

PATTERN AND FACTORS ASSOCIATED WITH DISPLACEMENT OF PERMANENT INCISORS IN PATIENTS ATTENDING A TERTIARY HOSPITAL IN LAGOS.

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ABSTRACT

Introduction: Displacement of permanent incisors may have a negative impact on aesthetics which would affect an individual's self - esteem and social life because of the prominent anterior position of the incisors. It could also result in poor oral health and functional impairment. There is however paucity of information on its pattern of presentation among Nigerians.

Objectives: The study aimed to describe the distribution pattern and aetiological factors associated with displaced permanent incisors.

Methodology: A retrospective study of 234 participants that presented with displaced permanent incisor(s) attending both the Paediatric dentistry and Orthodontic units of Child Dental Health Department at Lagos State University Teaching Hospital between January 2018 and June 2021. The data was retrieved from the patients' records at the Records Department of the hospital. All the data were analyzed using the Statistical Package for Social Sciences Version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Numerical data were presented using tables and graphs. Any significant differences and possible associations among variables were compared using Chi-square test and logistic regression.

Results: The mean age of the subjects was 12.6 (± 7.8) years with a male to female ratio of 1:1.27. Retained teeth formed the highest aetiological factor (53.4%) with significance ($p = 0.01$), the lateral incisor was the commonest displaced tooth in 123 subjects while the upper arch was the commonest location (56.4%) of displacement. Binary logistic regression revealed age groups as the only associated factor determining tooth displacement ($p = 0.013$).

Conclusion: Aetiology and age group had significant relationship with tooth displacement. Parents and caregivers are advised to monitor any displacement and seek early intervention to prevent the need for more extensive treatments or orthodontic therapy.

Keywords: Displaced permanent incisors, malocclusion, Nigerian

INTRODUCTION

Malocclusion is a condition where there is a deflection from the normal relation or alignment of the teeth to other teeth in the same arch and/or to the teeth in the opposing arch. [1] Malocclusion could present as displacement, crowding, spacing, rotations, crossbites, or open bites. It is a major concern for children, adolescents, their caregivers and adults. [1] Although, most often, function isn't affected, malocclusion can lead to development of caries, periodontitis, occlusal disharmony and even ankylosis. [2] Due to the prominent position of the incisors in the anterior aspect of the dentition, any misalignment may be unattractive, having a negative impact on aesthetics which would affect a patient's self - esteem and social life. [1]

The displacement of permanent incisors in the dental arches have been reported to be due to several factors. [3,4] These factors include the unfavorable eruption path of the incisors due

to the lingual positioning of the permanent tooth germ; the resorption resistance of primary roots which results in their retention; the presence of an obstruction such as a supernumerary tooth, odontomes, hyperplastic gingival tissue; and others such as severe crowding, trauma. [3,4]

The degree of displacement of the permanent incisors usually vary from a minor deviation or rotation to a complete transposition of position. [3] The choice of treatment is dependent on the presentation and could range from leave alone, removal of any obstruction, use of removable or fixed appliances and in some cases, extraction of the incisor if severely displaced. [5, 6] Several published studies [7 - 9] have focused on the diagnosis and management of unerupted or impacted permanent incisors, their association with dental anomalies and other aetiological factors. However, there is a paucity of studies

on aetiological factors, presentation, and complications associated with displaced permanent incisors among children and adolescents. Not many Nigerian studies on the distribution and pattern of displaced permanent incisors are available, this necessitated this research to be carried out.

METHODOLOGY

Ethical Clearance

Approval was obtained from the Health Research and Ethics committee of the Lagos State University Teaching Hospital, Ikeja, Lagos.

Study design and population

This retrospective study involved records of a total of 234 participants that presented with displaced permanent incisor(s) attending both the Paediatric dentistry and Orthodontic units of Department of Child Dental Health at Lagos State University Teaching Hospital, Ikeja between January 2018 and June 2021.

Inclusion criteria

Dental records of patients who visited the Paediatric dental and Orthodontic units with history of displaced permanent incisor(s).

Exclusion criteria

Dental records of patients with no history of displaced permanent incisor(s) or with incomplete information with respect to age, gender and displacement of permanent incisor(s).

Sampling Technique

A convenience sampling of all patients who visited the Paediatric dental and Orthodontic units during the time frame were included in the study.

Data collection

The data was retrieved from the patients' hospital records. Information on demographics, presentation of displaced permanent incisor(s), aetiology and arch location was collected from patients' records.

Statistical analysis

All the data were entered and processed using the Statistical Package for Social Sciences Version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Numerical data were summarized and presented using tables and graphs. Any significant differences and possible associations among variables were compared using Chi-square test and logistic regression.

