

Relationship between Calendar Age and Degree of Edentulousness of the Lower Third Molar in Cameroon: About 419 Cases

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Received: 21 Jul, 2022 | **Accepted:** 07 Aug, 2023 | **Published:** 12 Sep, 2023

Citation: Nokam Abena ME, Mballa Amougou JC, Frank Olivier NG, Tamoh S, Talla Sokoudjou FI, et al. (2023) Relationship between Calendar Age and Degree of Edentulousness of the Lower Third Molar in Cameroon: About 419 Cases. *Int J Dent Oral Health* 9(2): dx.doi.org/10.16966/2378-7090.408

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Abstract

Introduction: Estimation of forensic age has gained in importance, whether for supplementary judgment or criminal responsibility. Our study reports the association between the civil age and the degree of edification of the lower third molar in Cameroon.

Materials and method: We conducted a descriptive and retrospective cross-sectional study in three private imaging centers in two cities in Cameroon over a period of 7 months, from November 2021 to May 2022, over the period from 2017 to 2020, i.e. 4 years. Included were all radiographic records of individuals 10 to 25 years old. The ophthalmographic estimation was made according to the Demirjian stages. Using Epi info 7 software, data analyses were performed. The significance threshold was set at 5%.

Results: A total of 419 were included. The majority of individuals in our sample were male (53%) with a sex-ratio of 1.13. The average civil age was 16.7 ± 4.4 years. The mean age of patients increased with the level of tooth edification, whether tooth 48 or 38. Individuals who constituted Demirjian stage H where predominant, 31% for the 48 and 29% for the 38. For tooth 48 they were at least 18.3 years for men and 18.6 years for women while for the 38, the minimum age for this stage was 18.3 years for men and 19 years for women.

Conclusion: Our study showed that the preponderant stage of construction was stage H with a minimum age corresponding to criminal majority in Cameroon.

Introduction

Understanding morphological changes underlies a wide range of research topics, clinical practice, and even medico-legal issues in the ante-mortem and post-mortem period [1-3]. Age assessment of living persons has been a relatively recent area of forensic research that is becoming increasingly important [4]. Apparent age estimation is a set of surveys to assess the chronological age of an individual [5]. Along these lines, radiographic evaluation of the degree of formation of third molars may prove necessary in cases of criminal liability concerning the age limit between adolescence and that of young adult hood. In Austria, in 2007, a study referred to the third molar in the context of an estimated identification [6]. In South Africa 2018, a comparative study based on the mineralization of third molars gave rise to an age estimate between white and black individuals in the country and subsequently made it possible to define a probability for each individual to be old. At least 18 years old [4]. In Cameroon, Benoah R, et al. [7] conducted in 2019, a study on the correlation between dental and bone ages in children. In our context, data on the forensic aspect of dentition are scarce. This study reports the association between

the civil age and the degree of edification of the lower third molar in Cameroon.

Materials and Method

This was a descriptive and retrospective cross-sectional study lasting 7 months (November 2021 to May 2022) which took place in three private imaging centers in two cities in Cameroon. Orthopantomogram images of patients aged 10 to 25 were included. Unusable pictures were excluded. The data collected was recorded in a pretexted exploitation sheet and included the socio-demographic characteristics (sex, age) and the radiographic characteristics (the Stage of edification). The stages of edification of lower third molars were interpreted according to the Demirjian stages on the sides of A-H [8,9] (Figure 1) (Annexe).

- A: mineralized and unfused cusps,
- B: plain mineralized cusps, recognizable mature occlusal surface,
- C: The crown is formed in half, a dentinal deposit occurs, The pulp chamber is curved, no visible pulp horn,

- D: The crown is complete, root formation has begun, the pulp chamber is trapezoidal in shape and the pulp horns are beginning to differentiate,
- E: The formation of the root bifurcation has started and the root length remains shorter than the height of the crown. The pulp horns are more differentiated,
- F: Root length is equal to or greater than the height of the crown, the bifurcation has developed sufficiently, the roots have funnel-shaped ends,
- F1: Root length is twice the coronal height, the root ends are still funnel-shaped,
- G: The root walls are parallel, but the apical end remains open,
- G1: The root walls are parallel, the apical end is not yet completely closed, the periodontal ligament space is greater than or equal to 1 mm,
- H: The root apex is completely closed

The results obtained were entered and analyzed by the Epi info 7 software. The data were expressed as mean, standard deviation, number and percentages. An ethical clearance was obtained from the Institutional Ethics and Research Committee of the Faculty of Medicine and Biomedical Sciences and the confidentiality of the information was respected.

