

# Prevalence of Dental Extractions in Orthodontic Treatment in Two Cities in Cameroon

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## Abstract

Dental extraction is a therapeutic act consisting of removing the tooth from its socket. In orthodontics, dental extraction, even healthy ones, holds an important place in the current therapeutic arsenal. However, it is a source of many controversies. As data related to orthodontic extractions are scarce in our context, we proposed to undertake this study whose objective was to determine the prevalence of dental extractions in orthodontic treatment. We carried out a cross-sectional and descriptive study over a period of 08 months in five dental clinics in the cities of Yaounde and Douala. Patients and records of patients who underwent extractions in orthodontic treatment were included. An adapted and pre-tested questionnaire was used for data collection. Statistical analyses were performed using SPSS 25.0 software. The sex ratio was 1.22. The mean age was 9.26 years  $\pm$  1.89 years with extremes of 5 and 15 years. The prevalence of extractions in orthodontic treatment was 10.68%. The main orthodontic abnormalities were position and eruption abnormalities (74.5% and 58.4%). Incisors (47%) were the commonly extracted dental group. The mastery of the indications, timings and sequences of dental extractions for orthodontic purposes would be an interest in the management of orthodontic abnormalities in general practice.

**Keywords:** Orthodontics, extraction in orthodontic treatment, orthodontic abnormality, Cameroon.

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## INTRODUCTION

Dental extraction is a therapeutic act that consists of removing the tooth from its socket. It presents various indications according to the oral medical disciplines [1].

Orthodontics aims to improve dental positions, shapes of the dental arcades and their relationships [2]. Orthodontic abnormalities can lead to dental, periodontal, joint and even psycho-social disorders [3]. In orthodontics, dental extraction, even healthy ones, holds an important place in the current therapeutic arsenal, for the restoration of the arcade in function and aesthetics[1]. Performed early, in isolation or in combination with other orthodontic treatments, dental extraction is an excellent way to prevent or intercept orthodontic abnormalities by minimizing or even avoiding their consequences; thus reducing the duration of the treatment[4]. Despite this, the controversies reported by the literature on the practice of dental

extractions in orthodontic treatment between extractionists and conservatists persist[5]. The integration of the practice of extraction into orthodontic treatment activities is universal. In the United States of America, Kuthy RA *et al.*, reported a prevalence of orthodontic extractions of 24.7% with malocclusions (41.1% class I, 54% class II, 4.1% class III) as the main cause[6]. This prevalence was 14.70% in 2006 according to the study by Danaie SM *et al.*, in Iran [7].

In Africa, studies conducted by Ikram M *et al.*, in Algeria in 2019 and Fadiga M *et al.*, in Conakry in 2020 revealed a prevalence of extractions in orthodontic treatment of 29.6% and 10.33% respectively [8,9].

In Cameroon, there are few studies on dental extractions performed in orthodontic treatment. Hence the interest of this study, whose research objective was to determine the prevalence of dental extractions in

orthodontic treatment in two cities in Cameroon (Yaounde and Douala).

## MATERIALS AND METHODS

We conducted a descriptive cross-sectional study in three dental clinics in Yaounde (Ma SULAMITE Dental clinic, LACOURONNE Dental clinic, EPC Dental Clinic in Djoungolo) and in two dental clinics in Douala (SAFY Dental Clinic and Family Health Medical Center Dental Clinic). Data collection was retrospective and prospective. The study was carried out over an eight-month period from November 2022 to June 2023. The choice of these places was justified by the abundance of orthodontic cases, as well as the multitude of orthodontic treatments provided. Sampling was non-probabilistic and consecutive. Our target population was patients who consulted at the study sites as well as patient records that were found. The source population was patients who consulted for orthodontic treatment and orthodontic patients' records at our selected study sites. Included in our study were any orthodontic patients or records of patients with temporary, mixed and adolescent dentition who had undergone an orthodontic extraction. Also, any patient who gave consent for participation in this study (only for the prospective phase). Any file that did not have the necessary data to meet our objectives, any individual who withdrew his or her consent in the course of the study, suffered from a mental disability, or refused to submit to a physical examination were excluded from our study. After obtaining recruitment authorisations, we collected information from patients using a pre-established data collection sheet with 35 questions

organised into three sections (socio-demographic characteristics, clinical and paraclinical data, therapeutic data). The information collected was input and analysed using SPSS software version 25.0. Diagrams, figures were made using Microsoft Excel 2016, while tables were made using Microsoft Word 2016. This study obtained the ethical clearance of the Institutional Ethics Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaounde I and research authorizations in the various study sites. The study was conducted with respect for the dignity and integrity of the patients. The data was anonymized and used only for the study.

