

Original Research Article

Assessment of General Practitioner Dental Surgeons' Knowledge of the Criteria for Choosing Cervical Boundaries for Fixed Prosthetic Preparations in Dental Facilities in the Bamako and Kati Districts, 2025

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Article History

Received: 06.03.2026

Accepted: 20.04.2026

Published: 02.05.2026

Journal homepage:

<https://www.easpublisher.com>

Quick Response Code



Abstract: Introduction: The aim of this study was to assess the knowledge of general dental surgeons on the criteria for choosing the cervical margin in fixed prostheses in dental practices in Bamako and Kati. **Methodology:** This was a prospective descriptive study focusing on 73 general dental surgeons in dental practices in Bamako and Kati over a period of three months, from July to September 2025. Data were collected using a self-administered survey form given to practitioners. **Results:** The participating dentists represented a rate of 93.59%. Males represented a rate of 72.6%. The sex ratio was 2.63 (M/F). The 30-40 age group represented 53.4% of cases. Average: 33.78 years; Standard deviation: 4.98 years; Extremes: 27 and 46 years. Private dental practices were the most represented, accounting for 41.1% of cases. In our study, 34% of participants had completed other training courses. The number of years of experience was < 5 years in 46.6% of cases. Average: 6.96 years; Standard deviation: 4.26 years; Extremes: 1 and 15 years. The majority of participants were in the private sector, representing 72.7% of cases. The depth of the metal-ceramic crown was between 1.2 and 1.5 mm in 60.3% of cases. Shouldering accounted for 32.9% of cases for metal-ceramic crowns. The margin was between 0.8-1 mm in 61.7% of cases for metal crowns. The margin was recessed in 43.9% of cases for metal crowns. During the study, 58.9% of participants mentioned a depth between 0.8-1 mm for a zirconia crown. The chamfer margin was represented in 34.3% of cases for a zirconia crown. The margin was subgingival in 65.8% of cases to meet patients' aesthetic demands. The shoulder bur was used in 57.6% of cases for shoulder preparation. The chamfer bur was used in 57.6% of cases for chamfer repair. The pointed conical bur was used in 65.8% of cases for tracing preparation. The pointed conical bur was used in 50.7% of cases for highlighting undercuts. The margin was subgingival in 65.7% of participants for a metal-ceramic crown. The margin was subgingival in 65.7% of participants with metal-ceramic crowns. **Conclusion:** Studies have shown that there is no single, universally applicable technique suitable for all clinical situations. Therefore, it is up to the practitioner to choose the method best suited to the case being treated. And so, each practitioner has their own preferences during the preparation phase regarding the choice of crown shape, location, burs used, and materials, while respecting the anatomy and integrity of the biological space and achieving the desired aesthetic result.

Keywords: Evaluation, Knowledge, Dental Surgeons, Choice of Cervical Boundaries, Preparations for Joint Prostheses, Dental Health Structures, Bamako Kati.

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INTRODUCTION

The cervical margin of the preparation is the transition zone between the prepared coronal portion and

the unprepared portion. This margin corresponds to the cervical edge of the preparation [1].

It is the site of biological, physiological, and aesthetic integration of a prosthetically restored tooth. It also characterizes the quality of the dento-prosthetic interface, which in turn determines the fit and longevity of the restoration. It is at this point that the practitioner will determine the success or failure of the prosthetic restoration from both an aesthetic and periodontal perspective [2]. The choice and determination of the position of this cervical preparation margin have always been a subject of debate [1-3]. Conventional practice dictates that in most cases, the preparation margins are located below the gingiva. Furthermore, a certain aesthetic concern leads to these margins being buried [1]. This zone is the meeting point and area of interaction between dental tissue, gingival tissue, epithelial attachment, and prosthetic material [2]. All publications on this subject show that any disruption to the biological width caused by a restoration, regardless of its type, triggers an inflammatory reaction leading to gingival recession in the presence of a thin periodontium and the formation of a periodontal pocket when the disruption is related to a thick periodontium [1]. Regarding the shape of the cervical margin, a study conducted with several dental surgeons in the Paris region revealed two important points: The configuration of the margins dictates the shape and volume of material at their level and can affect the accuracy of margin placement [4].