Results

Sociodemographic characteristics

A total of 419 were included. The majority of individuals in our sample were male (53%) with a sex-ratio of 1.13. The average civil age was 16.7 ± 4.4 years (Table 1).

Radiographic identification according to the demirjian score of the edification stage

In the tooth building phase, stage H was the most represented with 31% for 48 and 29% for 38 (Figure 2).

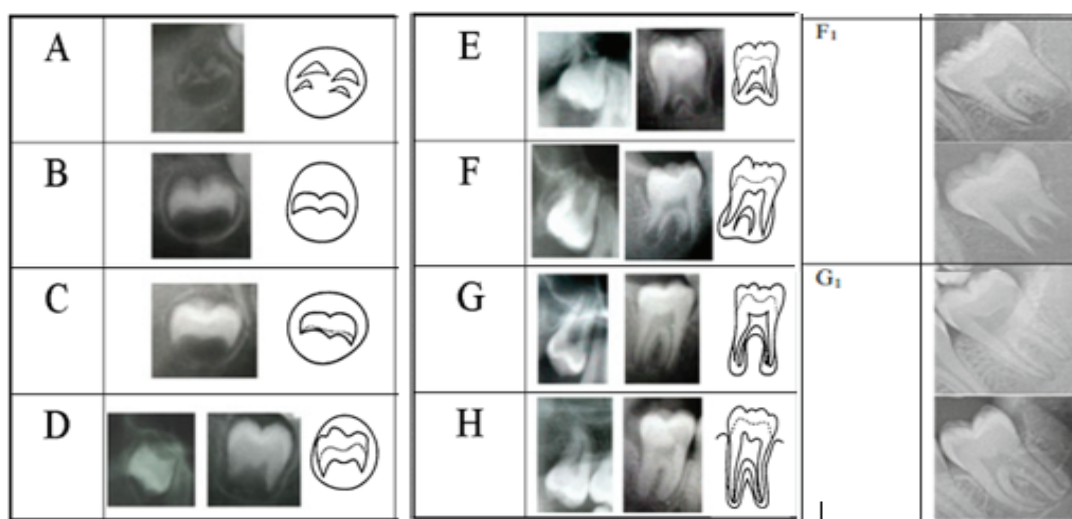


Figure 1: Classification of the Demirjian stages of construction [9].

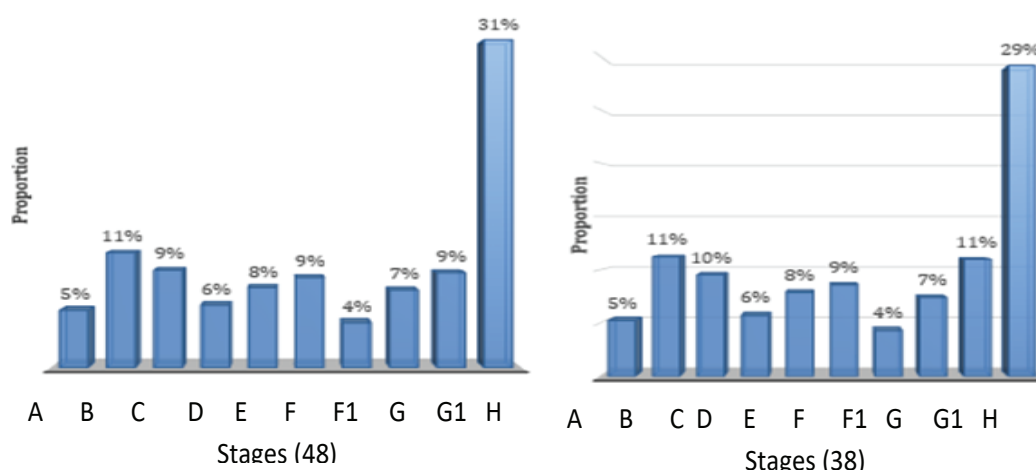


Figure 2: Distribution of the stages of edification of the individuals in our study.

