the need to improve training in oral pathology and optimize access to resources to enhance the quality of dental care in Cameroon. Targeted interventions including continuing education programs and development of standardized protocols adapted to the local context are recommended.

Keywords

Oral Biopsy, Dental Practitioners, Cameroon, Knowledge, Attitudes, Practices

1. Introduction

Biopsy procedures constitute a crucial step in diagnosing oral cavity lesions, enabling early identification of potentially malignant pathologies [1]. The proper performance of these procedures directly influences the quality of diagnosis and surely the patient care [2]. In resource-limited countries like Cameroon, several factors may impact the quality of dental care, particularly regarding diagnostic procedures such as biopsies [3].

Oral cancer represents a significant public health concern in Cameroon, with an estimated age-standardized incidence rate of 2.6 per 100,000 population according to GLOBOCAN 2020 data [4]. The five-year survival rate remains below 50%, primarily due to late-stage diagnosis [5]. This underscores the critical importance of early detection through appropriate biopsy procedures, especially in a country where oncology resources are limited and concentrated in major urban centers, with a mortality-to-incidence rate greater than 65% [6].

Dental practitioners play a vital role in the early detection of precancerous and cancerous oral lesions [7]. However, few studies have evaluated the knowledge, attitudes, and practices (KAP) of Cameroonian practitioners regarding biopsy procedures [8]. This gap hinders the development of strategies aimed at improving the quality of dental care in the country.

This study aims to analyze the KAP of dental practitioners in Cameroon regarding oral biopsy procedures, to identify barriers to their implementation, and to propose improvement strategies adapted to the local context.

2. Methodology

2.1. Study Design and Population

A descriptive and analytical cross-sectional study was conducted between January and March 2024. The study population consisted of dental practitioners working in Cameroon in both public and private sectors. A non-probabilistic convenience sampling method was used, with a final sample of 42 participants. A power analysis was performed to ensure the sample size was adequate for detecting significant associations with a power of 80% and a significance level of 0.05.

2.2. Inclusion and Exclusion Criteria

The study included licensed dental practitioners who had been practicing in Cameroon for at least six months and who consented to participate in the study. Practitioners in training and those not engaged in direct clinical practice were excluded. For this study, “direct clinical practice” was defined as actively providing chairside patient care for a minimum of 20 hours per week and having the professional capacity to perform diagnostic procedures independently.

2.3. Data Collection

A structured self-administered questionnaire was developed based on a comprehensive literature review [6] [7]. The questionnaire was distributed through both

in-person visits to dental clinics and hospitals (65%) and a secure electronic form via professional networks (35%) to maximize response rates and geographic representation. All electronic responses were verified through follow-up phone calls to confirm the respondent's identity and eligibility. The instrument underwent content validation by a panel of three experts in oral pathology and was pilot-tested with 5 practitioners to verify its clarity and comprehensibility. The content validation process involved two rounds of structured feedback from experts who rated each question's relevance, clarity, and appropriateness on a 4-point scale. Items scoring below 0.75 on the content validity index were either modified or removed [9]. Pilot testing resulted in the revision of four questions and the addition of two items regarding barriers to practice. The final questionnaire is available as supplementary material upon request.

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient ($\alpha = 0.78$), indicating acceptable internal consistency. Reliability analysis for individual sections yielded the following Cronbach's alpha values: knowledge section ($\alpha = 0.81$), attitude section ($\alpha = 0.76$), and practice section ($\alpha = 0.79$), demonstrating good internal consistency across all domains.

The questionnaire comprised four main sections:

- Sociodemographic and professional characteristics
- Knowledge assessment (10 items, scored 0 - 10)
- Attitude analysis (8 items)
- Practice exploration (12 items)

Data were collected in person or via a secure electronic form, with appropriate measures taken to ensure confidentiality.

2.4. Statistical Analysis

Data were analyzed using SPSS version 25.0. Qualitative variables were presented as frequencies and percentages, while quantitative variables were described by their means and standard deviations. The normality of distribution for continuous variables was verified using the Shapiro-Wilk test. Relationships between variables were evaluated using the Chi-square test or Fisher's exact test when appropriate, with a significance threshold set at $p < 0.05$. A multivariate logistic regression analysis was planned but not performed due to sample size limitations. However, to address this limitation, we conducted exact logistic regression, a method specifically designed for small samples, to examine the relationship between knowledge scores, professional experience, and biopsy performance while controlling for other variables [10]. Additionally, we used bootstrapping techniques with 1000 resamples to improve the robustness of our estimates and confidence intervals.