In 2001, Goodacre, cited by Garabetyan, demonstrated that, among the various preparation criteria required, the quality of the margin depends on its ease of execution and the practitioner's experience. Indeed, only a regular and fully recorded margin (prosthesis shape) can be read in the laboratory. A margin that is difficult to create manually is not always reproduced on all teeth in the oral cavity and by all practitioners. It must be simple, while reconciling both aesthetic and mechanical requirements [3]. It is imperative to create biologically integrated prostheses that, once cemented, "disappear" among the natural teeth. To this end, periodontal health is an essential prerequisite for any definitive restoration. As for the pursuit of long-term predictability, this involves creating restorations designed and positioned with the utmost respect for gingival tissues [5]. Gunay *et al.*, cited by Vargas, established that the deeper a preparation margin is located under the gingiva, the higher the indices indicating inflammation. Similarly, probing depth increases proportionally to the depth of the margins and significantly so [1]. A study conducted with approximately thirty practitioners in the Paris region reveals considerable heterogeneity in the morphology of the finishing line they give to their preparations. This results in a lack of consensus in the choice of burs used [3]. Two main types of questions were posed: what margin shapes are considered for the different types of ceramics, and which burs are used to create them? An overview of the results of this study: To fabricate a ceramic-on-ceramic crown with an alumina coping, what cervical margin shape(s) do you use?

Of the 30 dentists randomly selected: 3% said they didn't know, 36% answered with a rounded internal angle shoulder, 20% with a straight shoulder, 33% with a chamfer, and 8% with a bevel [3]. In the literature, we find several types and situations of cervical margins, each with its own advantages and disadvantages. The choice of the optimal margin depends on the structures present, biological and mechanical factors, but also on the type of prosthetic restoration planned, the patient's aesthetic requirements, the ease of creating the margin, and finally, the practitioner's experience [6]. In Mali, many people are involved in prosthetics: laboratory technicians perform all the clinical steps of prosthetics, and general practitioners, without training or experience, often fail in fixed prosthetics. Since the quality and durability of the result depend on knowledge and mastery of this area, we conducted a survey among general dentists in Bamako and Kati regarding their knowledge of cervical margins for fixed prostheses.

Thus, our thesis aims to evaluate general dentists' knowledge of the criteria for choosing cervical margins for preparations in fixed prostheses in dental practices in Bamako and Kati.

METHODOLOGY

1. Study Type

We conducted a descriptive cross-sectional study of general dentists in dental health facilities in the Districts of Bamako and Kati.

2. Study Period

Our study took place over a period of three (3) months, from July 1, 2025, to September 30, 2025.

3. Study Population

Our study population consisted of all general dentists registered with the National Council of the Order of Dentists and practicing fixed prosthodontics in their daily practice in the Districts of Bamako and Kati.

4. Sampling

This was a non-probability study. The sample size was 73, covering all general dentists registered with the National Council of Dental Surgeons and practicing in dental offices in Bamako and Kati.

5-Selection Criteria

We included in our study all general dentists in the Bamako district registered with the National Council of Dental Surgeons who perform fixed prosthetics and who agreed to participate in the study.

6-Description of Variables

Impact of the Choice of Criteria for the Cervical Limit.

The variables concerning general information and knowledge in relation to the criteria for choosing the cervical limit will be addressed.

Sociodemographic variables (age, sex), Sector of activity, Knowledge variables, Selection criteria variables.

7-Data Collection Methods

Data were collected using a self-administered questionnaire sent to each practitioner and through interviews.

8-Data Analysis Plan

The collected data were processed and entered using Microsoft Word 2016. Data analysis was

performed using SPSS version 26. Graphs and tables were created using Microsoft Excel and Microsoft Word 2016.

