Orthodontic treatment complexity and need at the University College Hospital, Ibadan, Nigeria, according to the Index of Complexity, Outcome and Need (ICON): A pilot study

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Although occlusal indices have been useful in research, audit, Abstract practice management, and quality assurance in clinical orthodontics, complexity of orthodontic cases had not been easy to assess for a long time in clinical practice. This pilot study aimed at assessing the orthodontic treatment need and complexity in a referral orthodontic centre in Nigeria. A retrospective analysis of 56 pre-treatment study models randomly selected from the orthodontic model collection of the University College Hospital, Ibadan, Nigeria was carried out without any bias for age or gender. The index of Complexity, Outcome and Need (ICON) was used as the outcome measure. Descriptive statistics were employed in the data analysis. Forty-seven (83.9%) of the sample needed treatment. Thirty-four (60.7%) cases were classified as difficult or very difficult. Only 1 (1.8%) and 13(23.2%) belonged to the easy and mild categories, respectively. The overall mean ICON score was 67.4 ± 19.6 SD (range 25-104). Considerable proportions of these referred orthodontic cases in Nigeria needed treatment and had treatment complexity comparable to the Caucasians.

Key words Complexity, ICON, Need, Nigeria, Orthodontics

Introduction

Occlusal indices are useful for research, audit, practice management, and quality assurance in orthodontics¹). According to Koochek *et al.*²), with the ever-increasing importance of clinical effectiveness and audit, the only way of ensuring the proper undertaking of evidence-based research on a large scale is to standardize methods of measurement.

Orthodontic treatment need has been assessed in different populations using different indices such as Index of Orthodontic treatment Need by Brook and Shaw³⁾ and the Dental Aesthetic Index by Cons *et al.*⁴⁾ Bergstrom and Halling⁵⁾ defined complexity (difficulty) of orthodontic treatment as the degree of effort associated with correcting a malocclusion

Received on January 12, 2006 Accepted on March 12, 2006 and obtaining normal or ideal occlusion. Complexity of orthodontic cases was not easy to assess with international uniformity for a long time before the recent development of the Index of Complexity, Outcome and Need¹).

Following the need for an international unified index for assessment of different facets of orthodontic treatment and an earlier call made by Richmond *et al.*⁶⁾ for a standardized assessment of orthodontic treatment difficulty (complexity), the Index of Complexity, Outcome and Need (ICON) was developed by an international panel of 97 orthodontists from 9 countries intended for use in the context of specialist practice¹⁾. It is believed that this international index would provide the means to compare treatment thresholds in different countries and serve as a basis for quality assurance standards in clinical orthodontics.

Although there are some interesting reports

Age range (years)	Male n (%)	Female n (%)	Total n (%)
6–10	9 (45)	11 (55)	20 (40)
11–15	3 (16.7)	15 (83.3)	18 (36)
16-20	2 (25)	6 (75)	8 (16)
21–25	1 (50)	1 (50)	2 (4)
26-30	_	1 (100)	1 (2)
31–above	_	1 (100)	1 (2)
Total	15 (30)	35 (70)	50 (100)

 Table 1 Age and gender distribution of the study sample

Note: Six (6) study casts had poor recordings of the age and gender of the patients.

on the ICON from Europe and recently North America^{2,7–11}, there is still paucity of information from the developing parts of the globe like Nigeria. Knowledge of the treatment complexity and need of orthodontic cases seen at a tertiary care centre attended by patients from various parts of the nation could be helpful in national health planning as well as for international comparison of data.

Therefore, the aim of this study was to assess the orthodontic treatment complexity and need of cases (pre-treatment) in a referral orthodontic specialist clinic of a Nigerian teaching hospital the University College Hospital (UCH), Ibadan.

Materials and Methods

A retrospective sample of 56 pre-treatment study models was randomly selected from the model store of a specialist orthodontic clinic in a Nigerian Teaching Hospital (University College Hospital, Ibadan, Nigeria). Although no special consideration was given to age or gender of the subjects in this retrospective selection of cases, the ages of the selected sample ranged from 6–32 years with mean of 12.90 ± 5.55 (SD).

No patient identifier was allowed in the study models during the examinations.

Measures of complexity and need

The use of ICON in the objective assessment of treatment complexity, outcome and need has been shown in previous publications^{1,2,7–9)}. In this study, the ICON was used to score the 56 pre-treatment dental casts for assessment of treatment complexity and need by one calibrated examiner.

Table 2 Distribution of pre-treatment ICON scores of the sample

ICON Score	Interpretation	n	%
Less than 43	No need for orthodontic treatment	9	16.1
Greater than 43	Treatment needed	47	83.9
Total		56	100



Fig. 1 Graphic presentation of pre-treatment ICON scores for the 56 orthodontic cases

Intra-examiner reliability

Excellent intra-examiner reliability of the single investigator (COO) on the use of ICON has been shown previously¹¹, using the Root Mean Square (RMS) in line with earlier reports^{7,8}.

Statistical analysis

Descriptive statistics were employed in the data analysis for central tendency and spread as well as graphic presentation of the sample ICON scores.

