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## Pattern of tooth loss in Nigerian juvenile and plaque-induced chronic periodontitis patients

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### Summary

The aim of this study was to determine the pattern of tooth loss in chronic periodontitis patients and hence help the clinician to plan preventive treatment against the loss of these teeth. Dental record notes of all the subjects, the periapical radiographs and actual intra-oral examinations of the juvenile periodontitis patients were done to determine the number and types of tooth loss. It was observed that the pattern of tooth loss in both groups of chronic periodontitis (plaque Induced periodontitis (PIP) and juvenile periodontitis (JP) was different as the most frequently lost teeth in PIP was incisors and lower incisor in JP while the least lost in PIP was the upper canines and the lower premolars in JP

**Keywords:** Juvenile, plaque-induced periodontitis, tooth loss

### Résumé

Le but de cette étude était de déterminer la fréquence de la perte des dents aux patients ayant la périodontite chronique. Ceci afin d'aider les médecins de planifier un traitement préventif contre la perte des dents. Le registre dentaire de tous les sujets étaient faite, les examens de la radiographie périapicale et intra-orales de la périodontite juvénile chez ces patients étaient analysés pour déterminer le nombre et les types de dents perdus. Ils étaient observés que les fréquences de la perte des dents chez les 2 groupes de périodontite chronique (périodontite à plaque induite (PPI) et la périodontite juvénile étaient différents. Comme la plupart de la perte des dents aux PIP était les incisives inférieure et les incisives inférieure aux JP. Cependant la moindre perte aux ayant la PIP était les canines supérieure et les prémolaires inférieure à ceux ayant la périodontite Juvénile

### Introduction

The term periodontal disease has different meanings and is used rather ambiguously in a general sense to encompass all diseases of the periodontium in much the same way as are terms such as liver and kidney diseases. It may be considered synonymous with periodontopathia, although this term is not in use currently. Periodontitis is the extension of inflammation from the gingival or from the periapex into the periodontal ligament resulting in alveolar bone loss, increase mobility and subsequent loss of the tooth/teeth [1].

Juvenile periodontitis is characterized by gingival inflammation and severe angular bony defects which results in pronounced loss of periodontal attachment with tooth loss during adolescence. It is distinguished from plaque induced periodontitis (PIP) by several features, including younger age of onset, extensive periodontal destruction that is not commensurate with the amount of local irritants and familiar aggregation.

Tooth loss data, which can be expressed statistically as the total number of teeth missing per person, has previously been obtained by one of three methods. First, by actual examination of the mouth, secondly by examining dental records of patients who had dental treatment and thirdly, by examining dental radiographs.

The collection and analysis of data about the loss of teeth in the community is useful both as a method of assessment of the effectiveness of the available dental services and for purpose of assessing the patient's level of awareness of the available dental services. The tooth loss data in this study is expressed statistically as the total number of teeth missing per person obtained by actual examination of the mouth of the JP patients, their periapical radiographs and examining the dental records of plaque-induced chronic periodontitis patients of about the same age group as the JP patients.

Tooth loss data are available for a representative sample of the adult population in the United States of America [2,3], Europe [4,5], Netherlands [6], Australia [7], South Africa [8], East and West Africa [9] and Nigeria [10-16]. While data are available in developed countries [17-19] to compare the pattern of tooth loss in periodontal disease, no such data are available in Nigeria. These data are available for determining various prognostic indicators and demonstrate the long-term value of periodontal therapy [17].

Analysis of the pattern of tooth loss in periodontal disease gives the clinician an idea of the type of tooth that is most frequently lost and their sequence in either of the periodontitis. This knowledge will help to plan preventive measures for the teeth before progression of the disease to advanced stages leading to loss of the teeth.

### Materials and methods

Selection of subjects for the study was carried out in two stages. The first stage entailed a compilation of the case notes of all adults aged 15-30 years that attended Prosthetics Clinic of the University College Hospital, Ibadan for tooth-replacement between January 1997 and December 1998. Out of this list of 684 persons, those with chronic periodontitis and juvenile periodontitis were further selected, which constituted the second stage. A total of 255 cases were thus identified out of which 10 were juvenile periodontitis (JP) cases. Information obtained on each subject included the biodata, causes of tooth loss, past dental experience in the past 3 years and type of tooth/teeth loss.