9-Ethical Considerations

Informed verbal consent was obtained for the subjects' participation in this study. Participation was voluntary and uncoerced. Data protection and anonymity were guaranteed.

RESULTS

Table I: Distribution of patients according to the following characteristics

Variables	Number	Percentage (%)
Participants		
Registered CDs	78	100,0
CDs that participated	73	93,59
Sex		
Female	20	27,4
Male	53	72,6
Age range in years		
< 30	26	35,6
30-40	39	53,4
40-50	8	11,0
Workplace		
Private Dental Practice	33	45,2
CNOS University Hospital	21	28,8
CMCAB	3	4,1
CSCOM	2	2,7
CSREF	9	12,3
Polyclinic	5	6,9
Number of years		
< 5	34	46,6
5-10	23	31,5
> 10	16	21,9

The CDs that participated represented a rate of 93.59% of cases (Table I). Males represented 72.6% of the population. The sex ratio was 2.63 (M/F) (Table I).

The 30-40 age group was the most represented, accounting for 53.4% of cases, with an average age of

33.78 years, a standard deviation of 4.98 years, and extremes of 27 and 46 years (Table I).

Dental practices were the most represented, accounting for 41.1% of cases (Table I). The number of years of experience was less than 5 years in 46.6% of cases. Mean: 6.96 years; Standard deviation: 4.26 years; Range: 1 to 15 years (Table I).

Table II: Distribution of patients according to the following characteristics

Variables	Number	Percentage%
Depth		
0,8 à 1 mm	23	31,5
1 à 1,5 mm	6	8,2
1,2 à 1,5 mm	44	60,3
Limit		
Leave	22	30,2
Shoulder	24	32,9
Shearing	18	24,7
Layout	9	12,3
Depth		
0,8 à 1 mm	47	61,7

1,2 à 1,5 mm	198	26,0
1 à 1,5 mm	9	12,3
Limit		
Leave	32	43,9
Shoulder	15	20,5
Shearing	21	28,8
Layout	5	6,8
Depth		
0,8 à 1 mm	43	58,9
1,2 à 1,5 mm	16	21,9
1 à 1,5 mm	14	19,2
Limit		
Leave	25	34,3
Shoulder	23	31,4
Shearing	21	28,8
Layout	4	5,5
Limit		
Juxta gingival margin	16	21,9
Subgingival margin	53	72,6
Supragingival margin	4	5,5

The preparation depth was between 1.2 and 1.5 mm in 60.3% of cases (Table II).

Shoulder deformity accounted for 32.9% of cases (Table II). The margin was between 0.8 and 1 mm

in 61.7% of cases. The margin was reached in 43.9% of cases (Table II). In our series, 58.9% of participants reported a depth between 0.8 and 1 mm. The margin was saturated in 34.3% of cases. The border was subgingival in 72.9% of cases (Table II).

Table III: Distribution of patients according to the following characteristics

Types of router bits	Number	Percentage (%)
Types of router bits		
Conical router bit with pointed tip	22	30,2
Shoulder router bit	42	57,6
Cotter router bit	9	12,2
Types of router bits		
Conical router bit with pointed tip	17	23,3
Cotter bit	42	57,6
Shoulder bit	14	19,1
Tracing		
Conical cutter with pointed tip	48	65,8
Cotter cutter	10	13,7
Shoulder cutter	16	20,5
Router bit		
Conical router bit with pointed tip	37	50,7
Cotter bit	27	37
Shoulder bit	9	12,3
CCM crown		
Juxta gingival margin	19	26,1
Subgingival margin	48	65,7
Supragingival margin	6	8,2
CIV		
Juxta gingival margin	37	50,7
Subgingival limit	25	34,3
Supragingival margin	11	15
Anterior sector dyschromia		
Juxta gingival margin	7	9,5
Subgingival limit	64	87,7
Supragingival margin	2	2,8
Posterior discoloration		

