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The Functional Need for Orthognathic Treatment in a Nigerian Orthodontic Population

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Abstract

Background: The functional need for orthognathic treatment among the orthodontic population in Nigeria is unknown. This study therefore evaluated malocclusion types, orthodontic treatment need and the functional need for orthognathic treatment in a Nigerian orthodontic population.

Methods: Clinical Records of 94 patients who presented for orthodontic treatment at the Obafemi Awolowo University Teaching Hospital, Ile-Ife were evaluated. Orthodontic treatment need was determined with the Dental Aesthetic Index (DAI) and Index of Orthodontic Treatment Need (IOTN), functional need for orthognathic treatment was determined with the Index of Orthognathic Functional Treatment Need (IOFTN). SPSS version 26.0 was used for analysis.

Results: Angles class I malocclusion was predominant in the population (77.6%). Based on the Aesthetic Component (AC) of IOTN, 31.9% had great need for treatment, while 57.4% had great need for treatment with the Dental Health Component (DHC). The Dental Aesthetic Index (DAI) gave 55.3% as having very severe malocclusions with treatment considered mandatory. The IOFTN determined 31(33.0%) as having no need, 9 (9.6%) mild need, 10 (10.6%) moderate need, 34 (36.2%) great need and 10 (10.6%) very great need for orthognathic treatment. Moderate significant correlation was observed between DHC of IOTN and IOFTN (r = 0.411), DAI and IOFTN (r = 0.376) and AC of IOTN and IOFTN (r = 0.303) showed low significant correlations.

Conclusion: A significant proportion of the population studied had functional need for orthognathic treatment, with increased overjet, increased overbite with trauma and speech difficulties as the main indicators. Comprehensive assessment and multidisciplinary care are essential to address functional orthognathic needs.

Keywords: Functional treatment need, Index of Orthognathic Functional Treatment Need (IOFTN), Orthognathic treatment, Orthognathic surgery.

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ORIGINAL ARTICLE

Introduction

Orthodontic treatment is often indicated when the presence of malocclusion causes significant deviations in intramaxillary or intermaxillary relations of teeth. However, when severe skeletal deformities exist, the orthodontic treatment goals of attaining acceptable occlusion, aesthetics, and function are impossible to attain with orthodontic treatment alone, such cases are amenable orthognathic surgery.[1] Osteotomies of the midface and mandible may be required to address these dysmorphologies of the maxillomandibular complex.[2]

Deformities that require orthognathic surgery include significant skeletal discrepancies in the sagittal, vertical, or transverse planes of the maxilla, mandible, or both, leading to functional impairments such as compromised mastication, speech difficulties, temporomandibular joint dysfunction, and psychosocial issues related to impaired facial aesthetics. [3,4] Orthognathic surgery provides positive improvements in function, occlusion, aesthetics, psychological well-being and quality of life. [2,5]

Identification of deviations from predetermined norms, are routinely measured in orthodontics with a variety of standardized indices such as the Index of Orthodontic treatment Need (IOTN) and the Dental Aesthetic Index (DAI).[6] Indices are tools that are used

as a reference against which to measure.[7] They comprise of numerical values describing the relative status of a population on a graduated scale with definite upper and lower limits, which are designed to permit comparison with other populations classified by the same criteria and methods.[8]

Determining the need for orthognathic surgery is a complex process that must consider both functional and aesthetic factors, as well as the impact of the deformity on a patient's quality of life.[9] While some studies report that patients' concerns about physical appearance and psychosocial consequences are the greatest motivation for demanding orthognathic surgery,[10] others have found that the primary motivation for requesting treatment are functional needs rather than aesthetics.[11] Selection of patients from orthognathic surgery must therefore be carefully made with objective universally acceptable, and applicable means of measurement.[8,12]