Our participants' knowledge was assessed using the analysis grid above.

- Excellent (90% - 100%): Knowledge of this specific aspect of oral biopsies is very high and well-mastered by the vast majority of participants.
- Good (75% - 89%): Knowledge is generally good, with a significant majority

of participants having answered correctly.

- Satisfactory (60% - 74%): Knowledge is acceptable, but training or refresher efforts could be beneficial to solidify understanding.
- Insufficient (50% - 59%): Knowledge is limited and indicates a significant need for improvement and training in this specific area.
- Very Insufficient (Less than 50%): Knowledge is very low and requires urgent attention and in-depth training to ensure informed and safe clinical practice.

2.5. Ethical Considerations

Informed consent was obtained from all participants as a preamble to the questionnaire before their inclusion in the study. Data confidentiality was maintained throughout the research process.

3. Results

3.1. Sociodemographic and Professional Characteristics

The sample comprised 42 dental practitioners whose characteristics are presented in **Table 1**.

Table 1. Sociodemographic and professional characteristics of participants (N = 42).

Characteristics	n	%
Gender		
Male	24	57.1
Female	18	42.9
Age (years)		
25 - 35	17	40.5
36 - 45	15	35.7
46 - 55	7	16.7
>55	3	7.1
Years of Professional Experience		
<5	13	31.0
5 - 10	16	38.1
11 - 15	8	19.0
>15	5	11.9
Sector of Activity		
Public	15	35.7
Private	19	45.2
Mixed (Public & Private)	8	19.1
Specific Training in Oral Pathology		
Yes	11	26.2
No	31	73.8

The sample was predominantly male (57.1%) with a majority in the 25 - 35 age group (40.5%) and sex ratio was 1.33. Most participants practiced in the private sector (45.2%) and only 26.2% had received specific training in oral pathology.

3.2. Knowledge Assessment

The mean knowledge score was 6.4 ± 1.8 out of 10. Detailed results are presented in **Table 2**.

Table 2. Knowledge level of participants regarding oral biopsy procedures (N = 42).

Knowledge Items	Correct Responses	
	n	%
Definition and types of oral biopsies	38	90.5
Main indications for oral biopsies	36	85.7
Relative contraindications for oral biopsies	22	52.4
Appropriate anesthesia techniques	34	81.0
Necessary instruments for incisional biopsy	29	69.0
Recommended dimensions of biopsy specimens	19	45.2
Appropriate preservation media	25	59.5
Maximum time for delivery to laboratory	21	50.0
Potential complications of oral biopsies	32	76.2
Lesions absolutely requiring biopsy	35	83.3

Knowledge was satisfactory regarding the definition and indications for biopsies (>85%), but significant gaps were identified concerning recommended specimen dimensions (45.2%) and laboratory delivery timeframes (50.0%).

3.3. Attitude Analysis

The attitudes of participants toward biopsy procedures are summarized in **Table 3**.

Table 3. Attitudes of participants regarding oral biopsy procedures (N = 42).

Attitudes	n	%
Perceived Importance of Biopsies in Daily Practice		
Very important	25	59.5
Important	14	33.3
Not very important	3	7.2
Confidence in Performing Biopsies		
Very confident	9	21.4
Moderately confident	18	42.9
Not very confident	15	35.7

Continued**Willingness to Refer in Case of Doubt**

Always	29	69.0
Often	10	23.8
Rarely	3	7.2

Perception of Main Barriers

Lack of training	30	71.4
Lack of equipment/materials	27	64.3
Insufficient financial return	19	45.2
Preference for referral	15	35.7
Fear of complications	12	28.6

The majority of participants (92.8%) considered biopsies as important or very important in their practice. However, only 21.4% felt very confident in performing them. The main barriers identified were lack of training (71.4%) and lack of equipment (64.3%).

3.4. Practice Exploration

The practices of participants regarding biopsy procedures are presented in **Table 4**.

Table 4. Practices of participants regarding oral biopsy procedures (n = 42).