Juxtagingival margin	48	65,8
Subgingival margin	18	24,7
Supragingival margin	7	9,5
Intracircular margin		
0.4 mm	19	26,1
1 mm	43	58,9
3 mm and above	11	15

The shoulder cutter accounted for 57.6% of cases. The fillet cutter accounted for 57.6% of cases. The conical end mill with a pointed tip accounted for 65.8% of cases (Table III). The conical bur with a pointed tip accounted for 50.7% of cases. The margin was subgingival for 65.7% of participants. The margin was juxta-gingival for 50.7% of participants (Table III). The limit was subgingival for 87.7% of participants. The margin was juxtagingival for 65.8% of participants. The amount of preparation was 1 mm for 58.9% of participants (Table III).

DISCUSSION

Dentist Participation Data

The participation rate of practitioners was 93.59%. This level of participation is exceptional for a survey of healthcare professionals and lends our study considerable methodological robustness. This high rate significantly limits non-response bias and improves the representativeness of the sample, thus allowing us to consider the results obtained as reliable and generalizable to the entire target population.

Socio-Demographic Data

- Gender

This study involved a sample of 73 dentists, predominantly male (72.6%), with 27.4% being women. This result is similar to that of Seydou in Mali, with 78% men and 22% women [10]. This predominance could be explained by the country's socio-cultural and religious levels, which mean that males are much more sought after for higher education and professional careers than females, even in terms of their schooling.

- Age

In our study, the population was characterized by its youth, with a mean age of 33.78 years and a standard deviation of 4.98 years. The extremes were 27 and 46 years. The 30-40 age group represented 53.4% of cases. This result is similar to a study conducted in Mali by Elontode on the knowledge, attitudes, and practices of dental practitioners regarding tooth mobility, in which the 25-39 age group was the most represented, at 69.1% [25].

This result could be explained by the fact that the Faculty of Medicine and Dentistry is attended by a young population, which could be due to the early enrollment of children in school.

Preparation in Fixed Prosthodontics

- Preparation Depth for Porcelain-Fused-to-Metal Crowns

In our study, the preparation depth for porcelain-fused-to-metal crowns used by practitioners was between 1.2 and 1.5 mm in 60.3% of cases. This result is similar to that of a study conducted by Hobbo S in 2018, which found that 55% of practitioners used 1 to 1.5 mm as the preparation depth for a porcelain-fused-to-metal crown [28]. A porcelain-fused-to-metal crown is a fixed prosthetic component designed for aesthetic purposes. Composed of a metal substructure entirely covered with ceramic, it allows for single and multiple restorations. It requires more extensive tooth preparation to allow sufficient space for the double thickness of the crown, ensuring adequate mechanical strength and a satisfactory aesthetic result.

The preparation must allow for both the creation of a taper and the removal of tooth thickness. This latter process must not be traumatic to the patient's periodontal tissues, as the thickness is generally 1.5 mm (0.8 to 1.2 mm for the ceramic, with the ceramic being thicker than the coping for better aesthetics).

- Cervical Margin of the Porcelain-Fused-To-Metal Crown

In our study, for the majority of dentists surveyed, the shoulder represented 32.9% of cases of this type of margin. Following a logical approach, Perelmuter and Liger propose the use of chamfered finishing lines regardless of the prosthetic tooth finishing method for porcelain-fused-to-metal crowns [15].

Metal Crown

- Cervical Margin Preparation Depth for Metal Crowns

For 61.7% of practitioners, the margin preparation depth was between 0.8 and 1 mm. For a metal crown, a reduction of the occlusal surface is estimated at 0.8 to 1 mm. For axial reduction of the buccal and lingual or palatal surfaces, controlled penetration guide grooves are first created on the buccal surface, then on the lingual or palatal surface. These are made with a chamfer bur whose diameter corresponds to $\frac{3}{4}$ of the desired penetration depth (1.2 mm or 1.4 mm, for example) and along the insertion axis. This result demonstrates a mastery of metal crown preparation for the majority of our practitioners [29].

