sciendo

DOI: 10.2478/aoj-2004-0003

Orthodontic treatment need of Nigerian outpatients assessed with the Dental Aesthetic Index

Chukwudi O. Onyeaso

Department of Preventive Dentistry, University of Ibadan, Nigeria

Background: When limited resources are available for orthodontic treatment, it is important that those with the greatest need receive treatment.

Aims: The aims of this study were to determine the orthodontic treatment needs of Nigerian children and young adults attending a University Hospital as outpatients, and to determine if a relationship exists between social class and orthodontic treatment need.

Methods: Of 148 consecutive patients attending a hospital department for orthodontic treatment, 136 were children and young adults (67 males, 69 females) between 6 and 18 years of age. These subjects were assessed with the Dental Aesthetic Index (DAI), and classified into two social classes with the Standard Occupational Classification.

Results: Almost 30 per cent of the children and young adults presenting for treatment had "no/little" need of orthodontic treatment, 20 per cent had DAI scores between 26 and 30 indicating that treatment was "elective", 15 per cent had a "desirable" need for treatment, and 35 per cent had a "mandatory" need for treatment. There was a significant association ($p < 0.05$) between treatment need and social class: more subjects from the lower social classes (semi-skilled and unskilled occupations) needed orthodontic treatment than subjects from the higher social classes (professional, managerial, and skilled occupations).

Conclusion: The study has shown that not all outpatients presenting/referred for orthodontic treatment "need" treatment. Patients from the semi-skilled and unskilled occupations were more likely to need orthodontic treatment than patients from the professional, managerial and skilled occupations.

(Aust Orthod J 2004; 20: 19–23)

Received for publication: June 2003

Accepted: December 2003

Introduction

When a third party, such as a local authority or a national health service, is responsible for the provision of orthodontic treatment, it is necessary to find some means of determining treatment priority because the demand for treatment frequently outstrips the resources available.[1] Of the indices currently available, the Dental Aesthetic Index (DAI) has been adopted by the World Health Organization as a cross-cultural index,[1,2] and it has been validated for use on Nigerians.[3] Although the DAI has a tendency to overestimate treatment need, it has high sensitivity, indicating that it correctly predicts cases requiring orthodontic treatment.[4] Advantages of the DAI are that the cut-off point for treatment/no treatment can be varied to identify cases with greater or lesser need within the severity levels, and it can be applied reliably by auxiliaries.[5] These reasons make it a suitable index to use on Nigerians seeking orthodontic treatment.

The aims of this study were to determine the orthodontic treatment needs of Nigerian children and young adults attending a University Hospital, and to determine if a relationship exists between social class and orthodontic treatment need.

Subjects and methods

All patients who presented for orthodontic treatment in the Orthodontic Unit of University College Hospital, Ibadan, between January 2001 and September 2002, were assessed with the Dental Aesthetic Index.[2,6] Each subject was also asked for

Table 1. Distribution of the subjects according to DAI score, age and gender.

Age (Years)	Gender	DAI scores									
		≤ 25		26-30		31-35		≥ 36		Total	
		N	Per cent	N	Per cent	N	Per cent	N	Per cent	N	Per cent
6-11	M	9	20.4	11	25.0	1	2.3	34	52.3	44	32.3
	F	14	35.9	6	15.4	15	38.5	4	10.2	39	28.7
12-18	M	5	21.7	5	21.7	1	4.4	12	52.2	23	17.0
	F	12	40.0	5	16.7	4	13.3	9	30.0	30	22.0
Total		40	29.4	27	19.9	21	15.4	48	35.3	136	100.0

6 to 11 year-olds (males compared with females), $Chi^2 = 27.98$, $p = 0$ .000
12 to 18 year-olds (males compared with females), $Chi^2 = 2.26$, $p = 0$ .235

their occupation or the occupation of the parent regarded as the principal wage/salary earner. The majority of the patients were from the Southwest Region of Nigeria.

Of the 148 potential subjects, 136 were children and young adults (67 males, 69 females) between 6 and 18 years of age. Twelve subjects over 18 years of age were excluded: 10 of these subjects were between 26 and 35 years of age and two were between 36 and 55 years of age.

The DAI was carried out according to the World Health Organization (WHO) guidelines.[6] The 10 components were recorded with the teeth in centric occlusion, and with the aid of a mouth mirror and millimetre rule. The scores for each component were then multiplied by the assigned weight, and the resulting scores and the constant summed to obtain a standard DAI score for each patient. The same orthodontist carried out all assessments.

The occupations of the patient or parent regarded as the principal wage/salary earner were classified into social classes using the Standard Occupational Classification.[7] Following the recommendations of Beal,[8] Social Classes I, II and III were combined, and Social Classes IV and V were combined into a second group. Classes I (Professional), II (Intermediate) and III (Skilled) constituted the "middle class" ranging from professional and senior managerial occupations to skilled occupations such as draughtsmen, plumbers and clerks. Classes IV (Semi-skilled) and V (Unskilled) constituted the "working class" that included occupations such as gardener, storekeeper, labourer, and cleaner.