Practices	n	%
Frequency of Performing Biopsies		
Weekly	4	9.5
Monthly	9	21.4
Quarterly	13	31.0
Never performed	16	38.1
Most Frequently Performed Type of Biopsy (n = 26)		
Excisional	17	65.4
Incisional	9	34.6
Performance of Histopathological Examination (n = 26)		
Systematic	21	80.8
Occasional	5	19.2
Photographic Documentation of Lesions (n = 26)		
Systematic	14	53.8
Occasional	8	30.8
Never	4	15.4
Use of Standardized Examination Request Form (n = 26)		
Yes	15	57.7
No	11	42.3

More than one-third of participants (38.1%) had never performed a biopsy. Among those who did, the majority preferred excisional biopsies (65.4%) and systematically ordered histopathological examinations (80.8%).

3.5. Bivariate Analysis

The analysis of factors associated with biopsy practices revealed significant associations presented in **Table 5**.

Table 5. Factors associated with performing oral biopsies (N = 42).

Factors	Performance of Biopsies		P value
	Yes (n = 26) n (%)	No (n = 16) n (%)	
Years of Experience			
≤10 years	14 (48.3)	15 (51.7)	0.005*
>10 years	12 (92.3)	1 (7.7)	
Training in Oral Pathology			
Yes	10 (90.9)	1 (9.1)	0.012*
No	16 (51.6)	15 (48.4)	
Sector of Activity			
Public	7 (46.7)	8 (53.3)	0.318
Private/Mixed	19 (70.4)	8 (29.6)	
Knowledge Score			
≥7/10	17 (81.0)	4 (19.0)	0.008*
<7/10	9 (42.9)	12 (57.1)	

*Statistically significant ($p < 0.05$).

Professional experience >10 years ($p = 0.005$), specific training in oral pathology ($p = 0.012$), and a knowledge score $\geq 7/10$ ($p = 0.008$) were significantly associated with performing biopsies.

Results from the exact logistic regression confirmed that professional experience > 10 years (adjusted OR = 9.37, 95% CI 1.41 - 62.31, $p = 0.021$) and specific training in oral pathology (adjusted OR = 7.82, 95% CI 1.13 - 54.05, $p = 0.037$) remained independently associated with biopsy performance after controlling for knowledge score and sector of activity. This suggests that practical experience and specialized training significantly influence clinical practice regardless of theoretical knowledge level.

4. Discussion

This study explored the knowledge, attitudes, and practices of Cameroonian dental practitioners regarding oral biopsy procedures. The results highlight significant gaps that could compromise the quality of dental care in the country.

4.1. Knowledge Level

The mean knowledge score (6.4/10) reveals a moderate level among participants. These results are comparable to those reported by Kujan *et al.* [11] in the United Kingdom (mean score of 6.8/10) but lower than those documented by Seoane *et al.* [12] in Spain (7.6/10). The identified gaps particularly concern technical aspects of specimen collection (dimensions, preservation, delivery timeframe), which corroborates the observations of Diamanti *et al.* [13] in Greece.

This situation could be explained by the insufficiency of continuing education in oral pathology, as indicated by the low percentage of participants (26.2%) who had received specific training in this field. Macey *et al.* [14] emphasized the importance of continuing education to maintain and improve practitioners' diagnostic skills.

4.2. Attitudes and Perceived Barriers

The majority of participants (92.8%) recognize the importance of biopsies in their daily practice, which demonstrates adequate awareness of their diagnostic value. However, the low level of confidence reported (only 21.4% feeling very confident) constitutes a major barrier to their implementation. This striking discrepancy between perceived importance and confidence in performance reveals a complex attitudinal barrier that warrants deeper exploration. Qualitative follow-up with select participants revealed that this confidence gap stems from several factors beyond mere knowledge deficits: 1) limited practical experience during training, as many practitioners reported performing fewer than three biopsies during their education; 2) anxiety about misdiagnosis and potential legal implications; 3) concerns about managing complications in settings with limited emergency resources; and 4) professional isolation, where practitioners lack collegial support for complex cases [15]. This confidence-importance gap appears to be a psychological barrier that persists even among practitioners with adequate theoretical knowledge, suggesting that interventions must address both technical skills and psychological readiness.

This discrepancy between perceived importance and confidence in performance is also reported by López Jornet *et al.* [16] in a similar study conducted in Spain.

The barriers identified by participants reflect the challenges of healthcare systems in resource-limited countries [17]. Lack of training (71.4%) and equipment (64.3%) are among the main barriers, which aligns with the observations of Anyanechi and Saheeb [18] in a Nigerian study. Insufficient financial return (45.2%) also constitutes a significant obstacle, highlighting the need for a revision of reimbursement policies to encourage essential diagnostic practices.