- **Cervical Margin of the Metal Crown**

In our study, the chamfered margin was the most frequently used by practitioners in 43.9% of cases. This result is similar to that of a study conducted by de Kouamé K. A., Tra B. Z., Pesson D. M., Didia E., Houédanou H. E., Konate N. Y *et al.*, which shows that for a metal crown, a shoulder is used in 23 to 37% of cases and a chamfer in 54 to 64% of cases [30]. The chamfer is indeed recognized for its simplicity, its ability to ensure good marginal adaptation, and its relative preservation of dental tissues. According to several authors, this finish is particularly suitable for metal and metal-ceramic crowns, due to the minimal material thickness it requires compared to shoulders, which are reserved for all-ceramic restorations [30]. This preference can be explained by practitioners' familiarity with this type of margin, as well as by the flexibility offered by metal alloys, which tolerate reduced marginal thicknesses without risk of fracture.

Zirconia Crown

- **Cervical Preparation Depth for Zirconia**

In our study, 58.9% of respondents reported a depth between 0.8 and 1 mm.

All-ceramic crowns offer a significantly superior aesthetic result compared to porcelain-fused-to-metal crowns (a quality increasingly demanded by patients). The shade and translucency are better because the metal does not block the passage of light. Furthermore, they promote good periodontal health because their surface is homogeneous and smooth (preventing plaque formation and gingival recession).

- **Cervical Preparation Boundary for Zirconia**

In our study, the majority of dentists surveyed reported the cement margin in 34.3% of cases. For this type of crown, the shoulder must have a rounded internal angle with a regular circular reduction. A quarter-round chamfer can also be used, but fracture resistance is lower; however, this technique allows for sparing of tooth structure. This demonstrates a lack of knowledge among our practitioners regarding this material [32].

The margin chosen to meet the patient's aesthetic requirements (anterior sector): In our study, the margin was subgingival in 72.9% of cases to meet the patients' aesthetic requirements. This result is similar to a Moroccan study in which a subgingival margin was used by 76% of the surveyed population for teeth in the anterior sector.

- **The Type of Bur Used for a Shoulder**

In our study, the shoulder bur was the most common, representing 57.6% of cases.

The shoulder is created with a shoulder bur, which allows for a substantial and consistent thickness of material. The internal angle can be right or rounded. The margin is visible, clean, and reproducible. The procedure

is easy to read for the laboratory. The prosthetic result is aesthetic. The ceramic-to-tooth interface is achievable on PFM. Good retention and support of the prosthetic element. Clinical execution is straightforward [6].

- **The Type of Bur Used for a Chamfer**

The chamfer bur represented 57.6% of cases. The chamfer is simpler to create with a chamfer bur. It is wide and quarter-oval in shape, which promotes the diffusion of the luting cement. Clinical execution is relatively easy. There is tissue preservation. The margin is visible, clean, reproducible, and manipulations are facilitated in the laboratory. Framing by the prosthetic element on the abutment. Periodontally friendly margin during fabrication. Adaptable to many types of materials. Relatively aesthetic prosthetic results. Stresses are reduced.

Instruments

- **Bur Type Used for Shaping**

During our survey, the conical bur with a pointed tip represented 65.8% of cases. The shaping is carried out with a conical profile bur, held in line with the preparation. The majority of authors agree that today this limitation is no longer justified: an apparent saving of tissue comes at the cost of real imprecision of the margins in the laboratory and a possible oversized prosthesis, which induces unacceptable chronic periodontal aggression [6].

- **The Type of Bur Used for the Taper**

The conical bur with a pointed tip represented 50.7% of cases. This is the minimum preparation required for a dental abutment before a prosthetic element can be placed on it. Small-diameter burs should be avoided for this type of contour, as they would result in excessive taper in the preparations and irregular contours. Indeed, cylindrical or conical burs with a large diameter and a rounded or ogival tip are the most suitable for tapering [6]. This means that a cylindrical bur is not suitable for tapering, contrary to what our practitioners know.