To evaluate the reliability of the method of assessing treatment need, 30 randomly-selected patients were re-examined by the same orthodontist four weeks after their initial examinations. Associations between the DAI scores on the two occasions were determined with the Spearman rank correlation coefficient. A high level of reliability was found for the DAI assessments ($r = .98$; $p < 0.001$). The Chi-squared test was used to determine if significant gender, and age and gender differences were present in the DAI scores and the DAI components respectively. Statistical significance was accepted at $p < 0.05$.

Results

Distributions of the subjects according to DAI score, age and gender are shown in Table I. Over 60 per cent of the patients were between 6 and 11 years of age, and the distribution of males to females was significantly different in this age group. Although the females outnumbered the males in the group with "no/slight" need of treatment (DAI score: ≤ 25), there were more males in the group with very severe or handicapping malocclusions with treatment considered "mandatory" (DAI score: ≥ 36). There was no significant gender difference in the 12–18 year-old group.

Almost 30 per cent of the subjects in the 12–18 year-old group had no or slight need of orthodontic treatment (DAI score: ≤25), and in 20 per cent of the subjects treatment was considered to be "elective" (DAI score: 26–30). Approximately half of those seeking treatment were judged to need orthodontic treatment (DAI scores: 31–35 and ≥ 36), and there were slightly more males than females (37 males and 32 females) in these groups (Table I).

Table II. DAI component scores for Nigerian outpatients.

	Age groups (Years)						
	6-11 years			12-18 years			
DAI components	M	F	Total	M	F	Total	*p*
Missing teeth (6)	2	1	3	4	4	8	NS
Crowding (1)	8	4	12	9	8	17	NS
Spacing (1)	15	6	21	6	11	17	*
Diastema (mm) (1)	21	9	30	6	13	19	**
Irregularity - Ant. Maxilla (mm) (1)	25	9	34	14	21	35	**
Irregularity - Ant. Mandible (mm) (1)	16	6	22	8	16	24	**
Maxillary overjet (mm) (2)	8	6	14	4	10	14	NS
Mandibular overjet (mm) (4)	7	0	7	1	0	1	**
Openbite (4)	7	5	12	0	6	6	*
Molar relationship (3)	7	7	14	3	8	11	NS

Weights in parentheses
NS, not statistically significant
* $p < 0.05$
** $p < 0.01$

Table III. Distribution of subjects according to DAI scores and social class.

	Social class					
	Middle class		Working class		Total	
DAI scores	N	Per cent	N	Per cent	N	Per cent
≤25	27	67.5	13	32.5	40	29.4
26-30	17	63.0	10	37.0	27	19.9
31-35	11	52.4	10	47.6	21	15.4
≥ 36	19	39.6	29	60.4	48	35.3
Total	74	54.4	62	45.6	136	100.0

Comparison of DAI scores between social groups, $Chi^2 = 7.85$; $p = 0.049$

When the number of subjects in the DAI component categories was analysed, significant gender and age differences were found in the following categories: spacing in the incisal segments, diastema, maxillary and mandibular anterior irregularities, mandibular overjet and openbite (Table II).

The distributions of the subjects according to the DAI score, age and social class are given in Table III. There were more "middle class" subjects overall, and in the groups with DAI scores ≥ 30. Subjects considered to belong to the "working class" outnumbered the middle class subjects in the group with the greatest need of treatment (DAI score: ≥ 36).

Discussion

Due to the increasing demand for orthodontic care globally, there is a need to develop methods to assess, and grade, malocclusion in order to prioritize treatment, particularly for publicly-funded programmes. The adoption of the DAI by the World Health Organization as a cross-cultural index,[2] coupled with its relative simplicity and high examiner reliability, makes it an index with great potential internationally. While the DAI has been widely used to determine orthodontic treatment need in epidemiological studies,[9,10–12] it has the potential to establish orthodontic treatment need in smaller hospital-based groups.

Bearing in mind the limitations of this clinical study, such as self-selection of patients, it was not surprising that the pattern of malocclusion traits in the present study differed from those reported in an epidemiological study of Nigerian secondary school children.[12] In this latter study over 77 per cent of the children had DAI scores of 25 or less with slight/no treatment

need, whereas in the present study approximately 27 per cent of the outpatients were in this group. The previous study[12] also reported that 13.4 per cent, 5.5 per cent and 3.7 per cent of the subjects had DAI scores of 26–30, 31–35 and ≥ 36 respectively.

In the present clinical study the greatest percentage of patients (35 per cent) was in the very severe or handicapping malocclusion group (DAI score: ≥ 36) with treatment considered mandatory. Although the DAI scale has decision points separating different levels of orthodontic treatment need, the scores can be rank ordered on a continuous scale from 13. This continuous scale enables cases, with a greater or a lesser need for treatment, to be separated within the severity levels. Thus, decision points for eligibility to receive treatment in a publicly-funded programme can be modified to meet the available resources. Furthermore, the index can be used by trained dental auxiliaries.[2,5,13]

In the present study six variables (spacing, diastema, anterior maxillary irregularities, anterior mandibular irregularities, mandibular overjet and openbite) demonstrated significant gender and age differences. Of interest were the relatively high numbers of 6–11 year-old boys, but fewer older boys, with these features. Generally, the number of girls with these components increased with age.

