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## The pattern of malocclusion among orthodontic patients seen in Dental Centre, University College Hospital, Ibadan, Nigeria

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### Summary

The aim of this study was to analyse the malocclusion pattern among patients who presented for treatment in the Orthodontic Unit of the Dental Centre, University College Hospital, Ibadan, as baseline data for proper treatment planning, teaching and further research. A total of 289 subjects aged 5-34 years with mean age of  $10.6 \pm 1.5$  (S.D.) years were seen. Angle's classification of molar relationships among those seen is as follows: class I - 76.5%, Class II - 15.5% and Class III - 8.0%. There was increased overjet in 16.2% of the patients, reduced overjet in 0.7% while 2.1% had reversed overjet. Other occlusal abnormalities included: increased overbite (3.8%), reduced overbite (1.4%); anterior open bite (5.2%); crossbite (8.4%) and scissorsbite (0.6%). Crowding, spacing and retained primary incisors constituted 29.7%, 1.4% and 40.1%, respectively. Delayed eruption of canine (1.0%), Bimaxillary protrusion (0.7%), incompetent lips (0.7%), supernumerary teeth (0.7%) malformed tooth (0.3%), mandibular deviation on closure (1.0%) and oral habits (4.5%) were other forms of malocclusion diagnosed. Males were found to have significantly more of classes II and III molar relationships than females ( $P < 0.05$ ). Occurrence of retained primary teeth as well as overjet deviations from normal were significantly higher in females ( $P < 0.05$ ). No significant sex differences were found in the other occlusal disorders ( $P > 0.05$ ). The findings were comparable with previous epidemiological surveys in other parts of the country.

**Keywords:** Malocclusion, pattern, UCH, Ibadan.

### Résumé

Le but de cette étude était d'analyser la mauvaise occlusion chez les patients qui se sont présentés pour le traitement dans l'unité orthodontique du collège Hospitalier Universitaire d'Ibadan comme données de base pour un traitement planifier, enseignement et recherche supplémentaire. 289 sujets âgés de 5-34 ans avec une moyenne d'âge de  $10.6 \pm 1.5$  (S.D.) ans ont été consultés. La classification d'angle des relations molaires pour ceux consultés était comme suit: classe I - 76.5%, Classe II - 15.5%, et Classe III - 8.0%. L'augmentation des jets allaient de 16.2%, la réduction chez 0.7% alors que l'inverse était de 2.1%. D'autres anomalies destructives étaient: Augmentation des crocs (3.8%) réduction de la morsure (1.4%). Ouverture des dents antérieures (5.2%) dents croisées (8.4%) et dents en ciseaux (0.6%). 29.7%, 1.4% et 40.1% représentaient respectivement les dents touffues, espacées et les incisives primaires retenues. L'éruption retardée des canines (1.0%), la protrusion bimaxillaire (0.7%), lèvres incompetents (0.7%), nombre supérieur élevé des dents (0.7%), dents malformées (0.3%), déviation mandibulaire (1.0%), habitudes orales (4.5%) étaient les autres formes de malocclusion diagnostiquées. Les hommes se retrouvaient plus dans les classes II et III que les femmes ( $P < 0.05$ ). La rétention des dents de lait aussi bien que la déviation de jet de la normale étaient significativement plus élevées

chez les femmes ( $P < 0.05$ ). Aucune différence significative du sexe était observée dans les autres malformations des dents ( $P < 0.05$ ). Les conclusions ont été comparées aux enquêtes épidémiologiques précédentes faites dans d'autres régions du pays.

### Introduction

The World Health Organization [1] included malocclusion in the group of Handicapping Dentofacial Anomalies. These are anomalies which cause disfigurement or impede function and for which treatment is required when the disfigurement or functional defect is likely to be an obstacle to the patient's physical or emotional well-being. Salzman [2] similarly defined a handicapping malocclusion as one which adversely affects aesthetics, function or speech.

Epidemiological surveys have often been used to study malocclusion pattern in various communities. However, clinical evaluations of the severity of malocclusions are comparable to objective measures in terms of inter-examiner reliability and are also relatively stable over time [3]. Consequently, even in mass screening programs, evaluations based on clinical judgments are often preferred to more objective measurements of the severity of malocclusion or the need for orthodontic treatment [4].

Hitherto, there has been no published information on the various types of malocclusion in Ibadan, the capital city of Oyo State and largest indigenous city south of the Sahara. The data available in this area are the reports from other parts of the country [5-11].