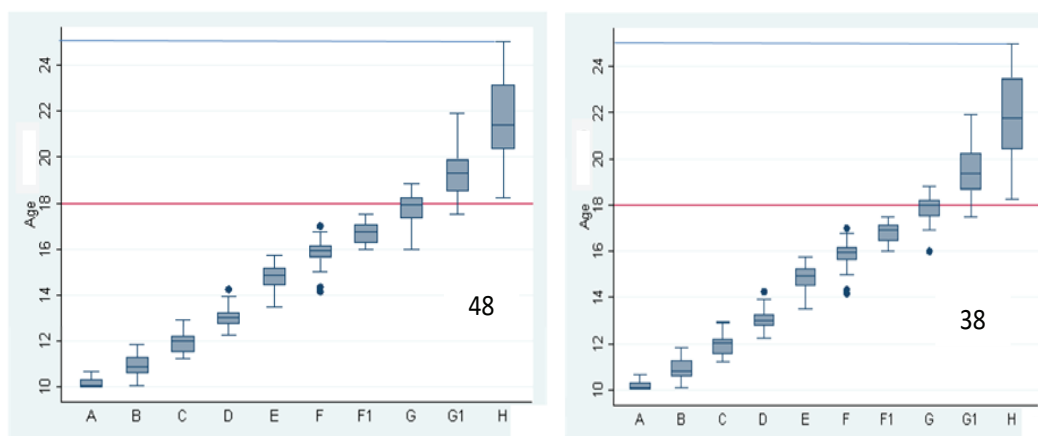


Figure 3: Distribution of age according to the stage of edification of tooth 48 and 38.

Description of the stages of edification according to the age of the patients

The average age of the patients increased according to the level of edification of the tooth, as shown in figure 3 for the 48 and figure 3 for the 38.

Individuals who constituted stage H or apical closure stage for 48 was aged at least 18.3 years for men and 18.6 years for women (Table 2).

The average age of individuals at stage B or occlusal maturation stage for 38 was 11 years for men and 10.8 years for women (Table 3).

Discussion

This study, carried out in three private imaging centers in two cities in Cameroon, aimed to investigate the association between civil age and the degree of edification of the lower third molar in Cameroon. The main pit fall noted during its realization was the difficulty of the archiving system in the imaging centers. However, the setting, sample size, and method allowed us to achieve these goals. In the building phase of the lower third molar, the H stage or apical closure stage was the most represented, whether for the right or left lower third molar, as in other series [6,10,11]. Indeed, we noted in our series as previously mentioned an average age of 16.7 ± 4.4 years these data are therefore in agreement with the literature which reports the predominance of stage H at more than 18 years. The third molar was encountered at stage B of edification or stage of occlusal maturity at an average age of 11 years for men and 10.8 years for women. Our results are similar to those obtained by Meini A, et al. [6] in 2007 who during an investigation of The chronology of third molar mineralization and its contribution to forensic age estimation in the Austrian population noted an average age of 12.7 years for men and 12.4 years for women at this stage and could be explained by our eating habits with the promotion of a much more solid diet that appeals early to the masticatory function in response to this. Also among the extrinsic factors influencing dental development there are nutritional factors such as proteins and carbohydrates which are an integral part of our diet. Stage H was encountered at a minimum age of 18.3 years for men and 18.6 years for women. Indeed, according to Article 80 paragraph 4 of the 2016 Cameroonian penal code, the age of criminal responsibility is 18 years old. Our series therefore underlines a similarity with this value. In our study, the average age difference between one stage and the next stage

Table 1: Distribution of individuals by age and sex.

