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## RESEARCH ARTICLE

## “IOTN INDEX BASED MALOCCLUSION ASSESSMENT OF 12 YEAR OLD SCHOOL GOING CHILDREN IN MYSORE CITY”.

Dr. Bhagyalakshmi Avinash, Dr. Shivalinga BM, Dr. Nitin V muralidhar, Dr. Avinash BS, Dr. Suma Shekar, Dr. Pradeep S.

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#### \*Corresponding Author

Dr. Bhagyalakshmi  
Avinash

### Abstract

Four schools from Mysore city was selected randomly and all 12 year old children were included. A total of 363 school children (159 boys & 204 girls) were examined using Dental Health Component (DHC) of Index of Orthodontic treatment need (IOTN) to assess the normative need. The same orthodontist administered the questionnaire to assess the patient's perceptive needs using the Aesthetic Component (AC) of the IOTN and the Oral Aesthetic Subjective Impact Scale (OASIS). The DHC & the AC of the IOTN and the OASIS showed respectively that 61.4%, 2.5% and 0.6% of the children had definite need for treatment. The perception of need for orthodontic treatment differed inversely from the normative need and this is seen to be significant ( $P < 0.05$ ) when OASIS was used. Approximately 3 out of 5 children in the selected schools of Mysore city have a great need for Orthodontic treatment for dental health reasons.

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## INTRODUCTION

Various occlusal indices have been developed which assess the severity of malocclusion and aid in determination of the normative need for orthodontic treatment. However, several studies have shown that self-perceived dental appearance is an important determinant in the decision to seek orthodontic treatment. Referrals are usually based on Professional opinions but it is the patient's perception of orthodontic treatment need with respect to both aesthetics and function that is the main factor which encourages them to seek treatment. For these reasons, perceived treatment need must also be determined and considered simultaneously with normative treatment need for manpower planning.

The Index of Orthodontic Treatment Need (IOTN) is useful for defining the severity or degree of occlusal traits and has been used as an epidemiological tool to assess treatment need among school children. It incorporates both a Dental Health Component (DHC) as first described by Brook and Shaw and an Aesthetic Component (AC) described by Evans and Shaw. The validity and reliability of the IOTN have been established in several studies

The Oral Aesthetic Subjective Impact Scale (OASIS) is a relatively new independent self-evaluation tool which has been used to measure perceptive treatment need. It is a consumer-based measure based on a child's perceived socio-psychological impact of their malocclusion. This scale measures the childhood impact of external influences by asking questions about their perceptions of others and themselves, as well as about their previous behavior related to the appearance of their teeth. The validity of OASIS is supported by its correlation with the normative IOTN AC, which may be considered as the gold standard.

Studies have been published that determined the Orthodontic Treatment needs of children in many parts of India. However, there is no study done till date for Mysore city. Also, the methodology employed to assess the treatment need is no by IOTN index.

In this study, both the normative and perceived orthodontic treatment needs of 12 year old school going children was assessed and analyzed using IOTN and the OASIS. The aim of the study was to determine the normative and perceived needs of the 12 year old school going children of the selected schools of Mysore city.

## MATERIALS & METHODS

Ethical clearance was obtained from the Institutional Ethical Review Board, JSS University. Subjects were selected from randomly chosen 4 schools from the Mysore city. All children who were 12 years of age and who were present on the day of the examination formed the study sample. Students who had received/undergoing orthodontic treatment, medically comprised children, handicapped children, and subjects not willing to participate in the study were excluded. An approval from the school authorities and informed consent were obtained prior to the study.

A total of 363 subjects were examined (159 boys & 204 girls) a well- lit room was provided in each school for the interview and clinical examination. All eligible subjects were asked to complete the OASIS questionnaire. The subjects were then presented with 10 colored photographs of anterior teeth displaying varying degrees of malocclusion, and were asked to evaluate which photograph on this aesthetic scale most closely resembled their own dentition to let them determine their IOTN AC score in the range of 1 to 10 with 1 for the best occlusion and 10 for the worst malocclusion using aesthetic criteria. They were initially shown a face mirror which was then removed so that they refreshed their memory but were not allowed continued self examination while viewing the photographs. Finally, the subjects were carefully examined using gloves and mouth mirror to determine their IOTN DHC score using the morphologic criteria as given in IOTN DHC component.. To assess for the reliability of the IOTN rating, 30 children were re-examined by the examiner.

