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Assessment of malocclusion in pre-school children in Benin City using the incisor classification of malocclusion.

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Summary

This study was aimed at analysing the incisors as a means of classifying malocclusion in pre-school children Incisal classification is not common but is a simple and reliable means of assessing malocclusion, especially in pre-school children. The classification is mainly used to describe the incisal relationship of cases in verbal and written communication between clinicians. Angle's classification holds when the first permanent molars are in place, but in the pre-school child, between the ages of 2-4 years, the first permanent molars may not have erupted. The methods of classifying malocclusion in pre-school children carried out by Foster and Hamilton (1969) and Baume (1950) took into consideration other parameters without the use of the incisors as a means of classifying malocclusion. The incisor classification would then be a more reliable means of analyzing the malocclusion and evaluating the need for early management. A sample of 505 pre-school children between the ages of 2-4 years of age were randomly selected from day care centres and pre-schools in three local government areas of Benin City, Edo State. The incisors were examined and classified using the British Standard Classification of Malocclusion. The results showed that the incisal Class I malocclusion was seen in 90.6% Class II in 2.4% (class II div 1 in 1.8% and class II div 2 in 0.6%) and the incisal class III in 7% of the total sample studied. The 4-year-old age group exhibited a higher frequency of malocclusion in the Class I, Class II div 1 and Class III groups, and showed no significant decrease with age (P>0.05). Girls showed a higher frequency for a tendency to malocclusion than boys. Our findings show that the most common type of malocclusion seen in pre-school children is the incisal class I, followed by the incisal class III with the class II having the smallest number. The assessment of malocclusion using the incisal classification was fast and easy to use, and was able to detect those children that would require treatment later on. The importance of early detection of malocclusion as regards those that present a functional and aesthetic problem (class II and III) especially in pre-school children is suggested, in order to permit effective and long term planning, according to the child's individual requirements.

Keywords: *Assessment, malocclusion, pre-school children, incisor classification*

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Résumé

Cette étude avait pour but d'analyser les incisives comme un moyen de classifier la malocclusion chez les enfants. La classification des incisivales n'est pas commun mais est simple, effective pour évaluer la malocclusion chez les enfants en maternelle. La classification a pour but de décrire la relation incisivales entre les cas de communication verbale et écrite parmi les médecins. La classification angulaire est utilisée lorsque les premières molaires permanentes sont formes, mais entre l'age de 2- 4 ans, la première molaire peut ne pas être sorti. La classification des malocclusions chez ces enfants était faite par les méthodes de Foster et Hamilton (1969) et Baume (1950) prenait en considération d'autres paramètres sans incisives comme mode de classification. La classification des incisives apparaît comme la méthode la plus effective d'analyse des malocclusions et d'évaluation des besoins des soins. 505 enfants ages de 2 – 4 ans étaient sélections au hasard des écoles maternelles dans trois district dans l'état de Bénin à Edo. Les incisives étaient examinés et classifiés utilisant le modèle standard de classification de malocclusion. Les résultats montraient que la malocclusion de classe I d incisive était observé chez 90.6%, Classe II chez 2.4%(classe II div 1 chez 1.8% et classe II div 2 Chez 0.6%) et la classe III chez 7% dans la population étudiée. L'age de 4 ans démontrait une grande fréquence de malocclusion de type I, II div 1 et III, mais pas significative avec l'age (P>0.05). Les filles démontraient une fréquence élevée de malocclusion que les garçons. Ces résultats montrent le plus commun type de malocclusion vu chez les enfants est de la clase I, suivi de la classe II et enfin la classe III. L'évaluation des malocclusions utilisant les incisives est rapide, simple et effective dans la détection des enfants qui pourrions avoir un besoin des soins au future. L'importance de la détection précoce comparée au problème actuel de fonctionnement et d'esthétique (classe II et III) chez les enfants demande les programmes panifiés à long terme

Introduction

Angle's classification of malocclusion was the first useful classification of malocclusion and it was classified into classes I, II and III. It was based on the arch relationship in

the saggital plane of the first permanent molar teeth and its alignment with other teeth in the line of occlusion in the opposing arch [1,2].

Jago [3], in 1974 questioned the validity and reliability of Angle's classification. Also, Gravely and Johnson [4] found the reliability of Angle's classification to be low. A more recent survey in the United States of America has included incisor malalignment as a means of assessing malocclusion [5]. All these studies were carried out on adults and children from eight years of age.

The incisor classification of malocclusion was originally introduced by Ballard and Wayman in 1964 [6]. Based on the work of Backlund (1963) [7], it forms the basis of the British Standards Institute's (1983) Classification of Malocclusion [8]. It has now superceded Angle's classification in the United Kingdom [1,8].

Angle's classification holds when the first permanent molars are in place, but in pre-school children, between the ages of 2-4 years, the first permanent molars would not have erupted. The methods of classifying malocclusion in pre-school children carried out by Foster and Hamilton [9] and Baume [10-14] took into consideration other parameters without the use of the incisors as a means of classifying malocclusion. The incisor classification could be an alternative means of assessing the malocclusion and evaluating the need for early management.

The aim of this study was to assess the incisors as a means of classifying malocclusion especially in pre-school children in our environment

Materials and methods

This cross sectional study was developed in two stages and two sampling methods were used: the stratified random sampling in which the children were stratified according to age, and the cluster sampling which was used in day care centres

The study population included children between the ages of 2-4-years of age, with the age approximated to the nearest birthday. Those included were children in pre-school or day care centres and who had all their primary teeth present in the mouth. Also included were those resident in Benin City.