RESULT

This study involved 234 subjects with incisor displacement, mean age was 12.6 (± 7.8) years with a median of 11 years. The age range of the subjects ranged from 4 to 52 years, 75th percentile was 15 years, the 4 to 9 year olds formed the largest population (43%) while the lowest were subjects older than 16 years (21%) (Figure 1).

Table 1 showed that male to female ratio was 1:1.27, retained teeth formed the highest aetiological factor (53.4%) followed by crowding (33.8%), the least were oral habits and odontomes (2.1%). The lateral incisor was the commonest displaced tooth ($n = 123$, 52.6%) while the upper arch was the commonest location (56.4%). However, only 3 subjects (1.3%) had permanent incisor displacement in both jaws while lingual/palatal displacement was recorded in 191 (81.6%) subjects. Central incisor displacement was highest among the 4-9 year olds (57.7%) while the displaced lateral incisors was highest among the 10 -16 year olds (48.8%), this was significant ($p=0.001$) (Table 2). The females (53.2%) had more displaced teeth than their male counterparts but this was not significant ($p=0.41$). Retained deciduous tooth was the commonest feature associated with displaced central (60.4%) and lateral incisors (47.2%) respectively.

Table 1: Description of the subjects based on the variables

Variable	Frequency (n = 234)	Percentage (n = 100%)
Sex		
Male	103	44.0
Female	131	56.0
Aetiology		
Retained tooth	125	53.4
Trauma	9	3.8
Arch constriction	11	4.7
Crowding	79	33.8
Oral habits	5	2.1
Odontome	5	2.1
Displaced tooth		
Central	111	47.4
Lateral	123	52.6
Arch		
Upper	132	56.4
Lower	99	42.3
Both	3	1.3
Position		
Buccal/labial	43	18.4
Lingual/palatal	191	81.6
Side		
Left	56	23.9
Right	74	31.6
Both	104	44.4

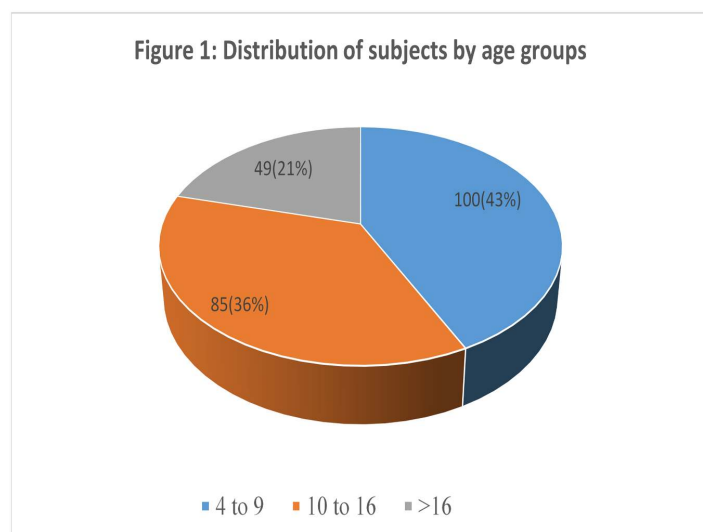
Table 2: Relationship between the variables and displaced tooth/arch of the displacement

	DISPLACED TOOTH		df	P-value
	Central 111(100%)	Lateral 123(100%)		
Age groups			2	0.001*
4-9	64(57.7%)	36(29.2%)		
10-16	25(22.5%)	60(48.8%)		
>16	22(19.8%)	27(22.0%)		
Sex			1	0.41
Male	52(46.8%)	51(41.5%)		
Female	59(53.2%)	72(58.5%)		
Aetiology			5	0.01*
Retained tooth	67(60.4%)	58(47.2%)		
Trauma	6(5.4%)	3(2.4%)		
Arch constriction	6(5.4%)	5(4.1%)		
Crowding	25(22.5%)	54(43.9%)		
Oral habits	4(3.6%)	1(0.8%)		
Odontome	3(2.7%)	2(1.6%)		

	ARCH			df	P- value
	Upper 132(100%)	Lower 99(100%)	Both 3(100%)		
Age groups				4	0.001*
4-9	38(28.8%)	60(60.6%)	2(66.7%)		
10-16	57(43.2%)	28(28.3%)	0		
>16	37(28.0%)	11(11.1%)	1(33.3%)		
Sex				2	0.93
Male	58(43.9%)	44(44.4%)	1(33.3%)		
Female	74(56.1%)	55(55.6%)	2(66.7%)		
Aetiology				10	0.20
Retained tooth	66(50.0%)	58(58.6%)	1(33.3%)		
Trauma	6(4.5%)	3(3%)	0		
Arch constriction	4(3%)	7(7.1%)	0		
Crowding	47(35.6%)	30(30.3%)	2(66.7%)		
Oral habits	5(3.8%)	0	0		
Odontome	4(3%)	1(1%)	0		

*significant – p value < 0.05

Figure 1: Distribution of subjects by age groups



This was followed by crowding in 22.5% and 43.9% respectively for central and lateral incisors. The least associated feature was odontomes in 2.7% and 1.6% for central and lateral incisors respectively. This relationship was significant ($p=0.01$).