For each of the three assessment tools, IOTN DHC, IOTN AC, and OASIS, patients were categorized into three groups as having: (i) little/no need; (ii) borderline need; or (iii) definite need (Table 1). Frequencies and percentages were determined for each of these groups, gender and the worst features of malocclusion used to determine the IOTN DHC.

The Chi-square test of independence was used to test for any dependency on gender for normative and perceptive treatment needs (IOTN DHC, IOTN AC and OASIS) in the sample. The significance of the treatment needs for the whole sample was assessed using the Chi square test of equality. Association between normative need and perception assessment measures in the whole sample was also tested using the Chi-square test of independence.

Intra-examiner reliability was tested using normative orthodontic treatment need data obtained from the repeated examinations to calculate the Pearson correlation coefficient. SPSS, the Statistical Package for the Social Sciences (version 16.0, SPSS, Inc., Chicago, Illinois, USA) was used to analyze the data. A five per cent significance level was set for all tests.

## RESULTS

The intra-examiner reliability for the DHC of the IOTN (number/grade; and letter *i.e.* worst feature of malocclusion) was almost perfect with mean correlation coefficients of 0.96 and 0.96.

Table 2 shows the frequency distribution of the worst features of malocclusion that were identified in the sample and thus used to determine the DHC of the IOTN. The vast majority of the worst features were contact point displacements (80.4%) which were a result of crowding and increased overjet (12.4%). Numerical comparison of frequencies of the orthodontic treatment needs is helpful (Table 4) and visual assessment with graphs (Figs. 1–3) is even more so. Figure 1 show that using the DHC of the IOTN, 61.4% of the sample had a definite need for orthodontic treatment, 20.4% had a moderate need while only 18.2% were assessed as having little/no need. The AC of the IOTN used by the children indicated that 2.5% perceived their level of orthodontic treatment need to be definite, 25.3% moderate and 72.2% thought their orthodontic treatment need was little/none (Fig. 2). Results with OASIS show that their need was perceived to be definite by 0.6%, moderate by 33.3% and little/none by 66.1% (Fig. 3). Chi-square tests of independence showed that the need for orthodontic treatment using the IOTN DHC and AC, and OASIS, does not depend significantly on gender, as  $\chi^2$  was 5.068, 1.784 and 2.498, respectively (compared to the test value of 5.991 with  $df = 2$ ). Chi-square tests of equality confirmed that the results for the IOTN DHC and AC, and OASIS are significant as  $\chi^2$  was 129.240, 274.926 and 234.066, respectively (compared to the test value of 5.991 with  $df = 2$ ). Results of Chi-square tests of independence calculated for cross-tabulation comparisons of normative and perceptive needs data for the whole sample are displayed in Table 4. These tests show that the inverse association between the DHC of the IOTN and OASIS is significant; for the DHC and AC of the IOTN, this is not significant. However, the association between the two perceptive needs, the AC of the IOTN and OASIS, is also statistically significant.

## DISCUSSION:

The chronological age of 12 years is commonly associated with the early permanent dentition stage. This makes it the earliest age at which the IOTN can be used as intended. At this early age, the percentage of the target population that has started Orthodontic fixed appliance treatment is at its lowest and the likelihood of loss of permanent tooth material affecting the IOTN disproportionately is greatly reduced: consequently, these two potential sources of error in epidemiological studies are reduced.

Contact point displacement was the most commonly found worst feature of malocclusion in the sample. This is observed in most populations but the incidence of this finding ( 80.4%) is much higher than what is reported for children in Davangere, Karnataka, India( 43.9%), Senegal ( 49.4%), Kuwait ( 39.5%). Similarly, our finding that 61.45 of 12 year old children in Mysore city have a definite Orthodontic treatment need according to the DHC of the IOTN is much higher than those reported for children in the following countries: Malaysia, 47.9%, Senegal, 42.6%, Turkey, 38.8%, Ireland, 30.4%, Kuwait, 28%. Since there are only two dental colleges at Mysore district, majority of children requiring Orthodontic treatment are not able to avail the treatment need. Also, the socioeconomic factors like availability and perceived affordability of fixed appliance treatment and deprivation have been found to influence the perceived need for Orthodontic treatment in Mysore city.