## RESULTS

In the retrospective arm, we worked with 1342 orthodontic files, 173 were included, 31 excluded and 142 finally retained. In the prospective arm, we received 53 patients coming for orthodontic consultations, 18 were included, 11 excluded and 7 finally retained. A total of 149 patients underwent extractions in orthodontic treatment out of 1395 patients who came for orthodontic consultations, i.e. a prevalence of 10.68%.

### SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PATIENTS

The average age of our study population was 9.26 years  $\pm$  1.89 years with extremes of 5 and 15 years. The male gender was more represented (55%), with a sex ratio of 1.22. The predominant age group was between 7 and 9 years old (46.3%). The primary school level was mainly represented (65.8%). (Table I)

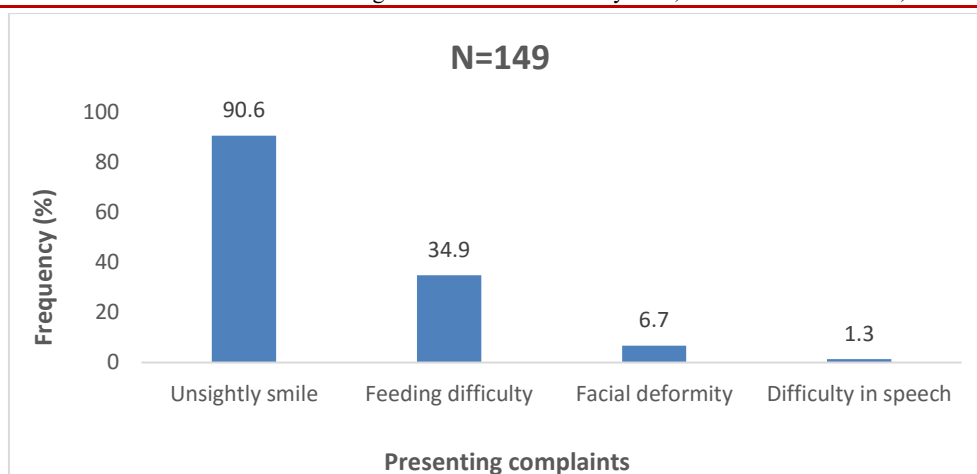
**Table I : Distribution of the population by socio-demographic characteristics**

Variables	Frequency (n=149)	Percentages (%)
<b>Age groups (years)</b>		
[5-7[	17	11.4
[7-10[	69	46.3
[10-15[	63	42.3
<b>Sex</b>		
Male	82	55.0
Female	67	45.0
<b>Level of education</b>		
Nursery	8	5.4
Primary	98	65.8
Secondary	43	28.9

### CLINICAL AND PARACLINICAL FEATURES

**History:** During the study, the history reported was sickle cell anaemia and cleft lip and palate surgery in (2.7%) of cases

**Presenting complaint:** The reasons for orthodontic consultation noted in our study were aesthetic and functional. The unsightly smile was the main presenting complaint in 90.6% of cases. (Figure 1)



**Figure 1: Distribution of the population according to their presenting complaints.**

#### Extra-oral signs,

The facial features were mainly mesofacial in 89.3% of cases and of flat profile (76.5%). Labial inoclusion and facial floors asymmetry were common in 21.5 and 6.7% of cases, respectively.

#### Functional signs

In our study, nasal breathing, alternating unilateral chewing and adult swallowing were the most common in 94.6%, 66.4% and 75.8% of cases,

respectively. Thumb and tongue sucking accounted for 8.0% of parafunction cases.