The juvenile periodontitis patients were then recalled and clinical intra oral and periapical radiographic examinations were made by one of the authors (EBD) to confirm the diagnosis. The diagnostic criteria of juvenile periodontitis used were: general good health, no use of systemic antibiotics in the preceding six months, not pregnant, no systemic consideration that would alter disease progression, good plaque control and the presence of at least four pairs of teeth with interproximal intra bony defects seen from the periapical radiographs.

The study was approved by University of Ibadan/ University College Hospital Joint Ethical Committee and informed consent obtained from the juvenile periodontitis patients. All analysis were performed on a microcomputer using the Stata Gold Statistical analysis package. The means and standard deviations of the total number of teeth missing, the different types of teeth missing and the subjects past dental treatments were determined for the two groups of periodontitis. Independent T-test were used to determine the level of significance of the means of these clinical parameters for both groups.

### Results

Table 1 shows the causes of tooth loss in all the subjects. Dental caries was observed to be the commonest cause (58.25%) followed by plaque-induced periodontitis (PIP) (35.87%) and the least being juvenile periodontitis (JP) (1.43%).

**Table 1:** Causes of tooth loss in all subjects

Cause of tooth loss	Number of subject	Percentage of Total
Dental Caries	399	58.25
Plaque-induced periodontitis (PIP)	245	35.87
Trauma	30	4.45
Juvenile Periodontitis (JP)	10	1.43

Table 2 shows the past dental experience of all the subjects as related to gender. Thirty nine percent of the patients had previous dental experience while the remaining 61% had no previous dental treatment. The female to male ratio was 1:1.06 in subjects that had previous dental treatment while it was 1:1.04 in subjects that had no previous dental experience. Table 3 shows the past dental experience of all the subjects as related to gender and type of periodontitis.

**Table 2:** Past Dental experience of all subjects in the past 3 years as related to gender.

	No. of subjects that had Previous Dental Experience	No. of subjects that had no previous Dental Experience
Female (F)	138	204
Male (M)	129	213
Total	267	417
Percentage of over all total subjects	39%	61%
F:M Ratio	1.06:1	1:1.04

**Table 3:** Past dental experience of all the subjects as related to gender and type of periodontitis.

	Had Previous dental Experience (HPDE)	Had No previous dental Experience (HNPDE)	Ratio HPDE:HNPDE
<i>Females</i>			
All Female subjects	138	204	1:1.48
JP subjects	3	1	3:1
PIP subjects	50	74	1:1.5
<i>Males</i>			
All male subjects	129	213	1:1.65
JP subjects	1	5	1:5
PIP subjects	46	75	1:1.63

Table 4 shows the mean number of teeth loss in chronic periodontitis (JP and PIP) subjects as related to gender. Both gender significantly lost more teeth in the JP cases than the PIP cases. Female JP subjects significantly lost more teeth than their counter-part male subjects while the tooth loss difference between both gender was not significant in the PIP subjects.

**Table 4:** Mean number of teeth loss in all the chronic periodontitis subjects as related to gender.

	Female subjects	Male subject	P value
Juvenile Periodontitis	10.71 ± 1.05	5.6 ± 0.74	0.0414 Significant
Plaque-induced periodontitis	2.47 ± 0.71	2.74 ± 0.94	0.5794 Not significant
P value	0.0002 Significant	0.0029 Significant	

Table 5 shows the number of teeth loss in chronic periodontitis subjects as related to age. The older age group significantly lost more teeth than the younger age group for both types of periodontitis.