A relatively high prevalence of premature loss of deciduous molars ( without space maintenance of the extraction space) & relatively short mandibles in children are etiological factors for crowding that are probably largely responsible for large percentage of contact point displacements and, consequently, definite need for Orthodontic treatment.

Using (OASIS and) the AC of the IOTN, only (0.65 and) 2.5% of the children in this study perceived their Orthodontic treatment need to be definite and thus is similar to findings for children in Senegal, 3.2%.

There were no gender differences in perceived and normative needs. This is in agreement with finding for Senegal and Kuwait.

The perception of need for Orthodontic treatment differed inversely from the normative need and this is seen to be significant ( $p < 0.05$ ) when OASIS was used. Although the AC of the IOTN can be used to indicate the likely level of demand for Orthodontic treatment, OASIS appears to be more appropriate tool to use to determine the patient's perceived need and is therefore a better indicator of the level of demand for Orthodontic treatment.

## CONCLUSION

This study has shown that 61.4% of 12 year old children from selected 4 schools from Mysore city regardless of gender were in definite need of orthodontic treatment for dental health reasons. The children's perceptive orthodontic treatment need is best assessed using the OASIS but the children disagree with the professional in opinion on their orthodontic treatment need to the extent that the two sets of data have an inverse relationship. As perceptive orthodontic treatment needs are influenced by a multitude of varying socio-economic factors most of which cannot be clearly ascertained, the DHC of the IOTN should be considered as the most important factor in determining manpower requirements.

Table 1: Levels of treatment need

	Little/no need	Moderate need	Definite need
IOTN DHC	1 to 2	3	4 to 5
IOTN AC	1 to 3	4 to 6	7 to 10
OASIS	5 to 10	11 to 15	16 to 25

Table 2: distribution of worst features of malocclusion.

DHC letter	Frequency	Percent
a	45	12.4
b	1	0.3
c	1	0.3
d	292	80.4

e	0	0
f	0	0
g	0	0
h	6	1.7
i	1	0.3
l	0	0
m	4	1.1
p	0	0
s	0	0
x	1	0.3
No letter	12	3.3
<b>TOTAL</b>	<b>363</b>	<b>100.0</b>

TABLE 3: Distribution of Orthodontic treatment needs: frequency (%)

	Little/No need	Moderate need	Definite need
DHC	66(18.2)	74(20.4)	223(61.4)
AC	262(72.2)	92(25.3)	9(2.5)
OASIS	240(66.1)	121(33.3)	2(0.6)

TABLE 4: Statistical comparisons of normative and perceptive treatment needs.

	X <sup>2</sup>	df	Level of significance
DHC Vs AC cross tabulation.	8.884	5	Not significant
DHC Vs OASIS cross tabulation.	18.482	4	significant
AC Vs OASIS cross tabulation.	36.193	4	significant

Fig 1: Severity of treatment need found with the Index of Orthodontic Treatment Need Dental Health Component (IOTN DHC).

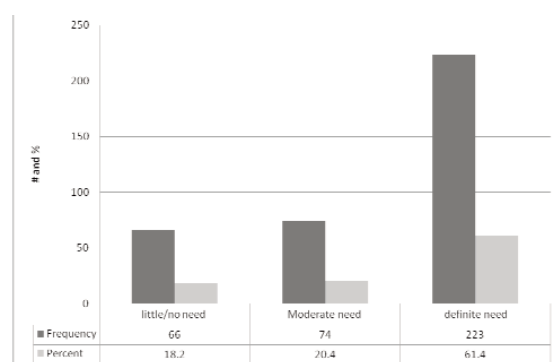


Fig 2: Severity of treatment need found with the Index of Orthodontic Treatment Need Aesthetic Health Component (IOTN AC).