The Registrar General's classification was deemed adequate for this study, because the social structure in Nigeria, a former British colony, is similar to that in Britain. The present study revealed a significant relationship between DAI scores and social status of the patients: there were more middle class outpatients with low DAI scores than those in the working class. A number of factors could account for this difference. Middle class parents, with better dental awareness, more informed attitudes toward dentistry, better attendance for dental check-ups, and greater financial power, may have sought earlier treatment for their children. Working class parents may have delayed seeking orthodontic treatment because of the perceived cost of treatment and/or a lack of dental or orthodontic awareness. In support of these propositions are the findings that the dental attendance pattern of the mother[14] is a good predictor of a child's dental attendance, and higher income groups have a greater uptake of fixed orthodontic treatment than lower income groups.[15]

In a 3-year prospective study in South Australia, a DAI score indicating need for treatment was found to be a good predictor of future fixed orthodontic treatment,[9,15] confirming an earlier proposal/finding by Jenny *et al.*[13] Because the DAI addresses the psychosocial dimensions of occlusal characteristics it appears to be a good instrument to assess the social and the clinical aspects of a malocclusion.[8,16]

Conclusion

This study has shown that when the DAI was used to assess orthodontic treatment need in Nigerian children and young adults requesting treatment, about 35 per cent would have qualified for publicly-subsidized orthodontic treatment. The majority of the outpatients with a mandatory need of orthodontic treatment came from the lower socioeconomic group in the community.

Corresponding author

Dr Chukwudi Onyeaso
Orthodontic Unit
Department of Preventive Dentistry
University College Hospital
Ibadan
Nigeria
Email: coonyeaso@yahoo.com

References

1. Beglin FM, Firestone AR, Vig KWL, Beck FM, Kuthy RA *et al.* A comparison of the reliability and validity of 3 occlusal indexes of orthodontic treatment need. Am J Orthod Dentofac Orthop 2001; 120: 240–6.
2. Cons NC, Jenny J, Kohout FJ. DAI: The Dental Aesthetic Index. Iowa City: College of Dentistry, University of Iowa, 1986.
3. Otuyemi OD, Ogunyinka A, Dosumu O, Cons NC, Jenny J *et al.* Perception of dental aesthetics in the United States and Nigeria. Community Dent Oral Epidemiol 1998; 26: 418–20.
4. Keay PA, Freer TJ, Basford KE. Orthodontic treatment need and the Dental Aesthetic Index. Aust Orthod J 1993; 13: 4–7.
5. Jenny J, Cons NC. Comparing and contrasting two orthodontic indices, the index of orthodontic treatment need and the Dental Aesthetic Index. Am J Orthod Dentofac Orthop 1996; 110: 410–16.
6. World Health Organization. Oral Health Surveys: Basic Method. 4th edn. Geneva: WHO 1997: 47–52.
7. OPCS (office of population censuses and surveys). Standard occupational classification. HMSO. London. 1990.
8. Beal JF. Social factors and preventive dentistry. In: Murray JJ ed. The prevention of oral disease. 3rd edn. New York, Oxford University Press, 1996; 217–33.

9. Spencer AJ, Allister JH, Brennan DS. Utility of the Dental Aesthetic Index as an orthodontic screening tool in Australia, Adelaide: University of Adelaide, 1992.
10. Esa R, Razak IA, Allister JH. Epidemiology of malocclusion and orthodontic treatment need of 12–13 year-old Malaysian school children. Community Dent Health 2001; 18: 31–6.
11. Johnston M, Harkness M. Prevalence of malocclusion and orthodontic treatment need in 10 year-old New Zealand Children. Aust Orthod J 2000; 16: 1–8.
12. Otuyemi OD, Ogunyinka A, Dosumu O, Cons NC, Jenny J. Malocclusion and orthodontic treatment need of secondary school students in Nigeria according to the Dental Aesthetic Index (DAI). Int Dent J 1999; 49: 203–10.
13. Jenny J, Cons NC. Establishing malocclusion severity levels on the Dental Aesthetic Index (DAI) scale. Aust Dent J 1996; 41: 43–6.
14. Greatrix D, Taylor JO, Lennon MA. Mother's dental attendance and dental health. Br Dent J 1990; 168: 441–3.
15. Spencer AJ, Allister JH, Brennan DS. Predictors of fixed orthodontic treatment in 15 year-old adolescents in South Australia. Community Dent Oral Epidemiol 1995; 23: 350–5.
16. Jenny J, Cons NC, Kohout FJ, Jakobsen J. Predicting handicapping malocclusion using the Dental Aesthetic Index. Int Dent J 1993; 43: 128–31.