A list of pre-schools and day-care centres was obtained from the State Ministry of Education and every 'n'th school selected (n was a number taken from a statistical table). In each selected pre-school, children for the study were selected from the class register using simple random sampling. For the day care centres, cluster sampling was used. Based on this method, a random sample of five hundred and five (505) children aged between 2-4 years were selected and examined comprising 205(40.6%) boys and 300 (59.4%) girls.

A questionnaire was administered to the parents or guardians of each selected child, and a consent form included within the questionnaire. Parameters documented included age, sex, teeth present and the incisal classification as approved by the British Standard Classification of Malocclusion [8].

Each child's occlusion was recorded in the centric position. This was obtained by placing the thumb and finger of the examiner on the chin of the child and asking the child to swallow and close the mouth at the same time, while gently guiding the jaw to this position. An assessment of the occlusion was carried out under natural light. The assessment was done using the incisor classification as approved by the British Standard Classification of Malocclusion [8].

Statistical analysis was performed with the statistical package for social sciences soft ware (SPSS) version 10.0. In addition to descriptive statistics, the chi-squared test was used to test for significance at 95% confidence level. Probability values (p-values) less than 0.05 were regarded as significant.

Results

Table 1 shows a distribution of the incisal classes relative to the number of children examined. The most common incisal class was the class I with 458 (90.6%)of cases. The lowest number was the class II division 2 with 3(0.6%) children. The 4-year-old age group in Table 2 showed the highest number of class I incisal relationship 192(41.9%). The 2-year-old age group recorded the lowest value in the class II division 2 incisal relationship, while the 3-year-olds had no class II division 2 at all. It was, however, noticed that the class III incisal relationship in the 4-year-old age group was high with 18 (51.4%). These showed no significant differences in the different incisal classes ($P>0.05$).

Table 1:   Incisal class distribution of children

Incisor class	No of cases examined	Percentage (%)
Class I	458	90.6
Class II div 1	9	1.8
Class II div 2	3	0.6
Class III	35	7.0
Total	505	100

Table 2 :   Age distribution of the children

Age in Years	Class I n %	Class II div 1 n %	Class II div 2 n %	Class III n %	Total n %
2	86(18.8)	-	1(3.3)	5(14.3)	92(18.2)
3	180(39.3)	4(44.4)	-	12(34.3)	196(38.8)
4	192(41.9)	5(55.6)	2(66.7)	18(51.4)	217(43)
Total	458(100)	9(100)	3(100)	35(100)	505(100)

$x^2 = 6.65$
$P>0.05$
$df = 12$

Table 3 shows the gender distribution of the incisal classes with 280 (61.2%) girls exhibiting a higher class I incisal relationship than boys 178 (38.8%). With the class II divisions 1 and 2 and the class III, boys showed a higher number in the different incisal relationships, compared with girls.

Table 3:   Gender distribution of incisal class

Gender	Class I	Class II div 1	Class II div 2	Class III
	n %	n %	n %	n%
Male	178(38.8)	5(55.6)	2(66.7)	20(58.5)
Female	280(61.2)	4(44.4)	1(33.3)	15(41.5)
Total	458(100)	9(100)	3(100)	35(100)

$x^2 = 6.646$
$P > 0.05$
$df = 4$

Discussion

Incisal classification though uncommon, is a simple and reliable means of assessing malocclusion [1] especially in pre-school children. Very few studies have been carried out on the incisal form of classifying occlusion in the pre-school child worldwide, but there have been other studies on the different methods of classifying malocclusion in the pre-school child and in adults [2,9-17]. In Nigeria, there appears to be no data on the incisal form of classifying occlusion in the pre-school child.

The results of this study showed that class I incisal relationship was seen in 90.6%, and is markedly different when compared with a study on Jordanian pre-school children where 50% had a Class I occlusion [18]. This is probably due to differences in anthropological jaw profiles [19-20]. The class I incisal relationship was highest in this study when compared to the total number of children studied. This is in agreement with studies by Onyeaso *et al* [15-17]. Other studies [18,19,25] are also in agreement with this finding. This is probably due to the fact that a large number of the population has normal occlusion.

There was no significant difference ($P > 0.05$) between boys and girls in all the three-incisal classes. This is probably because the age groups are different [25]

In other studies [5,18,21,22] Class II divisions 1 and 2 showed a relatively high value, and when compared with this study, the finding was low. This could be due to the fact that class II division 1 malocclusions are more common in Caucasians [22].

The four-year-old age group exhibited a higher frequency of malocclusion in class III, and showed no significant decrease with a decrease in age ($P > 0.05$). The

prevalence of Class III malocclusion in the four-year-old age group tends to suggest that incisal attrition may be contributory factor to this observation [17] The Class III incisal malocclusion was higher in the Nigerian pre-school child, when compared with other studies [5,18,21,23]. This could be attributable to the differences in race between Caucasians and blacks [24]. The frequency of Class III was more in boys than in girls, which corresponds with that obtained from other studies [5,18]. This could be due to differences in arch sizes between males and females [24-25].

In conclusion, this study shows that the majority of the Nigerian pre-school children examined have a Class I incisal relationship. The incisor classification is simpler and more relevant than Angles classification, especially in diagnosis in the pre-school child. Angle's classification holds when the first permanent molars are in place, but in pre-school children, between the ages of 2-4 years, the first permanent molars would not have erupted. The methods of classifying malocclusion in pre-school children carried out by Foster and Hamilton [9] and Baume [10-14] took into consideration other parameters without the use of the incisors as a means of classifying malocclusion. The absence of the first permanent molar in the 2-4 year old age group makes the incisor classification of malocclusion a viable tool in clinical orthodontic assessment, making it easier for early intervention and orthodontic planning. Thus interceptive orthodontic treatment would reduce the need for orthodontic treatment later.

It is recommended that follow up longitudinal studies that would help in determining the outcome in the permanent dentition be carried out.

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