The aim of this study therefore, was to analyse the various types of malocclusion among patients who presented for treatment in the Orthodontic Unit, Dental Centre, University College Hospital, Ibadan between May 1997 and November, 2000. The purpose is to establish a data base on that subject so that the information would enhance teaching, treatment planning and further research.

### Materials and methods

Consecutive patients seen in the Orthodontic Unit, Dental Centre, University College Hospital, Ibadan between May 1997 and November 2000 were included in the study which comprised 289 subjects (170 males and 119 females). The subjects were aged 5 to 34 years with mean age of  $10.6 \pm 1.5$  (SD) years.

Clinical examination was performed on all the patients with the teeth in centric occlusion. A plane mouth mirror and a periodontal probe, scaled in millimetres, were used for determination of occlusal variables. Antero-posterior occlusal relationships were assessed based on Angle's classification [12].

The criteria for assessment of the other occlusal are as follows: Overjet was determined as the horizontal distance from the labial surface of the maxillary central incisor to the labial surface of the mandibular central incisor in millimetres and was scored as NORMAL (2 - 3mm); INCREASED (more than 3mm); or REDUCED (less than 1mm); REVERSED (mandibular overjet).



Vertical overbite was scored as NORMAL: when the maxillary central incisor overlaps the mandibular antagonist by zero to about two thirds of the cervical height of the latter; INCREASED when more overlap, of the full height of the mandibular central incisor or it even contacts the gingivae posterior to the maxillary incisor; REDUCED OR INCOMPLETE when the mandibular central incisor occludes short of the cingulum plateau of the maxillary central incisor but with some overjet relationship and a NEGATIVE OVERBITE (open bite) was scored as the vertical distance from the incisal edge of the maxillary central incisor to the incisal edge of the mandibular central incisor in millimetres.

Crossbite may be present anteriorly and/or posteriorly. Anterior crossbite was recorded when one or more maxillary incisors or canines occluded lingually to the mandibular ones. It was scored unilateral or bilateral when only one or both sides of the midline were involved. Posterior crossbite was scored as present when a mandibular premolar or molar was buccally displaced, to a cusp-to-cusp, or worse deviation from normal.

Scissors bite was recorded when the palatal cusp of one or more maxillary premolars or molars occluded buccally to the buccal surface of the corresponding mandibular teeth. Crowding was recorded as present when there were overlapping contacts between the teeth and spacing was recorded present when there were no contacts between the teeth. Delayed eruption of canines were diagnosed on patients over 13 years of age who clinically showed no sign of eruption and were confirmed radiographically. Supernumerary teeth were confirmed when the normal complement of teeth were present in exclusion of the supernumerary teeth. Retained primary teeth were diagnosed when the permanent successors were erupted or erupting in displaced positions with the primary predecessors still firmly in place in the arch. The diagnosis of incompetent lips was made based on modified Jackson's classification of lips competence [13].

Deviation of mandible on closure was assessed as the mandible closed from rest position to full intercuspation while the oral habits of patients were registered based on the confirmation from parents/patients in addition to the clinical observations made.

Chi-square test was used to assess the statistical significances between different proportions. Fisher's exact test was used to assess the statistical significance of the observed relationship between sucking habit and anterior open bite and for proportions where chi-square test was not appropriate.

## Results

Table 1 shows the distribution of the subjects by age and gender.

Table 1: Distribution of subjects by age and gender

| Age (Yrs) | Females<br>n (%) | Males<br>n (%) | Total<br>n (%) |
|-----------|------------------|----------------|----------------|
| 5 - 9     | 56 (47.1)        | 91 (53.5)      | 147 (50.9)     |
| 10 - 14   | 42 (35.3)        | 50 (29.4)      | 92 (31.8)      |
| 15 - 19   | 17 (14.3)        | 21 (12.4)      | 38 (13.1)      |
| 20 - 24   | 4 (3.3)          | 6 (3.5)        | 10 (3.5)       |
| 25 - 29   | 0 (0)            | 0 (0)          | 0 (0)          |
| 30 - 34   | 0 (0)            | 2 (1.2)        | 2 (0.7)        |
| Total     | 119 (100)        | 170 (100)      | 289 (100)      |

Mean age of the patients:  $10.6 \pm 1.5$  (S.D.) years

Percentage distribution of subjects by Angle's classification is presented in Table 2. Angle's class I was a typical feature of the sample accounting for 76.5% of the studied population. Angle's classes II and III were observed in 15.5% and 8% of the study population, respectively.