To aid clinicians in assessing the necessity for orthognathic intervention, the Index of Orthognathic Functional Treatment Need (IOFTN) was developed by Ireland et al.[13] in 2014. The IOFTN provides a standardised, objective method for categorising the functional severity of dentofacial deformities. It was modelled after the widely used Index of Orthodontic Treatment Need (IOTN), with the hope of creating an index that feels familiar to many who use the IOTN. Wherever possible the same traits as used in the Dental Health Component (DHC) of IOTN, but with modifications and additions to reflect the functional indications of treatment need for orthognathic patients. The IOFTN offers a structured framework for treatment prioritization and resource allocation within healthcare systems.[13] The IOFTN has been validated and utilized in various populations, and has been found to be simple, reliable, and appropriate for the prioritization of surgical patients.[14] It was able to determine that about 93.5% patients who had been treated with orthognathic surgery[15], and 90% of patients being prepared for orthognathic surgery had great need for orthognathic treatment.[16] According to a recent systematic review and meta-analysis, the IOFTN successfully identified 93% of patients who underwent orthognathic surgery with a great need for treatment.[17]

Orthognathic surgery is becoming an essential component of modern orthodontic practice which is now routinely incorporated into the multidisciplinary care of patients with severe dentofacial deformities.[2,18] However, despite its clear advantages, and the widespread use abroad, orthognathic treatment is still rarely provided in developing countries, to correct severe skeletal malocclusions.[19,20] A framework for improving surgical-orthodontic collaborative care of patients has been developed and adopted in our study environment[21], yet there is a dearth of information on the need for orthognathic surgery among the orthodontic population. Borzabadi-Farahani[17] reported only studies from UK, New Zealand, Iran, Pakistan, Turkey, Malaysia, Japan in a meta-analysis. This gap in knowledge makes it necessary to investigate such need in a clinical setting like ours where patients often present with varying degrees of skeletal discrepancies. The aim of this study was therefore to evaluate the functional need for orthognathic surgery in a Nigerian orthodontic population with the IOFTN, by applying this index, we sought to assess the proportion of patients requiring surgical intervention and to determine the nature of the functional problems exhibited, we also determined the relationship between the IOFTN and the familiar indices of the orthodontic treatment need, the Index of Orthodontic Treatment Need (IOTN) and the Dental Aesthetic Index (DAI).

Materials and Methods

Ethical approval

Ethical approval for the study was obtained from the Health Research Ethics Committee of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife, with protocol number IPH/OAU/12/1979.

Study design, location, and population

Study was a cross sectional study conducted at the Orthodontic Unit of the Department of Child Dental Health, Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State.

The study population consisted of patients 18 years and older, who had presented at the Orthodontic unit of the hospital, who had appropriate study models and complete clinical records.

Sample size determination

The sample size was calculated using the formula for cross sectional studies in Epi Info Version 2000 (Atlanta, Georgia, USA) based on a previous study's prevalence of 5%.[22] The minimum sample size required for this study was determined as 73 participants, this was rounded up to 80 participants.

Study procedure

The complete sets of study models and clinical records of patients who were 18 years and above at the time of presentation were retrieved and included in the study. Study models were considered appropriate for use if they were properly trimmed and unbroken. Relevant patient biodata and other clinical details were extracted from the patients' case notes.

Classification of malocclusion:

Malocclusion was classified according to Angle's Classification, which is based on the anteroposterior relationship of the first permanent molars. Study models were examined in centric occlusion, and the classification was recorded as follows:

Class I: The mesiobuccal cusp of the upper 1st permanent molar occludes which the anterior buccal groove of the lower 1st permanent molar, but the line of occlusion is incorrect because of malposed teeth, rotations or other causes.

Class II: The mesiobuccal cusp of the upper 1st permanent molar occludes at least one-half cusp width anterior to the anterior buccal groove, line of occlusion not specified.

Division 1: The upper central incisors are proclined so that there is an increase in overjet.

Division 2: The upper central incisors are retroclined, lateral incisors may be proclined and the overbite is deep.

Class III: The mesiobuccal cusp of the upper first permanent molar occludes at least one-half cusp width distal to the anterior buccal groove, line of occlusion not specified.

Index of Orthodontic Treatment Need:

Orthodontic treatment need was evaluated from dental casts. Aesthetic impairment was assessed and determined with the Aesthetic Component (AC) of IOTN. A rating was allocated for overall dental attractiveness rather than specific morphological similarity to the photographs. Photographs 1-4 represent "No need for treatment"; 5-7, Borderline need for treatment" and 8-10 represent "great Need for treatment". For the Dental Health Component (DHC), each occlusal trait thought to contribute to the longevity and satisfactory functioning of the dentition was examined, dental health impairments were identified, and the most severe trait was the basis for grading an individual's orthodontic treatment need. Grades 1 and 2 represent "No need for treatment"; grade 3 "Borderline need for treatment" and grades 4 and 5 represent "Great need for treatment".