#### Intra-oral signs

Our study population had a majority of mixed (71.1%) and diastema (79.2%) dentition. Overlap was observed in 28.9% of cases. The canine and molar relationships were essentially of angle class I, i.e. 85.2 and 53.0% of cases, respectively. The reduction of the overbite and reverse occlusion were seen in 74.5% and 8.1% of cases respectively (Table II).

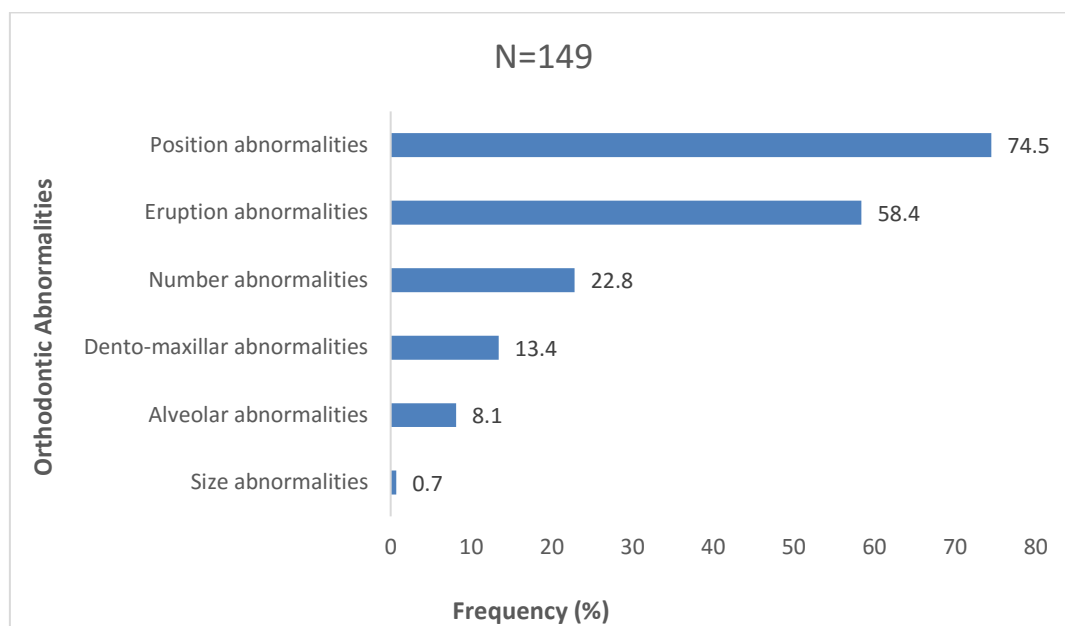
**Table II: Distribution of the population according to intra-oral signs**

Variables	Frequency (N=149)	Percentage (%)
<b>Dentition</b>		
Mixed	106	71.1
Adolescent Constitutional	43	28.9
<b>Types of dental arch</b>		
With diastema	31	20.8
Diastema-free	118	79.2
<b>Overlap</b>		
Yes	43	28.9
No	106	71.1
<b>Molar Relationships (Angle's Classification)</b>		
Class 1	127	85.2
Class 2	2	1.3
Class 3	8	5.4
no reports	12	8.1
<b>Canine Relationships (Angle's Classification)</b>		
Class 1	79	53.0
Class 2	2	1.3
Class 3	4	2.7
no reports	64	43.0
<b>Overjet</b>		
Normal	25	16.8
Increased	13	8.7
Diminished	111	74.5
<b>Reverse Dental occlusion</b>		
Yes	12	8.1
No	137	91.9

**Orthodontic abnormalities**

The main orthodontic abnormalities revealed during the study were positional abnormalities (74.5%), i.e. a total of 111 patients (25 patients with isolated

positional abnormalities, and 83 in association with other orthodontic abnormalities) and eruption abnormalities (58.4%) (Figure 2).