Table 2: Distribution of molar occlusion in the 289 patients seen at University College Hospital, Ibadan, according to gender

| Angles classification     | Males<br>n (%) | Females<br>n (%) | Total<br>n (%) |
|---------------------------|----------------|------------------|----------------|
| Class I                   | 114 (67.0)     | 107 (89.9)       | 221 (76.5)     |
| Class II (distocclusion)  | 36 (21.2)      | 9 (7.6)          | 45 (15.5)      |
| Class III (mesiocclusion) | 20 (11.8)      | 3 (2.5)          | 23 (8.0)       |
| Total                     | 170 (100)      | 119 (100)        | 289 (100)      |

Uncorrected  $\chi^2 = 20.33$ ,  $P = 0.0000065$

Yates corrected  $\chi^2$ ,  $P = 0.000013$

Table 3 shows the distribution of different degrees of overjet among the patients. Most of them (263; 91.0%) had normal overjet whereas increased overjet (greater than 4mm) was found in 18 (6.2%), and reversed overjet in 6 (2.1%). Reduced overjet was recorded in 2 (0.7%) of the patients. There were significant differences in incisor relationships between sexes with females showing more deviations from normal overjet ( $P < 0.05$ ).

Table 3: Distribution of sagittal incisal relationships in the 289 patients according to gender.

| Overjet       | M<br>n     | F<br>n     | Total<br>n | $\chi^2$ | P-value  |
|---------------|------------|------------|------------|----------|----------|
| Normal (%)    | 160 (94.1) | 103 (86.6) | 263 (91.0) |          |          |
| Increased (%) | 5 (2.9)    | 13 (10.9)  | 18 (6.2)   | 4.89     | 0.03 (S) |
| Reduced (%)   | 2 (1.2)    | 0 (0)      | 2 (0.7)    |          |          |
| Reversed      | 3 (1.8)    | 3 (2.5)    | 6 (2.1)    |          |          |
| Total         | 170 (100)  | 119 (100)  | 289 (100)  |          |          |

S = Significant differences between males and females (more overjet deviations present in females)

Table 4: Distribution of vertical relationships in the 289 patients according to gender

| Overbite      | M<br>n     | F<br>n     | Total<br>n | $\chi^2$ | P-value   |
|---------------|------------|------------|------------|----------|-----------|
| Normal (%)    | 155 (91.2) | 104 (87.4) | 259 (89.6) |          |           |
| Increased (%) | 5 (2.9)    | 6 (5.0)    | 11 (3.8)   |          |           |
| Reduced (%)   | 1 (1.2)    | 3 (0)      | 4 (0.7)    | 1.08     | 0.30 (NS) |
| Reversed      | 9 (5.3)    | 6 (5.0)    | 15 (5.2)   |          |           |
| Total         | 170 (100)  | 119 (100)  | 289 (100)  |          |           |

(NS = No significant sex differences)



The magnitude of vertical overbite is shown in Table 4, which shows that 259 (89.6%) of the patients had normal overbite. The incisal edges were reduced in 4 (1.4%) while 11 (3.8%) had increased (deep) overbite. Anterior open bite was present in 15 (5.2%) patients. No significant differences in overbite were found between males and females ( $P > 0.05$ ).

**Table 5:** Distribution of crossbite and scissors bite in the 289 patients.

| Distribution of crossbite and scissors bite in 289 patients |          |         |           |
|-------------------------------------------------------------|----------|---------|-----------|
| Relationships                                               | M (%)    | F (%)   | Total (%) |
| Crossbite (lingual crossbite)                               |          |         |           |
| Posterior                                                   | -        | -       | -         |
| Anterior:                                                   |          |         |           |
| Bilateral                                                   | 6 (3.5)  | 6 (5.0) | 12 (4.2)  |
| Unilateral                                                  | 9 (5.3)  | 3 (2.5) | 12 (4.2)  |
| Total                                                       | 15 (8.8) | 9 (7.5) | 24 (8.4)  |
| Scissors bite (buccal crossbite)                            |          |         |           |
| Bilateral                                                   | 1 (0.6)  | -       | 1 (0.3)   |
| Unilateral                                                  | 1 (0.6)  | -       | 1 (0.3)   |
| Total                                                       | 2 (1.2)  | -       | 2 (0.6)   |

NS = No significant differences in the sexes

Transverse deviations are shown in Table 5. All the lingual crossbites observed were found in the anterior segment of the arch. Bilateral lingual crossbites were found in 12 (4.2%) of the patients and unilateral lingual crossbites in 12 (4.2%) of the patients too. There were no significant differences in the occurrence of lingual crossbite between the sexes ( $P > 0.05$ ). One patient each had bilateral and unilateral buccal crossbite (scissors bite) giving the prevalence of 0.6%. Again, no significant differences between the sexes were found ( $P > 0.05$ ).