Dental Aesthetic Index:

Scores for each of the ten morphologic characteristics assessed by the DAI namely: number of missing visible teeth, crowding and spacing in the incisal segments, midline diastema, anterior irregularity in the maxillary and mandibular arches, anterior maxillary overjet and mandibular overjet, vertical anterior open bite and the antero-posterior molar relationships were determined by measurements from the dental casts. The multiplication of these scores by the weighting factor (regression coefficient), a summation of the products, and a constant produced the total DAI score. The DAI scores were graded into four groups based on the pre-defined DAI categories. Scores of 13–25 represent Grade 1 (normal or minor malocclusions with slight or no treatment need); scores of 26–30 represent Grade 2 (definite malocclusions with treatment considered elective); scores of 31–35 represent Grade 3 (severe malocclusions with treatment highly desirable); and scores of 36 and higher represent Grade 4 (very severe or disabling malocclusions with treatment considered mandatory).

The Index of Orthognathic Functional Treatment Need (IOFTN):

The IOFTN is a five-point scale similar to the DHC of

IOTN with the greatest need for treatment classified as group 5 and the little or no need for treatment classified as group 1. Within each group are descriptors of malocclusion that reflect the functional need for orthognathic treatment including overjet, openbite overbite, scissors bite, speech difficulties, facial asymmetry, sleep apnoea etc. As with the IOTN, the single most severe occlusal trait was used to score each dental cast. Details on presence of hypodontia, displacements, impaction or functional/speech difficulties, trauma to the soft tissues, overbite, lip competence or incompetence were extracted from the patients' clinical records.

Standardization of Examiner

The investigator (C.O.A) was calibrated by an expert (K.A.K) who is conversant with the development and application of occlusal indices. The investigator scored a set of dental casts not included in this study using the DAI, IOTN and IOFTN; scores were assessed with corrections made appropriately. Thereafter the investigator scored all selected study models, thirty of which were reassessed after two weeks to determine intra and inter-examiner agreement. Intra examiner agreement Cronbach's alpha ranged from 0.91-0.96 and the inter examiner agreement Cronbach's alpha ranged from 0.89-0.94.

Data analysis

The statistical analysis was carried out using SPSS Version 26.0. Descriptive statistics was done for sociodemographic variables such as age and gender. The frequency of the different components of the IOTN, DAI and IOFTN were determined and compared between gender using the Chi-Square test. Mean and standard deviation was determined for the DAI. Spearman correlation tests was conducted to determine relationship between the various indices. Statistical significance was inferred at $p \leq 0.05$.

Results

The data of 94 patients with age ranging from18 years to 48 years were analyzed. The mean age was 24.86 (SD = 6.02) years. There were 73 (77.6%) study models with Angles class I malocclusion, 12 (12.8%) with class II and 9 (9.6%) with class III. (Table 1)

The AC of IOTN scores for the study population ranged from 3 (4.3%) to 10 (2.1%). The greatest number of casts were scored as 7 (20.2%) and 8 (19.1%). The majority of the population were determined to have moderate need for treatment 44 (46.8), 30 (31.9%) fell in the great need for treatment category while (20) 21.3% had no need for treatment on aesthetic grounds. (Table 2) With the Dental Health Component (DHC) of IOTN, the most prevalent trait noticed within grades were contact point displacements. Table 3 shows the distribution of the study population according to treatment need, (20) 21.3% of the population had no treatment need, (20) 21.3% borderline need for treatment while 54 (57.4%) had great need for treatment.