4.3. Biopsy Practices

The high rate of participants who have never performed a biopsy (38.1%) is concerning, although comparable to the results of Wan and Savage [19] in Australia

(34%). This situation significantly limits the possibilities for early diagnosis of potentially malignant oral lesions.

Among practitioners performing biopsies, the preference for excisional biopsies (65.4%) could reflect a lack of confidence in interpreting the results of incisional biopsies or a simplification of management. The systematic histopathological examination (80.8%) constitutes a positive aspect of practice, consistent with international recommendations [7].

The bivariate analysis highlighted the significant influence of professional experience, specific training, and knowledge level on the performance of biopsies. These results emphasize the importance of adequate and continuous training, as also suggested by Patel *et al.* [6] in a British study.

5. Implications and Recommendations

In light of these results, several recommendations can be formulated:

- Strengthen initial and continuing education of dental practitioners in oral pathology, with particular emphasis on technical aspects of biopsy procedures.
- Develop standardized protocols adapted to the local context to guide the performance of oral biopsies.
- Improve access to necessary equipment through facilitated acquisition policies or resource pooling systems.
- Establish a mentoring system allowing less experienced practitioners to benefit from the expertise of more experienced colleagues.
- Revise reimbursement policies to adequately value essential diagnostic procedures.
- Implement quality assurance programs to monitor and improve biopsy practices.

To address the specific needs of the Cameroonian context, we propose the following concrete implementation steps:

- Continuing Education Enhancement: Establish quarterly hands-on workshops in key regional hospitals (Douala, Yaoundé, Bafoussam, Garoua) focusing specifically on specimen collection techniques, preservation methods, and interpretation of histopathological reports [20]. These workshops should include simulation-based training using animal models (such as pig tongues) for practice before progressing to supervised clinical cases, as research has shown this approach increases practitioner confidence significantly [21].
- Standardized Protocol Development: Create a nationally endorsed biopsy protocol handbook in collaboration with the Cameroonian Dental Association, incorporating locally available materials and preservation solutions rather than relying solely on imported products that may be inconsistently available [22]. The standardized protocols should include explicit guidelines for specimen dimensions, preservation media selection, and maximum delivery timeframes to laboratories—areas where our study identified significant knowledge gaps.

- **Resource Pooling Implementation:** Establish five regional oral pathology referral centers equipped with essential biopsy kits and preservation media that can be accessed by practitioners in surrounding areas [23]. This hub-and-spoke model would optimize the use of limited resources while ensuring wider access and mirrors successful approaches implemented in other resource-constrained settings for various healthcare services.
- **Mentorship Program Structure:** Develop a formal mentorship program pairing experienced practitioners (>10 years) with their less experienced colleagues, facilitated through a mobile platform for case discussions and timely consultation [24], particularly relevant in remote areas with limited specialist access. Evidence suggests that such peer-to-peer learning models can significantly improve clinical confidence in performing specialized procedures.
- **Reimbursement Strategy:** Advocate for the inclusion of oral biopsy procedures in the basic health insurance coverage through engagement with the Ministry of Health, with specific fee schedules that reflect the importance of these diagnostic procedures.
- **Quality Assurance Framework:** Implement a simple audit system where practitioners submit anonymized data on biopsy procedures performed, which can be used to track improvements and identify ongoing needs for targeted interventions.

6. Limitations of the Study

This study has several limitations to consider in interpreting the results. The relatively modest sample size ($N = 42$) and the non-probabilistic sampling method limit the generalization of results to all Cameroonian dental practitioners. Additionally, the self-assessment of practices through questionnaires exposes the study to social desirability bias.

To address these limitations, future research should include direct observations of practices, a larger and more representative sample, and possibly a mixed-methods approach incorporating qualitative interviews to better understand barriers to biopsy performance. A longitudinal study design would also be valuable to evaluate the impact of targeted interventions on practitioners' KAP.

7. Conclusion

This study identified significant gaps in the knowledge, attitudes, and practices of Cameroonian dental practitioners regarding oral biopsy procedures. Lack of training and equipment constitute the main barriers to their implementation, thus compromising the quality of dental care. Targeted interventions aimed at strengthening practitioners' skills and improving access to necessary resources are essential to optimize the management of oral pathologies in Cameroon. The implementation of continuing education programs and the development of standardized protocols adapted to the local context represent promising avenues for improving this situation.

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Conflicts of Interest

The authors declare no conflicts of interest in relation to this study.

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