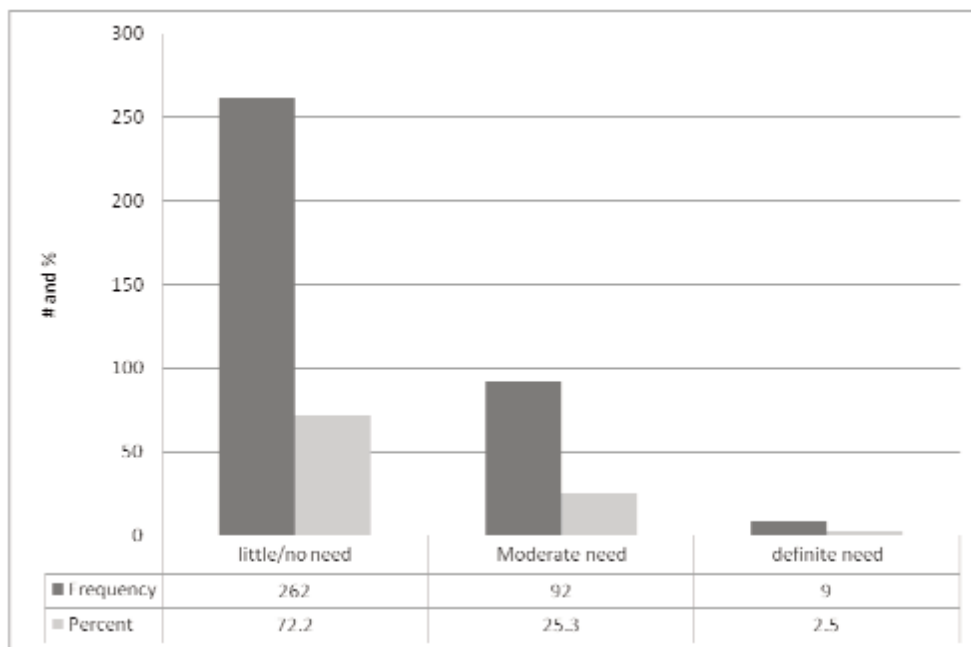
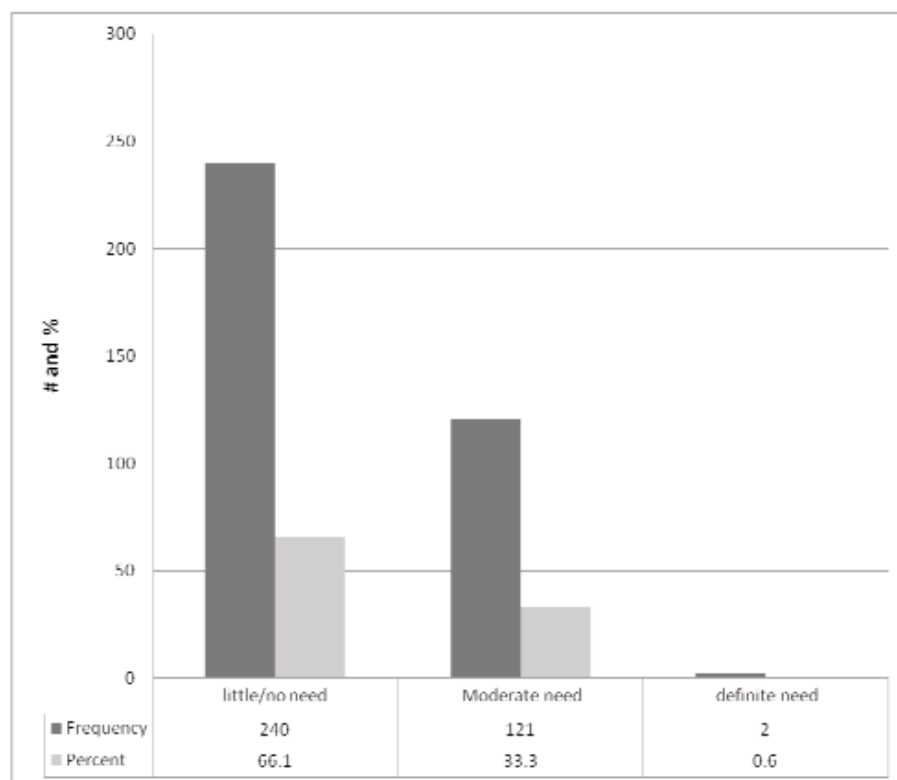


Fig 3: Severity of treatment need found with the Oral Aesthetic Subjective Impact Scale (OASIS).



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