The Dental Aesthetic Index (DAI) assessed the aesthetic aspects of occlusion from study models to produce a single score. The Mean DAI score was 38.35 (SD = 11.95), the mean score was 39.78 (SD =12.38) for females and 35.30 (SD = 10.53) for males. There was no significant gender difference in mean scores ($p = 0.090$). The need for orthodontic treatment according to the DAI id as presented in Table 4. Ten (10.6%) study models were graded as having normal or minor malocclusions with no/slight need for treatment, while the majority 52 (55.3%) had very severe/handicapping malocclusions, with treatment being mandatory. A significant gender difference in treatment need was observed ($p = 0.040$). A larger percentage of the female population compared with the male (62.5% vs 40%) had very severe handicapping malocclusions (Grade 4) whereas a larger percentage of the male population than the female (33.3% vs 9.4%) had definite malocclusion (Grade 2).

The functional need for orthognathic treatment of the study population was determined with the IOFTN. Distribution of models in the subcategories of the Index of Orthognathic Functional Treatment Need are as presented in Table 5. Subcategories 4.2 which represents increased overjet 6mm and 9mm, 4.8 increased overbite with evidence of dental or soft tissue trauma and 1.12 which represents speech difficulties were recorded for 14(14.9%), 11(11.7%) and 10(10.6%) dental casts respectively. Subcategory 1.14 which represented occlusal features not classified in the index was recorded for 21 (22.3%) dental casts.

The distribution of functional need for orthognathic treatment showed that, 31(33.0%) had no need, 9 (9.6%) mild need for treatment, 10 (10.6%) moderate

need for treatment, 34 (36.2%) great need for treatment and 10 (10.6%) had very great need for orthognathic treatment. Table 6 presents the gender distribution of orthognathic functional treatment need scores for this population, 40 (42.6%) dental casts [24 (37.5) female vs 16 (53.3) male] were determined to require no orthognathic treatment, 10 (10.6%) [5 (7.8) female vs 5 (16.7) male] had moderate need for treatment while 44 (46.8%) [35 (54.7) female vs 9 (30) male] had great need for orthognathic treatment. There was no significant gender difference in the need for orthognathic treatment (p = 0.068). A significant difference in functional need for orthognathic treatment based on Angle's malocclusion type was identified (p = 0.048), while the majority population with Angle's class I malocclusion had IOFTN grades 1 &2, most of those with Angles Class II and III had IOFTN grades 4 &5 (Table 7).

To determine the relationship between the occlusal indices used, the Spearman's rank correlation coefficient test was performed. Positive and significant moderate correlation was observed between the DHC of IOTN and IOFTN, 0.411 (p = 0.000). The DAI and AC of IOTN had low but significant positive correlations of 0.376 (p =0.000) and 0.303 (p = 0.003) respectively with the IOFTN.

Table 1. Malocclusion Distribution in the Study Population

Angle's Malocclusion	Female n (%)	Male n (%)	Total n (%)	p value
Class I	52 (81.2)	21 (70.0)	73 (77.6)	
Class II	9 (14.1)	3 (10.0)	12 (12.8)	0.075
Class III	3 (4.7)	6 (20.0)	9 (9.6)	
TOTAL	64 (100)	30 (100)	94 (100)	

Table 2. Distribution of Orthodontic Treatment Need of the Study Population according to the AC of the IOTN

AC of IOTN Category	Female n (%)	Male n (%)	Total n (%)	p value
1-4 (No need for treatment)	16 (25.0)	4 (13.3)	20 (21.3)	0.308
5-7 (Moderate need for treatment)	27 (42.2)	17 (56.7)	44 (46.8)	
8-10 (Great need for treatment)	21 (32.8)	9 (30.0)	30 (31.9)	
Total	64(100)	30(100)	94(100)	

Table 3. Distribution of Orthodontic Treatment Need of the Study Population according to the DHC of the IOTN

AC of IOTN Category	Female n (%)	Male n (%)	Total n (%)	p value
Grades 1&2 (No need for treatment	13 (20.3)	7 (23.3)	20 (21.3)	0.749
Grade 3 (Moderate need for treatment)	15 (23.4)	5 (16.7)	20 (21.3)	
Grades 4&5 (Great need for treatment)	36 (56.3)	18 (60.0)	54 (57.4)	
Total	64(100)	30(100)	94(100)	

Table 4: Distribution of Orthodontic Treatment Need of the Study Population according to the Dental Aesthetic Index (DAI)