**Figure 2: Distribution of the population according to orthodontic abnormalities.**

**Characteristics of Position Abnormalities**

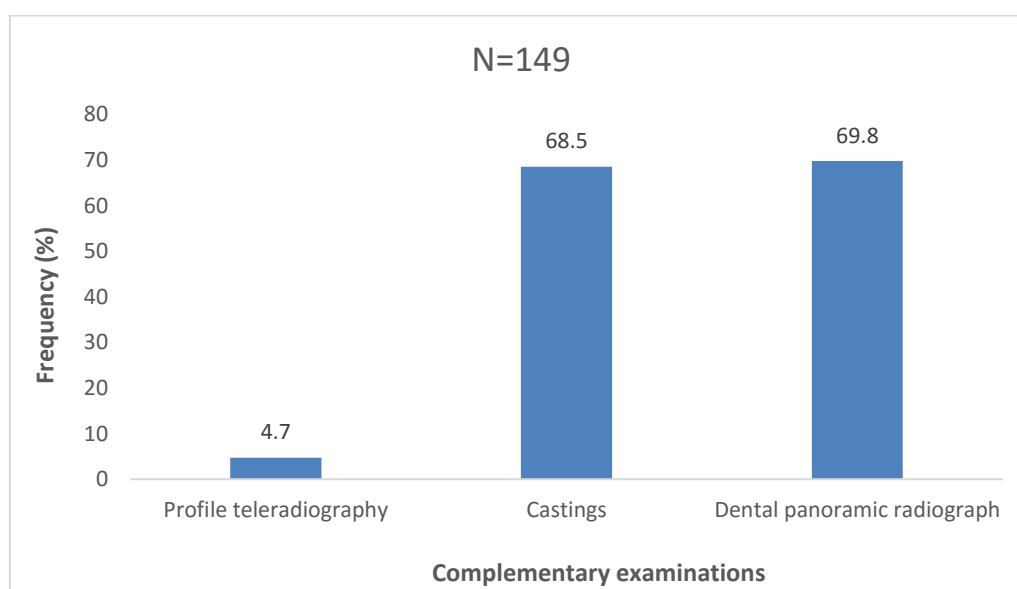
The main position abnormalities were linguo-position (33.3%), palato-position (28.8%).

**Characteristics of Eruption Anomalies**

The main eruption abnormality was delayed exfoliation of temporary teeth (59.8%).

**Additional examinations**

Dental panoramic radiography and casting were the main complementary examinations during the study, at 69.8% and 68.5% respectively (Figure 3).



**Figure 3: Distribution of the population according to complementary examinations**

**THERAPEUTIC ASPECTS OF ORTHODONTIC EXTRACTIONS**

The most extracted teeth were the incisors (47%), led by the temporary incisors (74.3%). (Table III)

**Table III: Distribution of the population according to the therapeutic characteristics of extractions**

Variables	Frequency (N=149)	Percentages (%)
<b>Number of teeth extracted</b>		
1	82	55.0
2	58	38.9
4	5	3.4
6	4	2.7
<b>Types of Teeth Extracted</b>		
Incisors	70	47.0
Canines	43	28.9
Molars	20	13.4
Premolars	16	10.7
<b>Types of incisors extracted (N=70)</b>		
Permanent	18	25.7
Temporary	52	74.3
<b>Types of canine teeth extracted (N=43)</b>		
Permanent	12	27.9
Temporary	31	72.1
<b>Types of molars extracted (N=20)</b>		
Permanent	4	20
Temporary	16	80

## DISCUSSION

### Socio-demographic profile of the study population

Our study population was predominantly male, at 55%, i.e. a sex ratio of 1.22. This could be explained by the fact that male patients were more courageous and more accepting of dental extractions. Our results are similar to those of Mendes, Miguel J.A. *et al.*, [38] and Fadiga M *et al.*, [9] which reported a sex ratio of 1.22 and 1.21 respectively in favour of the male gender. This tendency, although shared by some authors, was contradicted by Ikram M *et al.*, [8], Scott Franklin [36] and Peterson J [40] who had a strong predominance of the female gender in 63%, 73.3% and 85% of cases, respectively.

The most represented age group was between 7-9 years old with an average age of 9.26 years  $\pm$  1.89. This could be explained by the mixed nature of the dentition characterized by the cohabitation between the temporary and permanent teeth. Orthodontic abnormalities are more expressive during this transition phase. This result is in accordance with the study by Ikram M *et al.*, [8] and Fadiga M *et al.*, [9], which found the predominant age groups between 8-9 years (9 years  $\pm$  0.827) and 6-10 years respectively.