Table 2 also showed that the permanent incisor displacement in upper arch (43.2%) was commonest in the 10-16 year olds while the lower arch (60.6%) was most common in the 4-9 year olds, this was significant ($p=0.001$). The retained tooth was the highest determinant of the location in the upper (50.0%) and the lower (58.6%) arches, this was also not significant ($p=0.20$). Both buccal/labial (48.8%) and lingual/palatal (41.4%) positions of the displaced tooth was commonest among the 4-9 year olds ($p=0.60$) (Table 3). Retained tooth was the commonest determinant of position of the displaced tooth with the buccal/labial position accounting for 60.5% and lingual/palatal position for 51.8% ($p=0.33$).

Table 3 also showed the side of the jaw involved, the left side was commonest among the 10-16 year olds (39.3%), while the right (39.2%) and both sides (49.0%) involvement was commonest among the 4-9 year olds ($p=0.48$). Retained tooth was the commonest determinant for displaced tooth location on all sides of the jaw followed by crowding ($p=0.47$). The relationship of age, sex and aetiological factor with side of the jaw was not significant.

Binary logistic regression (Table 4) revealed age groups as the only associated factor determining the tooth displacement ($p = 0.013$).

Table 3: Relationship between the variables and position of displaced tooth/side of the displacement

	POSITION		df	P-value
	Buccal/labial 43 (100%)	Lingual/palatal 191 (100%)		
Age groups			2	0.60
4-9	21(48.8%)	79(41.4%)		
10-16	15(34.9%)	70(36.7%)		
>16	7(16.3%)	42(22%)		
Sex			1	0.42
Male	20(46.5%)	83(43.5%)		
Female	23(53.5%)	108(56.6%)		
Aetiology			5	0.33
Retained tooth	26(60.5%)	99(51.8%)		
Trauma	3(7%)	6(3.1%)		
Arch constriction	0	11(5.8%)		
Crowding	12(27.9%)	67(35.1%)		
Oral habits	1(2.3%)	4(2.1%)		
Odontome	1(2.3%)	4(2.1%)		

	SIDE			df	P-value
	Left 56 (100%)	Right 74 (100%)	Both 104 (100%)		
Age groups				4	0.48
4-9	20(35.7%)	29(39.2%)	51(49.0%)		
10-16	22((39.3%)	28(37.8%)	35(33.7%)		
>16	14(25%)	17(23%)	18(17.3%)		
Sex				2	0.27
Male	20(35.7%)	37(50%)	46(44.2%)		
Female	36(64.3%)	37(50%)	58(55.8%)		
Aetiology				10	0.47
Retained tooth	37(66.1%)	34(46%)	54(51.9%)		
Trauma	2(3.6%)	4(5.4%)	3(2.9%)		
Arch constriction	1(1.8%)	3(4.1%)	7(6.7%)		
Crowding	14(25%)	29(39.2)	36(34.6%)		
Oral habits	1(1.8%)	3(4.1%)	1(1%)		
Odontome	1(1.8%)	1(1.4%)	3(2.9%)		

*significant – p value < 0.05

Table 4: Binary logistic regression to assess prediction for tooth displacement

	Coefficients	S.E.	Wald	df	Sig.	Exp(B)
Age groups	.476	.192	6.189	1	.013*	1.610
Sex	-.025	.286	.008	1	.930	.975
Aetiology (Retained tooth)			10.728	5	.057	
Aetiology (Trauma)	.539	.952	.321	1	.571	1.714
Aetiology (Arch constriction)	-.101	1.178	.007	1	.931	.903
Aetiology (Crowding)	.589	1.120	.277	1	.599	1.803
Aetiology (Oral habits)	1.305	.961	1.846	1	.174	3.689
Aetiology (Odontome)	-.930	1.465	.403	1	.526	.394
Constant	-1.458	1.039	1.969	1	.161	.233

*significant – p value < 0.05

DISCUSSION

Displacement of permanent teeth in a developing dentition is a major concern to both the patient and parents. It has been reported to influence speech, eating, social interactions and quality of life due to altered aesthetics. [10] Early diagnosis and management of malocclusion is important in the development of a permanent dentition that is in a stable, functional, and esthetically acceptable occlusion and dentofacial development. [1] The management of such discrepancies depends on the aetiology and involves counselling, detailed history, clinical and radiographic examinations and appropriate treatment planning. [6]