DAI Category	Female n (%)	Male n (%)	Total n (%)	p value
Grade 1 Mild malocclusion (No need for orthodontic treatment)	7 (10.9)	3 (10.0)	10 (10.6)	0.040
Grade 2 Definite malocclusion (Treatment elective)	6 (9.4)	10 (33.3)	16 (17.0)	
Grade 3 Severe malocclusion (Treatment highly desirable)	11(17.2)	5 (16.7)	16 (17.0)	
Grade 4 Very severe malocclusion (Treatment mandatory)	40 (62.5)	12 (40.0)	52 (55.3)	
Total	64 (100)	30 (100)	94 (100)	

Table 5: Distribution of Study models of the Study Population in the Subcategories of the Index of Functional Orthodontic Treatment Need (IOFTN)

IOFTN Subcategory	n	(%)
5.4	2	2.1
5.3	1	1.1
5.2	7	7.4
4.8	11	11.7
4.4	5	5.3
4.3	4	4.3
4.2	14	14.9
3.4	1	1.1
3.3	9	9.6
2.8	9	9.62
1.14	21	2.3
1.12	10	10.6
Total	94	100

Table 6: Gender Distribution of Orthognathic Functional Treatment Need (IOFTN) Grades of the Study Population

IOFTN Grades	Female n (%)	Male n (%)	Total n (%)	p value
No need for treatment (Grades 1&2)	24 (37.5)	16 (53.3)	40 (42.6)	0.068
Moderate need for treatment (Grade 3)	5 (7.8)	5 (16.7)	10 (10.6)	
Great need for treatment (Grades 4 &5)	35 (54.7)	9 (30)	44 (46.8)	
Total	64 (100)	30 (100)	94 (100)	

Table 7: Distribution of Orthognathic Functional Treatment Need (IOFTN) Grades of the Study Population based on Malocclusion Type

IOFTN Grades	Angles Class I n (%)	Angles Class I n (%)	Angles Class I n (%)	Total n (%)	p value
No need for treatment (Grades 1&2)	35 (47.9)	2 (16.7)	3 (33.3)	40 (42.6)	0.048*
Moderate need for treatment (Grade 3)	9 (12.3)	0 (0.0)	1 (11.1)	10 (10.6)	
Great need for treatment (Grades 4 &5)	29 (39.7)	10 (83.3)	5 (55.6)	44 (46.8)	
Total	73 (100)	12 (100)	9 (100)	94 (100)	

*Likelihood Ratio

Discussion

This study evaluated malocclusion types and orthodontic treatment need within an orthodontic population using three indices: the Dental Aesthetic Index (DAI), the Index of Orthodontic Treatment Need (IOTN), and the Index of Orthognathic Functional Treatment Need (IOFTN). Angles Class I malocclusion was the most prevalent (77.6%) in the study population. The AC of the IOTN had 31.9% of the study population in the great need for treatment category, while the DHC of IOTN had 57.4% in the same category. Using the DAI, 55.3% had very severe malocclusions, with treatment considered mandatory. The IOFTN determined 46.8% as having great need for treatment (Grades 4 &5). Moderate correlation was between the DHC of IOTN and the IOFTN.

Our finding of the prevalence of Angles class I malocclusion in the population is consistent with previous Nigerian reports.[23-26] This observation within an orthodontic population however reflects the shortcoming of the Angles classification which is based on 1st molar relationship without an assessment of the features of malocclusion. Many reports among orthognathic surgery patients report the prevalence of Classes II and III malocclusion.[5,27-28]

The Aesthetic component (AC) of the IOTN, showed that about a third of this population had great need for treatment category. This was surprising in an orthodontic population typically motivated for treatment because of dissatisfaction with dental aesthetics.[29-31] This could be due to the limitation of the AC when applied to dental casts as previously reported.[32] The frequent occurrence of the AC of IOTN score 8 in the study population, may be related to the unesthetic appearance of the canine in this photograph. Ectopic canines have been reported as a common driving factor among orthodontic

populations.[33] With the Dental Health Component (DHC) of the IOTN, most of the population fell within great need for treatment, this aligns with the expectation in an orthodontic population. Interestingly, about a fifth had no need for treatment, probably due to the use of a single occlusal trait thought to contribute to the longevity and satisfactory functioning of the dentition to determine the DHC score.