**Table 5:** Mean number of teeth loss in chronic periodontitis subjects as related to age

	Mean no. of teeth loss in 15-18yrs	Mean no. of teeth loss in 19yrs and above	P value level of significance
Juvenile Periodontitis (JP)	2.33 ± 0.4587	6.25 ± 0.5288	0.0022 Significant
Plaque-induced Periodontitis (PIP)	0.39 ± 0.34	2.13 ± 0.86	0.0000 Significant
value level of Significance	0.0001 Significant	0.004 Significant	

**Table 6:** Pattern of teeth loss in chronic periodontitis subjects

Type of tooth loss	Mean no. of teeth loss in JP subjects	Mean no. of teeth loss in PIP subjects	P value
Upper incisors	2.58 ± 0.57	2.99 ± 0.65	0.5794 Not significant
Lower incisors	3.26 ± 0.78	2.42 ± 0.74	0.0414 (<0.05) Significant
Upper Canine	1.17 ± 0.76	0.67 ± 0.296	0.0562 Not significant
Lower Canine	1.37 ± 0.58	0.70 ± 0.420	0.0406 Significant
Upper Premolar	0.75 ± 0.28	2.11 ± 0.74	0.0029 Significant
Lower Premolars	0.50 ± 0.2918	2.24 ± 0.5163	0.0048 Significant
1 <sup>st</sup> & 2 <sup>nd</sup> Upper Molars	1.67 ± 0.4770	2.58 ± 0.5183	0.0559 (<0.0550) Not significant
1 <sup>st</sup> & 2 <sup>nd</sup> Lower Molars	1.67 ± 0.4587	2.42 ± 0.5288	0.0022 Significant

Table 6 shows the pattern of teeth loss in chronic periodontitis subjects. The pattern of teeth loss in both types of periodontitis were observed to be different.

Whilst comparing previous dental experience as related to gender, more females were observed to have previous dental experience than males (138 and 129 respectively). The ratio of the subjects that had previous dental experience were lower than those that had no previous dental experience except for female JP subjects with a ratio of 3:1 respectively.

## Discussion

Earlier studies in Nigeria [4,13-15], reported dental caries as the commonest cause of tooth loss in the younger age group. In this study, we found dental caries to be the commonest cause of tooth loss followed by chronic periodontal disease (JP and PIP) which supports these earlier studies [4,13-15] in Nigeria in the younger age group. This is probably due to the increased westernization in the country which has increased the amount of refined carbohydrate consumption.

Dentist-patient ratios vary considerably between regions as Douglass *et al* [20] reported unequal utilization of dental services by different groups in the United States of America. There is no such data for Nigeria and hence a comparison cannot be made. Some authors however suggested that the higher edentulous rate in rural areas is caused by the joint effect of low availability and accessibility of dental services together with socio-economic and cultural factor [2,6,21,22]. Aderinokun [23] reported very poor awareness of community to dental services, inadequate facilities for dental care in Nigeria and large percentage of patients who do not attend the dental clinic until pain developed and probably swelling of the jaw over a long period of time.

Generations of biographers, novelists, poets, playwrights, essayists and journalists have included descriptions of teeth in portraying the facial appearance of their characters [24] and hence the importance of keeping the teeth in proper condition.

Femor [25] noted the effect of partial and complete edentulousness on facial appearance as follows: "the middles of the faces are simultaneously flaccid and clenched as though a bad diet had pre-maturedly rotted away every tooth in their heads and often, for no very clear reasons, feature start sliding out of shape, noses, fall askew, eyes grow bleary and mouths are open

like those of snowmen or village idiots" Mercel Proust [26] also described the effect of tooth loss on jaw function as the fact that the tooth loss mouth allows unconscious dripping of saliva from the corners of the lips.

It can be deduced from the above observations that a person's beauty is related to how well the teeth appear and hence the reason why more females had previous dental experience than the males because they want to look good especially at this adolescent age. The characteristics of some dentists might also play a role in determining the rate of edentulousness. Craft *et al* [27] for example found that general dental practitioners in the North of England were less preventively oriented than general dental practitioners in the more urbanized South of England.