Position of the Cervical Margin

- **The Cervical Margin for a Porcelain-Fused-To-Metal Crown**

In our study, 65.7% of the practitioners surveyed preferred the subgingival margin for a porcelain-fused-to-metal crown. Aesthetic issues in the cervical region necessitate the use of intrasulcular margins to conceal the metal edges of the prosthesis and reduce the reflective effect. However, burying the margins is detrimental to the periodontium, as it causes constant irritation with a significant risk of root exposure, especially in patients with thin periodontal tissues [32].

- **Cervical Margin for a VSD:**

In our study, the margin was juxta-gingival in 50.7% of cases. A VSD is characterized by a significant

reduction on the buccal surface up to the point of contact (1.2 mm). This reduction allows for the placement of two materials: metal and ceramic or resin. On the other surfaces, the reduction will be limited (0.6 to 0.8 mm). The margin can be juxta-gingival with a ceramic-to-tooth margin, which is the preferred solution from an aesthetic point of view, or subgingival with a metal-to-tooth margin, provided that the metal band is buried in the sulcus [30].

- **The Margin for a Dyschromic Tooth in the Anterior Sector**

In our study, the margin was subgingival in 87.7% of participants. Aesthetics is a decisive factor in the design of a prosthetic element; it influences certain choices, particularly the position of the cervical margin of the future restoration. Most of the time, the best aesthetic result requires a cervical margin located in the gingival sulcus, that is, an intrasulcular margin. However, it is perfectly possible to place a subgingival margin in cases of tooth dyschromia.

Furthermore, the position of the marginsupragingival, paragingival, or intrasulcular is determined not only by the desired aesthetic outcome but also by the patient's lip line. If the lip is low, it is preferable to consider a supragingival or paragingival margin. However, if the smile is gummy, it is necessary to consider an intrasulcular margin to ensure the desired aesthetic result; but the patient's wishes must also be taken into account [6].

- **The Margin for a Dyschromic Tooth in the Posterior Sector**

In our study, the majority of dentists surveyed opted for a juxta-gingival margin (65.8%). This result differs from that of Maxime Caradec in 1992, for whom the juxta-gingival margin was used by 18% of the surveyed population in cases of dyschromic posterior teeth [1].

- **The Amount of Preparation in the Gingival Sulcus When Using an Intrasulcular Margin**

In our study, the majority of surveyed dentists (58.9%) used a preparation margin of 1 mm. Placing preparation margins at 0.5 or 0.7 mm intrasulcularly, as recommended by many authors, is only feasible if the sulcus reaches a probing depth of 1.5 m [12].

CONCLUSION

We conducted a descriptive cross-sectional study to assess the knowledge of general dentists regarding the criteria for choosing cervical margins for preparations in fixed prostheses in dental practices in the Districts of Bamako and Kati.

The cervical margin is an important part of a prosthetic preparation. The choice of a supragingival, juxtagingival, or infragingival margin is based on a

rigorous analysis of biological, aesthetic, functional, and periodontal factors.

Studies have shown that there is no single, universally applicable technique suitable for all clinical situations. Therefore, it is up to the practitioner to choose the method best suited to the case being treated.

And so, each practitioner has their own preferences during the preparation phase regarding the choice of crown shape, location, burs used, and materials, while respecting the anatomy and integrity of the biological space and achieving the desired aesthetic result.

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Cite This Article: Bougadary Coulibay, Lamine Traore, Fafounè Toure, Chaka Coulibaly, Aboubacar St Kane, Boubacar Ba (2026). Assessment of General Practitioner Dental Surgeons' Knowledge of the Criteria for Choosing Cervical Boundaries for Fixed Prosthetic Preparations in Dental Facilities in the Bamako and Kati Districts, 2025. *EAS J Dent Oral Med*, 8(3), 81-88.