The DAI identified significant gender difference with the distribution orthodontic treatment need. A larger percentage of the female population compared with the male population had very severe handicapping malocclusions. The reason for this observation is not clear as most previous investigations fail to identify gender-based differences in orthodontic treatment need.[34-36] However similar to our findings Närhi et al. [37] observed significant gender differences with the need for orthodontic treatment. It was interesting that the DAI determined only about 10% as having no need for treatment compared to about 20% by the AC and DHC of IOTN. This is similar to a report among individuals with special health care needs in the same environment.[35] This reflects the DAIs more comprehensive evaluation of the occlusal traits. The World Health Organisation (WHO) endorses the DAI for evaluation of malocclusion in epidemiological studies.

Nearly half (46.8%) of our study population were identified as needing functional orthognathic treatment according to the IOFTN. This is similar to the report of Zheng et al.[38], where 48% of the patients in the orthodontic treatment group were classified as category 4 or 5, and contrasts the high rates 90% - 93.5% reported in in England and Pakistan among patient treated and awaiting orthognathic surgery.[15,16] This is an eye opener as our finding suggests that the proportion of patients who would benefit from a combination of orthodontic and surgical intervention rather than only orthodontic treatment is large. This information is important for Nigerian orthodontists as it raises the awareness that cases with indications for orthognathic treatment are probably being underdiagnosed and undertreated. The implication of this is that the quality of life of orthodontic patients may remain suboptimal even after provision of orthodontic treatment.

Previous studies have proffered reasons for the grossly suboptimal orthognathic practices in Nigeria, some of the barriers identified are the lack of coordinated collaboration between the orthodontists and maxillofacial surgeons and absence of a multidisciplinary treatment protocol.[20] In the report of a framework for improving surgical-orthodontic collaborative care of patients, the importance of the surgical-orthodontic clinic for evaluation and treatment planning was highlighted[21], however the report failed to identify and emphasize the need for use of objective indices like the IOFTN during such evaluations. Routine use of objective universally acceptable, and applicable means of measurement for selection of patients for orthognathic surgery has been recommended[8,12] which our findings support.

The IOFTN Subcategories most commonly responsible for orthognathic treatment need in our population were 4.2 which represents increased overjet 6mm and 9mm; 4.8 which represents increased overbite with evidence of dental or soft tissue trauma and 1.12 which represents speech difficulties. Several other studies have found 4.2 as one of the prevalent subcategories.[5,22,27] Clinicians should therefore be mindful that these very familiar occlusal traits and speech difficulties could constitute indications for orthognathic treatment. Many in our population also fell in the subcategory 1.14 with occlusal features not classified in the IOFTN. The reliance on dental casts rather than chairside assessments could have contributed to this. This represents a limitation with the use of the IOFTN.

We observed no significant gender difference in treatment need with the use of the IOFTN. This is similar to the observation of Eslamian et al.[5] among Iranian orthognathic patients, however Olkun et al.[39] reported gender differences in a population of patients who also received orthognathic treatment. A moderate correlation was observed between the DHC of IOTN and IOFTN, with lower correlations seen with the AC of IOTN and DAI. This is expected since the development of the IOFTN was modelled after the (DHC) of IOTN and where possible the same traits had been used.

To the best of our knowledge, this is the first report of the functional need for orthognathic treatment with the IOFTN in a Nigerian population. There are several implications of our study findings. The high prevalence of severe malocclusion with functional orthognathic treatment need highlights the necessity for comprehensive orthodontic and orthognathic assessment in Nigerian orthodontic practice. This work contributes to the growing body of evidence advocating the routine use of the standardised occlusal indices including the IOFTN in clinical practice.

Despite the potential of the IOFTN to improve diagnosis of functional orthognathic problems access to such specialized services is still limited in Nigeria due to low public awareness, the high cost and lack of specialized centres.[20] Surgical treatment of dentofacial deformities requires coordinated team care to meet the needs of patients. Perhaps a more important implication of our findings is the need to advocate for multidisciplinary care of the orthodontic patient population. The multidisciplinary team approach has been found to provide superior treatment outcomes compared with individualized care with cleft lip and palate management[40], this approach is inevitable for the successful management of patients with dentofacial deformity.[41] Such coordinated care is likely to stimulate patient motivation and increase the utilisation of surgical care.