The finding of a significantly higher mean number of teeth loss in female JP subjects than the males may be because JP has a predilection for females. This was noted by Hormand *et al* [28]. Also worth noting is Jackson [4] and Evans *et al* [29] finding of advanced tooth motality in females than males. The difference in the mean number of teeth loss in PIP female and male subjects were found not to be significant ( $P>0.05$ ) although with a slightly higher value in males than females. Sheiham *et al* [5] and Kelly *et al* [30] also reported similar finding and wrote that males were consistently found to have a higher prevalence and severity of periodontal disease than females, the difference been slight before 20 years of age and increasing thereafter. Again, we believe that most males do not care much about their outlook and hence they may not pay enough attention to oral hygiene instructions, if at all they know. JP subjects, were observed to loose more teeth significantly than PIP subjects in both genders, this could be due to the finding of Baer *et al* [31] that the rate of alveolar bone loss in JP is 3-4 times faster than PIP.

Comparing edentulousness with age, both forms of periodontitis show significant increase in the number of tooth loss in proportion with increase in age. This is different from the findings of Sheiham *et al* [5] who reported that the average number of missing teeth in the older age group was not as great as in the younger age group. He suggested that dental treatment delayed tooth loss especially in the London population who had better access to dental clinics, which is not the case in our own study, probably because of the low level of awareness [31]. However, Macgregor [12] and Bael *et al* [32] reported that the proportion of people who were edentulous increased with age and was higher in the lower socio-economic groups which is in keeping with the finding in our own present study. We observed a significantly higher number of tooth loss for both age groups in Juvenile Periodontitis patient than the plaque induced periodontitis which could also be due to the 3-4 times faster rate of bone loss in JP than PIP as reported by Baer *et al* [31].

The pattern of tooth loss in both forms of periodontitis differ, whilst the most frequently lost teeth in the PIP subjects was upper incisors, it was the lower incisors in the JP subjects. The upper canines were the least lost in the PIP subjects while it was the lower premolars in the JP subjects. The 3<sup>rd</sup> molars were not included in the study because we believe that they might have been lost by surgical extraction as a treatment for impaction or unerupted because of age. Manson *et al* [33] reported that the classic distribution of JP lesion and subsequent loss of teeth is in the region of the first molars and incisors with the least destruction in the cuspid-premolar area. The following possible reasons for the limitation of periodontal destruction to certain teeth in JP have been suggested:

- following initial colonization of the first permanent teeth to erupt (the first molars and incisors), Actinobacillus

actinomycetemcomitans (Aa) evades the host defenses by different mechanisms. After this initial attack, adequate immune defenses are stimulated to produce opsonizing antibodies to enhance phagocytosis of invading bacteria and neutralize destructive factors. Zambon *et al* [34] suggested that in this manner colonization of other sites may be prevented.

Hillman *et al* [35] suggested that bacterial antagonistic to Aa may develop, thereby decreasing the destructiveness of the lesions and reducing the number of colonization sites.

Slots *et al* [7] suggested that Aa may lose its Leucotoxin-producing ability for no reason. When this happens, the progress of the disease may become arrested or retarded and new colonization sites averted.

Parfitt [36] reported that single-rooted teeth have more mobility which enhances (with) their subsequent loss than multi-rooted teeth, hence the incisors having the most number lost in both forms of periodontitis.

The canines are the least lost in PIP subjects probably because of their long stout roots and the dense canine alveolar bone prominence surrounding them.

Schei *et al* [37] reported that severity of bone loss and subsequent loss of teeth follow the intra-oral pattern of subgingival calculus, with the incisor and molar areas being more severely affected than the canine and premolar areas. This may be the reason for the pattern of tooth loss observed in this study in the plaque induced periodontitis subjects.

In conclusion, although Macgregor [12] was perhaps the first to attempt to establish the pattern of dental extractions in Nigeria, he did not analyse the reasons for extraction. Okoisor [15] gave the first account of tooth loss in Nigeria together with an analysis of the reasons for the exodontia in his clinical study of the causes of tooth mortality but did not analyse the pattern of tooth loss in periodontal subjects. Having established periodontal disease as a cause of tooth loss in Nigeria, there has been no study analysing the pattern of tooth loss in the different forms of periodontitis, which is hopefully what has been presented in this study.

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