The eruption of the permanent first molars or the central incisors signifies the mixed dentition stage which runs between the 6 – 12th year of life. [6] The mixed dentition stage is the time of a child's growth spurt and should be aimed at prevention of adverse dental relationships and skeletal growth. Lingually erupting permanent incisors has been reported as a common problem occurring in the early mixed dentition period during the age of 5-7 years in the mandible and 7-9 years in the maxilla. [11 - 13]

This study involved 234 subjects with tooth displacement, mean age was 12.6 (± 7.8) years with a median of 11 years. The 4 to 9 year olds formed the largest population (43%) while the lowest were subjects older than 16 years (21%). The females (53.2%) had the commonest displaced teeth with a male to female ratio was 1:1.27. This could be related to the report that females generally tend to seek out aesthetic treatment more than males. [9]

Displacement of permanent incisors could occur because of unfavorable eruption paths of these teeth [3], lingual positioning of tooth germs [4], resorption resistance of primary roots due to partial ankylosis [11], retained, non-vital deciduous teeth [14], dentoalveolar trauma to the primary teeth [5], supernumerary teeth [15] and odontomes. [14] Childhood habits such as thumb sucking, tongue thrusting, pacifier use beyond age 3, and prolonged use of a bottle and mouth-breathers can also result in displaced permanent incisors. [16] The pre- maxilla has been reported to be predisposed to odontomes and supernumerary teeth which can cause displacement of permanent incisors. [7 - 9]

In this study, retained teeth formed the highest aetiological factor (53.4%) followed by crowding (33.8%), the least were oral habits and odontomes (2.1%). In a study by Ali et al [2], only 0.3% of the subjects had displaced permanent teeth due to retained primary teeth. The lateral incisor was the commonest displaced tooth in 123 subjects. Central incisor displacement was highest among the 4-9 year olds (57.7%) while the displaced lateral incisors was highest among the 10

-16 year olds (48.8%), this was significant ($p=0.001$). The central incisors being the first to erupt, frequently erupt normally, leaving insufficient space for the lateral incisors, which subsequently erupt in displaced positions either palatally, lingually or rotated within the line of the dental arch. [14] This lingual/palatally displaced lateral incisors has been reported to occur in children with both adequate spacing and arch length inadequacy between the primary incisors. [11] Retained tooth was the commonest determinant of displaced tooth for central (60.4%) while crowding 43.9% was the commonest determinant for lateral incisors. This relationship was significant ($p=0.01$). This corroborates the report that the last tooth of a series of teeth to erupt in this case, the lateral incisor is often the one most affected by crowding. [14]

The upper arch was the commonest location (56.4%) for displacement. In this study, the most associated variable in the displacement of the incisors for both arches was the retained teeth. Ali et al. [2] reported that retained primary teeth were found most frequently in the mandible rather than the maxilla which correlates with this study. This is different from a study at Tokyo dental college [17] that reported that crowding accounted for displacement in the anterior teeth most commonly in the mandibular (77.4%) arch while Ajayi [18] reported that crowding in both the upper and lower anterior segment were comparable with frequencies of 11.1% and 12% respectively.

The upper arch location (43.2%) was commonest in the 10 -16 yr olds while the lower arch (60.6%) was commonest in the 4 - 9 yr olds, this was significant ($p=0.001$). This is similar to a Lithuanian study that reported crowding was most common in the upper arch (38.4%) and significantly among the 13 - 15 year old subjects. [19] Both buccal/labial (48.8%) and lingual/palatal (41.4%) positions of the displaced tooth was commonest among the 4-9 year olds ($p=0.60$). Retained tooth was the commonest determinant of position of the displaced tooth with the buccal/labial position accounting for 60.5% and lingual/palatal position for 51.8% ($p=0.33$).

Most of the subjects had displacement in both left and right sides of the jaw, with the left side commonest among the 10-16 year olds (39.3%). Retained tooth was the commonest determinant for displaced tooth location on all sides of the jaw followed by crowding ($p=0.47$). The only associated factor determining the displacement of permanent incisors in this study was the age groups ($p = 0.013$).

Limitations

The paucity of studies on aetiological factors and presentation of displaced permanent incisors among children and adolescents was a limitation which militated against a more robust literature review and discussion.

Conclusion

The aetiology and age group had significant relationship with tooth displacement. Parents and caregivers are advised to monitor any displacement and seek early intervention in order to prevent the need for more extensive treatments or orthodontic therapy.

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