Variables	Frequency	Percentage
Gender		
Male	222	53.0%
Female	197	47.0%
Age groups (years)		
[10-18]	244	58.2%
[18-25]	175	41.8%

Table 2: Distribution according to sex and stage of edification of the 48 of the age of individuals.

	Stage	Number	Minimum	Standard Deviation	Mean	Maximum
Male	A	10	10	0.2	10.3	10.7
	B	22	10.2	0.5	11	11.8
	C	25	11.3	0.4	12	12.9
	D	15	12.6	0.4	13.1	13.9
	E	14	13.9	0.5	14.9	15.8
	F	16	15	0.5	16	17
	F1	8	16.2	0.4	16.8	17.3
	G	16	16.9	0.5	17.8	18.7
	G1	20	17.6	1.2	19.5	21.9
	H	76	18.3	1.8	21.9	25
Female	A	13	10	0.2	10.2	10.7
	B	24	10.1	0.4	10.8	11.6
	C	14	12	0.4	12	12.6
	D	10	12.3	0.6	13	14.3
	E	18	13.5	0.8	14.7	15.7
	F	20	14.2	0.7	15.8	17
	F1	10	16	0.6	16.8	17.5
	G	15	16	0.7	17.9	18.8
	G1	18	17.5	0.9	19	20.6
	H	55	18.6	1.8	21.7	25

Table 3: Distribution according to sex and stage of edification of the 38 of the age of the individuals.

	Stage	Number	Minimum	Standard deviation	Mean	Maximum
Homme	A	10	10	0.2	10.3	10.7
	B	22	10.2	0.5	11	11.8
	C	25	11.3	0.4	12	12.9
	D	15	12.6	0.4	13.1	13.9
	E	14	13.9	0.5	14.9	15.8
	F	16	15	0.5	16	17
	F1	8	16.2	0.4	16.7	17.3
	G	16	16.9	0.5	17.8	18.7
	G1	25	17.6	1.2	19.5	21.9
	H	71	18.3	1.8	21.9	25
Femme	A	12	10	0.2	10.1	10.7
	B	25	10.1	0.4	10.8	11.6
	C	15	11.3	0.4	12	12.6
	D	9	12.6	0.6	13.1	14.3
	E	19	13.5	0.8	13.5	15.7
	F	19	14.2	0.7	15.8	17
	F1	10	16	0.6	16.8	17.5
	G	16	16	0.7	17.9	18.8
	G1	21	17.5	1	19.2	20.8
	H	51	19	1.8	21.9	25

was 1 to 2 years whether it was the lower right or left third molar, the findings of Meinel A, et al in 2007 [6] in Austria also relates to ours with average age gaps between two stages of 1 to 2 years. This would demonstrate the fact that the age gap between one stage and the next according to Demirjian's constant, i.e. 1 to 2 years with in each breed.

Conclusion

At the end of our research, it appears that the preponderant stage of edification was stage H with a minimum age of 18.3 years for men and 18.6 years for women; which would correspond to the criminal majority in Cameroon and therefore could be used for forensic purposes.

Conflicts of Interest

The authors declare that they have no conflict of interest.

Contribution of Authors

All the authors designed the study, proceeded to the data collect and wrote the manuscript. All authors have given their approval for publication.

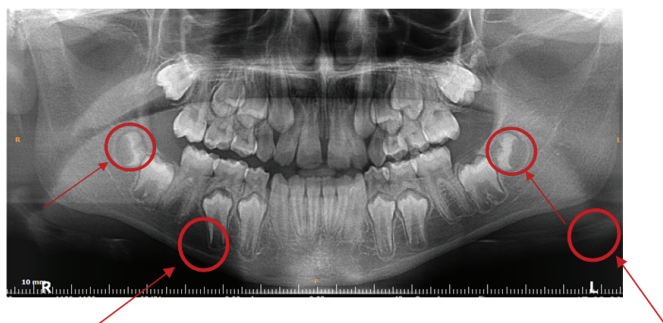
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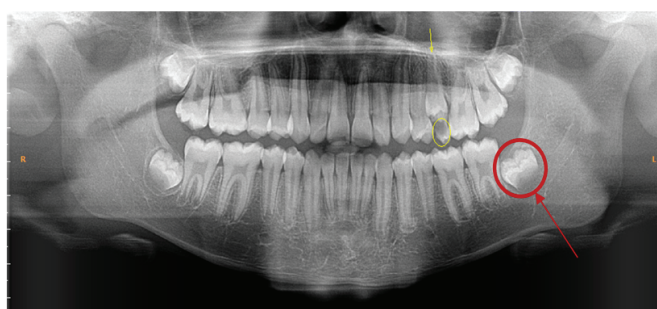
Iconography