Results

Table 1 shows the age and gender distribution of the study sample with the majority of the patients in the 11-15 and 6-10 age groups and the overall female to male ratio of the sample being 2.3:1.

The treatment need of the sample is shown in Table 2 while Figure 1 illustrates the graphic distribution of all the ICON scores of the subjects. Only 9 (16.1%) subjects had ICON scores of less than 43, which indicate no need for orthodontic treatment while 83.9% needed treatment according to the Index of Complexity, Outcome and Need

Complexity grade	Score range	Mean ICON Score \pm SD	n	%
Easy	<29	25.00	1	1.8
Mild	29–50	41.08 ± 6.56	13	23.2
Moderate	51-63	57.38 ± 3.20	8	14.3
Difficult	64–77	71.33 ± 2.96	12	21.4
Very difficult	>77	86.32 ± 6.33	22	39.3
Total		67.38 ± 19.63	56	100

Table 3 Distribution of pre-treatment complexity grade of the sample

(ICON).

Table 3 shows the distribution of pre-treatment complexity grade of the sample. Only 1 (1.8%) belonged to the easy category while mild and moderate cases constituted 21 (37.5%). The remaining 34 (60.7%) belonged to the difficult and very difficult categories.

Discussion

Orthodontic treatment complexity and need of patients seen in orthodontic clinics or referral centres could vary form one country to another depending on some factors which could influence the demand for orthodontic care such as the societal norms for acceptable occlusions, awareness and attitudes of the population to orthodontic care. At the time of this report, there was no previous report on the orthodontic treatment complexity and need of patients in Africa, according to the Index of Complexity, Outcome and Need (ICON).

The present Nigerian study showed that the mean ICON score was 67.38 ± 19.63 (SD), which is lower than 72.5, 69 and 72.9 ± 13.0 (SD) reported for Sweden, Greece and the UK, respectively^{7–9}. While this Nigerian study has recorded ICON score range of 25–104, the Swedish and Greece reports were 24–106 and 34–110, respectively. The mean age (age range) at the start of treatment for these Nigerian patients were 12.90 (6–32) years while those of Sweden⁷¹ were 14 (8–40) years and 12.6 (7–25) years in Greece⁸.

Richmond *et al.*^{7,8)} reported that out of 100 cases they studied, 94% were considered by the ICON scoring as needing treatment at the start of the intervention in Greece and 97.9% in Sweden, and both are higher than the percentage (83.9%) in the present Nigerian study. Also in Greece, Georgiakaki *et al.*¹²⁾ in their study of Angle's class II division I patients found that 42.2% of them needed no treatment, according to the ICON. Contributory to this lower Nigerian figure could be the higher prevalence of crowding believed to be present among the Caucasians than the Nigerians¹³. However, both the present study and the two from other parts of Europe have shown that, according to the ICON scoring system, very significant proportions of the orthodontic patients objectively needed the treatment. This is an important aspect of audit for orthodontic services.

Concerning the complexity of orthodontic treatment, Richmond *et al.*^{7,8)} reported 68.7% belonging to difficult and very difficult categories in Sweden⁷⁾ and 61% in Greece⁸⁾ while this Nigerian study has given 60.7% in these categories. These figures can be described as comparable. The present study gave 1.8% as belonging to the easy category while the Swedish⁷⁾ study reported 2% and Greece⁸⁾, nil (0%).

Liepa *et al.*¹⁰⁾ reported the orthodontic treatment complexity between the urban and rural settings in Latvia using ICON in an epidemiological study. Understandably, they reported higher figures for easy (34.3%) and mild (41.7%) categories and lower figures for difficult/very difficult categories (10%) compared to the aforementioned referred or demand populations.

Dental awareness in Nigeria is growing but not as much as the medical services. This applies also to the orthodontic care in the country, which can be said not to be as popular as in other developed parts of the globe. Payment for orthodontic treatment in Nigeria is still by 'fee-for-service' approach which makes it relatively unaffordable by an average Nigerian family. Generally, the poor economic climate in Nigeria which has persisted for some years now has not impacted positively on the availability of health services in the country. In addition, there are still very few orthodontists practicing in the country, which further makes access to orthodontic care relatively difficult. However, with the expected necessary modifications and the full take-off of the newly launched National Health Insurance Scheme (NHIS) by the Federal Government of Nigeria, it is hoped that there will be increased access to orthodontic treatment for Nigerians in need of such care.

This pilot study has given a fair idea of the treatment complexity and need of patients seeking orthodontic services at the University College Hospital, Ibadan, Nigeria. It is hoped that the report on degree of improvement and outcome of treated cases will follow in the near future, using the ICON.

Conclusions

- (1) The present Nigerian study has about 84% of the patients needing orthodontic treatment, according to the ICON. Although lower than the proportions reported in Europe, the Nigerian figure could be described as broadly comparable to them.
- (2) The orthodontic treatment complexity among the studied Nigerian orthodontic patients was found to have about 61% in the difficult and very difficult categories with 1.8%, 23.2% and 14.3% belonging to the easy, mild and moderate categories, respectively. Again, these figures are similar to the earlier European and North American reports.

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