### Prevalence of Dental extractions in Orthodontic treatment

Out of 1395 orthodontic treatment consultations, 149 patients underwent dental extractions, a frequency of 10.68%. Our result seems to be superimposed with the data of Fadiga M *et al.*, [9] and Danaie SM *et al.*, [7] which reported the prevalence of extractions in orthodontic treatment of 10.33% and 14.7% respectively. Our prevalence is low compared to other studies, such as:

- Ikram M *et al.*, [8] reports a frequency of 29.6% (108 subjects examined, 32 extractions);
- Scott Franklin (1995) [36] percentage of serial extractions of 26.31% (30 extractions out of 114 patients);
- Kuthy RA *et al.*, [6] reveals a prevalence of controlled extractions of 24.7%;
- Ammouche F *et al.*, [38] 52.6% serial extractions from 664 patients;
- OUEDRAOGO Y *et al.*, [41] frequency of dental extractions for orthodontic reasons 41.37% (319 cases, 132 extractions);

### Clinical Features

Our analysis showed that 71.1% of patients who underwent dental extractions were in the mixed dentition phase. This is in line with the results of Fadiga M *et al.*, [9] and Ikram M *et al.*, [8] which recorded 80.64% and 53% of patients with mixed dentition respectively. This could be explained by the fact that it is at this phase of dentition that early orthodontic treatments are favoured as well as dental extractions as described in the literature.

Position abnormalities accounted for 74.5% of indications for dental extractions with linguo-positions (33.3%) and palato-positions (28.8%) in the majority, followed by eruption abnormalities 58.4%, while number abnormalities accounted for 22.8%.

The high frequency of linguo-positions and palato-positions would result in the deviation of the eruption axis of the permanent teeth due to the lack of rhizalysis of the temporary teeth.

The high frequency of eruption abnormalities is explained by the fact that the process of tooth eruption in

some patients did not follow the chronology described by the literature.

### Therapeutic aspects

During the study, the incisors were the most extracted dental group (47.0%) followed by the canines 28.8%. The temporary type was the most represented (temporary incisors 74.3%, temporary canines 63.3%). Our results are similar to those of Fadiga M *et al*. [9] They also found a high frequency of extractions of temporary teeth (incisors 41.18%, canines 23.53%). Lahlou k *et al.*, reported that 80% of extraction cases involved primary teeth.[1]

The high frequency of extractions of temporary teeth is explained by their persistence beyond their normal period of exfoliation and the double incisor row caused by the eruption of the successional teeth in linguo-position.

### Limitations

**In the course of our study, we encountered difficulties of several kinds, namely:**

- The delay in obtaining certain authorizations limited our study to two cities.
- The impossibility of having orthodontic records in public dental services restricted our study to private dental services.
- The refusal of access to patient files by some practitioners for various reasons (unavailability of time, poor archiving, lack of profile teleradiography, etc.).
- Few studies have been carried out in Central Africa, making it difficult to compare our results with those of countries of the same economic and social status.

## CONCLUSION

At the end of our study, which aimed at collecting socio-epidemiological data on the practice of dental extractions in orthodontic treatment in dental clinics in the cities of Yaounde and Douala, it appears that the prevalence of extractions in orthodontic treatment is 10.68%. The average age at which these extractions were most performed was 9.26 years  $\pm$  1.89 years with a sex ratio of 1.22. The main indications were position and eruption abnormalities. The most affected were temporary teeth. These extractions do not completely avoid the use of long treatments such as brackets. However, the mastery of the indications, times and sequences of dental extractions for orthodontic purposes would be an interest in the management of orthodontic anomalies in general practice.

### Conflicts of Interest

The authors do not declare any conflicts of interest.

### AUTHORS' CONTRIBUTIONS

Manga Ambassa Parfait Josely: study design, data collection, results interpretation and analysis, manuscript writing.

Lowe Nantchouang Jacqueline: conception of the study, writing of the manuscript.

Bengondo Messanga Charles: reading and validation of the final version of the manuscript.

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