Annexe: Radiographic illustrations of Dermirjian stages.

Stage A



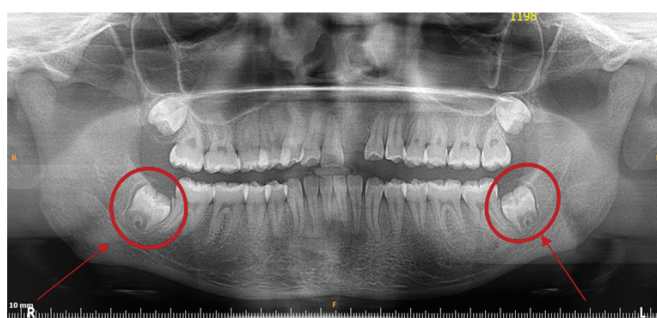
Stage B



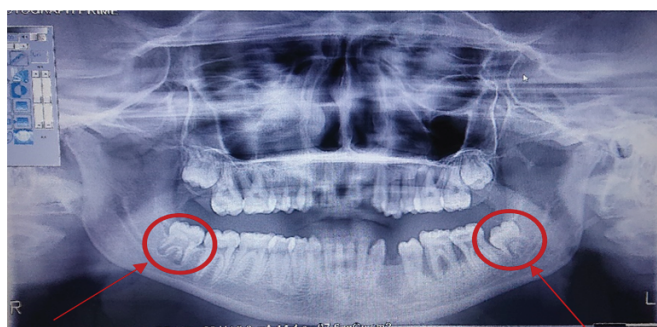
Stage C



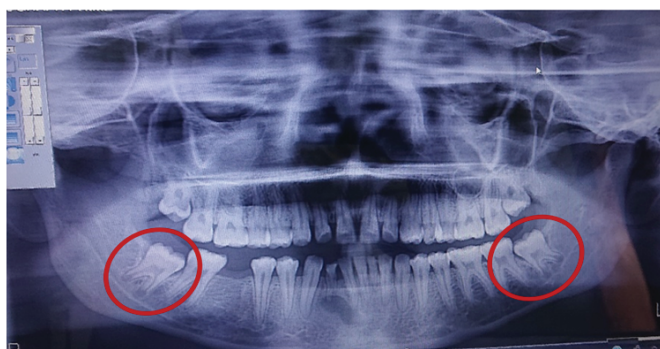
Stage D



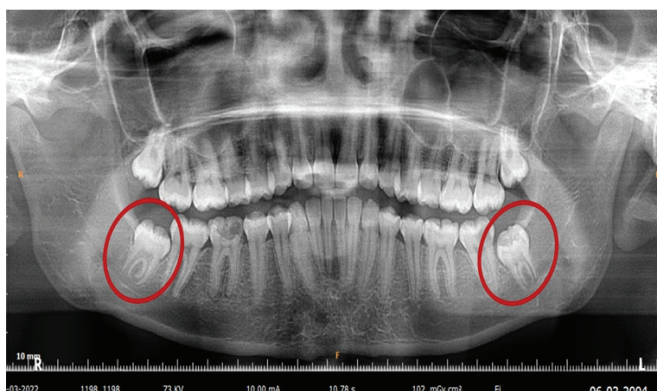
Stage E



Stage F



Stage F1



Stage G



Stage H

Study's collection.