Orthodontic treatment in Nigeria is currently provided on the basis of fee for service rendered which makes it inaccessible to many. This is unlike the practice in countries like the United Kingdom where indices are used to prioritize treatment which are public funded.[13] Our study findings serve as a justification for the advocacy for public health campaigns to educate the population about the importance of early detection and treatment of malocclusions. In addition, healthcare and education sector policies that recommend Government funding of orthodontic care through provision of subsidies and insurance coverage and support of specialised training for relevant professionals are long overdue.

This study provides baseline data that can guide future research in Nigeria. It also highlights and advocates the adoption of standardized indices like the DAI, IOTN, and IOFTN for clinical and epidemiological settings to ensure consistency and comparability of data. A limitation of this study is our reliance on information retrieved from the dental records of an orthodontic population. Chairside evaluation including the use of psychological indicators which this study could not apply are recommended for IOFTN use.[42] Also, our findings reflect a single-centre population in southwest Nigeria, it however serves as a valuable baseline data that highlights the overlap between aesthetic, dental health, and functional assessments of treatment need. Larger multicenter studies among orthodontic patients and the general population will be necessary.

Conclusion

There was a high prevalence of severe malocclusions with functional treatment need in the studied population. According to the IOFTN, 42.6% had no or mild need 10.6% had moderate need and 46.8% had great or very great need for orthognathic treatment. Increased overjet, increased overbite with trauma and speech difficulties were the main indicators for orthognathic treatment. These findings underscore the importance of comprehensive assessment and multidisciplinary care to address unmet functional needs in the Nigerian orthodontic population.

Kolawole KA was responsible for the concept and design, data analysis, drafting, critical revision and final approval of the manuscript.

Abdullai CO was responsible for the acquisition of data, drafting, critical revision and final approval of the manuscript.

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APPENDIX

Index of Orthognathic Functional Treatment Need

This index applies to those malocclusions that are **not amenable** to **orthodontic treatment alone, due** to **skeletal deformnity,** and will ordinarily apply to those patients who will have completed facial growth prior to surgery (commonly 18 years of age and older). It relates only to the functional need for treatment and should be used in combination with appropriate psychological and other clinical indicators.

5. Very Great Need for Treatment

5.1 Defects of cleft lip and palate and other craniofacial anomalies
5.2 Increased overjet greater than 9 mm
5.3 Reverse overjet ≥3 mm
5.4 Open bite≥4 mm
5.5 Complete scissors bite affecting whole buccal segment(s) with signs of functional disturbance and or occlusal trauma
5.6 Sleep apnoea not amenable to other treatments such as MAD or CPAP (as determined by sleep studies)
5.7 Skeletal anomalies with occlusal disturbance as a result of trauma or pathology

4. Great Need for Treatment

4.2 Increased overjet ≥ 6 mm and ≤9 mm
4.3 Reverse overjet ≥0 mm and <3 mm with functional difficulties
4.4 Open bite <4 mm with functional difficulties
4.8 Increased overbite with evidence of dental or soft tissue trauma
4.9 Upper labial segment gingival exposure ≥ 3mm at rest
4.10 Facial asymmetry associated with occlusal disturbance

3. Moderate Need for Treatment

3.3 Reverse overjet ≥0 mm and < 3 mm with no functional difficulties
3.4 Open bite <4 mm with no functional difficulties
3.9 Upper labial segment gingival exposure < 3mm at rest, but with evidence of gingival/periodontal effects
3.10 Facial asymmetry with no occlusal disturbance

2. Mild Need for Treatment

2.8 Increased overbite but no evidence of dental or soft tissue trauma
2.9 Upper labial segment gingival exposure <3mm at rest with no evidence of gingival/periodontal effects
2.11 Marked occlusal cant with no effect on the occlusion

1. No Need for Treatment

1.12 Speech difficulties
1.13 Treatment purely for TMD
1.14 Occlusal features not classified above