**Table 6:** Distribution of crowding in the 289 patients according to gender

|                            | M<br>n (%) | F<br>n (%) | Total<br>n (%) | X <sup>2</sup> | P-value |
|----------------------------|------------|------------|----------------|----------------|---------|
| Upper labial segment (ULS) | 10 (5.9)   | 19 (16.0)  | 29 (10.0)      | 0.37           | 0.54    |
| Lower labial segment (LLS) | 9 (5.3)    | 19 (16.0)  | 28 (9.7)       |                |         |
| Both segments              | 7 (4.1)    | 22 (18.4)  | 29 (10.0)      |                | (NS)    |
| Total                      | 26 (15.3)  | 60 (50.4)  | 86 (29.7)      |                |         |

Yates corrected  $X^2 = 0.13$ ,  $P = 0.72$

The presence and site of crowding of teeth are shown in Table 6. The frequency of crowding in the maxillary and mandibular arches were virtually the same and they were all found in the anterior regions especially between the incisors. In all, 86 (29.7%) of the patients had crowding. Female patients had statistically significant higher prevalence of crowding than the males ( $P < 0.05$ ).

Oral sucking habits found in males and females were 7(4.1%) and 6(5.0%), respectively, with 13 (4.5%) as the overall

prevalence (Table 7). No significant difference between sexes was also noted ( $P > 0.05$ ). Retained primary teeth was found in 116 (40.1%) of the subjects with 58 (34.1%) and 58 (48.7%) for males and females, respectively (Table 7). More females significantly had retained primary teeth than males ( $P < 0.05$ ).

**Table 7:** Distribution of local factors affecting the dentition of the 289 patients in Ibadan

| Local factor                                   | M<br>n (%) | F<br>n (%) | Total<br>n (%) | X <sup>2</sup> | P-value    |
|------------------------------------------------|------------|------------|----------------|----------------|------------|
| Sucking habits (digit, tongue and lip sucking) | 7 (4.1)    | 6 (5.0)    | 13 (4.5)       | 0.14           | 0.7 (NS)   |
| Retained primary teeth                         | 58 (34.1)  | 58 (48.7)  | 116 (40.1)     | 6.23           | 0.013 (NS) |
| Delayed eruption of canine                     | 0 (0)      | 3 (2.5)    | 3 (1.0)        |                |            |
| Supernumerary teeth                            | 1 (0.6)    | 1 (0.8)    | 2 (0.7)        |                |            |
| Malformed tooth (peg-shaped lateral)           | 1 (0.6)    | 0 (0)      | 1 (0.3)        |                |            |

(S = Significant differences in the sexes)

(NS = No significant differences in the sexes)

Delayed eruption of canine was found in 3(1.0%) of the subjects and all the involved patients were females (2.5%). Two (0.7%) patients had supernumerary teeth. The frequencies for males and females being 1(0.6%) and 1(0.8%), respectively (Table 7). Peg the shaped lateral was seen in one male patient (0.6%) giving a prevalence of 0.3% for the study population. None of these variables showed any significant gender differences.

**Table 8:** Distribution of spacing, bimaxillary protrusion, incompetent lips and mandibular deviation on closure in the dentition of the 289 patients in Ibadan.

| Variables                       | M<br>n (%) | F<br>n (%) | Total<br>n (%) | X <sup>2</sup> | P-value |
|---------------------------------|------------|------------|----------------|----------------|---------|
| Spacing of dentition            | 2 (1.2)    | 2 (1.7)    | 4 (1.4)        |                |         |
| Bimaxillary protrusion          | 1 (0.6)    | 1 (0.8)    | 2 (0.7)        |                |         |
| Incompetent lips                | 1 (0.6)    | 1 (0.8)    | 2 (0.7)        |                |         |
| Mandibular deviation on closure | 2 (1.2)    | 1 (0.8)    | 3 (1.0)        |                |         |

(NS = No significant differences in the sexes)

The frequency of spacing in the males and females were 2 (1.2%) and 2 (1.7%), respectively. The overall prevalence of spacing found in the patients was 4 (1.4%). There were no significant differences in spacing found between sexes ( $P > 0.05$ ) (Table 8).

Bimaxillary protrusion was found in 2(0.7%) of the patients with 1 (0.6%) and 1 (0.8%) for males and females,



No significant sex differences were found ( $P > 0.05$ ). Incompetent lips were diagnosed in 2 (0.7%)

One of them (0.6%) was a male patient while the other was a female. No significant differences were found between sexes ( $P > 0.05$ ) as shown in Table 2. Deviation of the mandible on closure from rest to maximum position was found in 3 (1.0%). Two of them were males while the other (0.8%) was a female (Table 2). No significant differences were noted between sexes ( $P > 0.05$ ).

Relationship between anterior open bite and digits among the children seen in Denter Center,

| Anterior open bite |            |       |
|--------------------|------------|-------|
| Present (+)        | Absent (-) | Total |
| 13                 | 0          | 13    |
| 2                  | 274        | 276   |
| 15                 | 274        | 289   |

Exact test,  $P = 0.000012$  (There was a high association between sucking habit and anterior open bite).

In our analyses, we found that there is a higher incidence of anterior malocclusions among males (21.2% for class II or class III as against 7.5% and 2.5%, respectively) which is statistically significant ( $P < 0.05$ ) as shown in Table 2. Molar relation recorded was the highest with classes I, II and III in that order. This present finding agrees with the previous clinical study reported in Lagos [2]. In this present study produced a trend in overjet values similar to that with the earliest epidemiological survey of overjet in population [14]. In the present study the normal range had the highest frequency (91%) followed by values (more than 3mm) of 6.2% as compared to 66.3% respectively, reported by Akpata and Jackson [14]. Overjet value was effectively the same in Lagos as in London [14]. Although overjet value is an indication of posterior relationship, it is nevertheless dependent on position of the incisor teeth. Thus, the antero-posterior relationship of the maxillary and mandibular skeletal bases in Ibadan cities of Nigeria and in York, England may not necessarily be the same.

The overbite relationship of the patients virtually followed the same trend as the overjet. Concerning the relationship, the percentage frequency of crossbite in the present study is comparable to those of Richardson and daCosta [7] while the scissors bite prevalence in our study (0.6%) is lower than the reported range (8 – 12%) [1] which the authors described as surprisingly high. However, prevalence of 1.0% for scissors bite reported in our present study is comparable to that reported in Northern Nigerian children [7]. Early treatments of crossbite malocclusion is helpful in the growth and development of the dentofacial complex [15-17]. One of the patients who had scissors bite did not require treatment because it was a bilateral case without any functional or aesthetic problems.

Premolar crowding was not noticed owing to the wide dentoalveolar ratio and infrequent extraction of premolars. Although incisor crowding was seen frequently,

it was not as common as in Europe or Tristan da Cunha, [18] and neither was it more common in the mandible than in the maxilla as reported among Swedish men and women [19,20].

The oral sucking habits especially digit sucking noted among the patients showed a strong association with anterior open bite when tested with the Fisher's exact test (Table 9). No history pointed to the use of dummy by any of the patients who had anterior open bite but digit, lip and tongue sucking habits were implicated. This is possibly a reflection of the non practice of such a habit (dummy sucking) in our environment unlike with the Caucasian children. The affected children responded well to the use of habit breakers such as "gold post" appliance.

The prevalence of retained primary teeth in the present study was relatively high (40.1%), suggesting a need for more oral health education in schools for early attendance at dental clinics for routine check-up. Other local factors such as supernumerary teeth and malformed teeth involved in causing malocclusion in the study group were not high in prevalence. The same prevalence of 0.7% for supernumerary teeth recorded in this study was reported in the Northern part of Nigeria [7]. However, there is need for emphasis on routine investigative procedures such as periapical and occlusal radiographs to ascertain the number and conditions of other unerupted supernumerary teeth as well as periodic follow-up radiographs of symptomless unerupted supernumeraries for possible pathologic changes. Delayed eruption of canine was diagnosed in 3 (1.0%) of the study population and this was reported to be 2% in Lagos [2].

Generalised spacing of the dentition was not a common finding of the occlusion. Bimaxillary protrusion was found in 2 (0.7%) of the patients. Cephalometric analyses were not done in these two patients. Modified Jackson's classification [13] was used in assessing the lip positions and only 2 (0.7%) had incompetent lips which seems to confirm the belief that Africans tend to have more competent lips than their Caucasian counterparts [21].

In conclusion, although this clinical material could not be regarded as a random sample of the Nigerian population, the findings may be accepted as representing the types of malocclusion which an orthodontist working in Ibadan may be treating. It could also serve as a stepping stone for both teaching and research purposes in our relatively young orthodontic unit.

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