

ORTHODONTIC TREATMENT NEED IN 13 – 30 YEARS PATIENTS BY USING THE INDEX OF ORTHODONTIC TREATMENT NEED

¹SEEM ZAHID, BDS, FCPS II (Trainee)

²ULFAT BASHIR, BDS, MCPS, FCPS (Orthodontics)

³NOEEN ARSHAD, BDS, M.Sc, M.S (Orthodontics)

⁴OMER HAFEEZ KALEEM, BDS, FCPS II (Trainee)

⁴RABBAB HASAN, BDS, FCPS II (Trainee)

⁴AYESHA IFTIKHAR, BDS, FCPS II (Trainee)

⁴AHSAN MEHMOOD SHAH, BDS, FCPS II (Trainee)

ABSTRACT

To evaluate the orthodontic treatment need a study was conducted at orthodontic department of Islamic International Dental Hospital (IIDH). Index of Orthodontic Treatment Need (IOTN) was applied in a sample of 300 patients. Data was analyzed using SPSS version 10.0. Out of 300 subjects 114 were males and 186 females with mean age of 18 ± 4.8 years were reported. Dental Health Component showed 19% (Grade 5), 57% (Grade 4), 18% (Grade 3), 5% (Grade 2) and 2% (Grade 1) results respectively and Aesthetic Component showed percentages as 31.66% (Scale 1-4), 32% (Scale 5-7) and 36.3% (Scale 8-10). Strong association was found between aesthetic component and dental health component ($p = .000$). According to Dental Health Component 75% of the population was found to be in definite treatment need and only 36.3% of the population was in definite treatment need according to Aesthetic Component. No significant gender difference was found for treatment need.

Key words: *Index of Orthodontic Treatment Need, Dental Health Component, Aesthetic Component.*

INTRODUCTION

With time, number of children, adolescents and adults seeking orthodontic treatment has been increasing and their prime concern is aesthetics.¹⁻⁴ For government funded programs, all patients seeking orthodontic treatment cannot be included because of limited resources and time. For that reason, before starting the treatment, it is necessary to assess the need for orthodontic treatment.

Many indices have been developed that categorize malocclusion and evaluate the need for orthodontic treatment (Draker, 1960; Grainger, 1967; Saltzmann, 1968; Summers, 1971; Linder-Aronson, 1974).⁵ These occlusal indices evaluate the malocclusion according to its severity.

Among the available range of indices *Index of orthodontic treatment need* [IOTN] is a simple, repeatable, and reliable index.⁶ IOTN does not require sophisticated tools, and at the same time is more practical as compared to the other indices to assess orthodontic treatment need. IOTN was described by Brook and Shaw in 1989.⁷ Its Aesthetic Component AC was developed originally by Evan and Shaw⁸ and it consists of a scale of ten color photographs showing different levels of dental attractiveness. Because of simplicity and ease of use, it became popular and is recognized as a method of objectively assessing treatment need.

Malocclusion is certainly a public health concern in populations but the data available on orthodontic awareness and treatment needs is insufficient. Therefore evaluation of treatment need in a population is impor-

¹ Resident FCPS II Trainee, Islamic International Dental Hospital, Islamabad-Pakistan

² Professor and Head of Orthodontic Department, Islamic International Dental Hospital, Islamabad-Pakistan

³ Diplomate American Board of Pediatric dentistry, Associate Professor

⁴ Residents FCPS II Trainee

tant from health perspective and for planning orthodontic services. Studies are available that estimate the proportion of the population that requires orthodontic treatment in Pakistan.⁹⁻¹¹ However studies on different samples across the country are required to evolve an overall picture of orthodontic treatment need. This study was designed to estimate the orthodontic treatment needs in patients attending orthodontic department of Islamic International Dental Hospital (IIDH) Islamabad. It may provide a baseline data for planning orthodontic services and future researches.

METHODOLOGY

It was a cross-sectional study and patients who reported to the orthodontic department of Islamic International Dental Hospital, Islamabad. (IIDH) were selected by purposive sample selection. Approval of the study was taken from ethical committee at IIDH. Duration of the study was ten months from September 2007 to July 2008. Sample included 300 patients between the ages of 13 to 30 years. Informed written consent was taken from the patients. The inclusion criteria for the sample included complete permanent dentition with the possible exception of third molars. The exclusion criteria included refused consents, previous history of orthodontic and/or orthopedic treatment, history of serial extractions and anomalies not listed in table 1.

DATA COLLECTION PROCEDURE

The DHC and AC of IOTN were scored as
DENTAL HEALTH COMPONENT

Treatment need was clinically assessed on dental chair under dental light according to the Dental Health Component of IOTN. The intra-oral examination was done with the help of a mouth mirror for missing teeth, cleft lip and palate, impeded eruption and molar relationship. The same operator with the help of millimeter ruler (N^o 0504, SWO, China) measured overjet, reverse overjet, overbite, openbite, crossbite and displacement. Findings were recorded on data collection Proforma. Each patient was graded for DHC according to the worst occlusal trait as listed in table 1.

AESTHETIC COMPONENT

Patient was seated in natural head position on the dental chair. The patient lips were retracted with self-

retaining lip retractor (Soft Spender, Ortho Care, U.K). Operator then positioned itself in front of patient at its foot end and evaluated the intra-oral front view under the dental light. Patient was then scored from its intra-oral front view for AC of IOTN for different levels of attractiveness according to the ten-point scale as shown in figure 1 and recorded on data collection Proforma.

Three categories of treatment need were scored as¹²

- DHC grades 1-2 and AC grades 1-4 represented no or slight need for treatment
- DHC grade 3 and AC grades 5-7 represented moderate or borderline need for treatment
- DHC grades 4-5 and AC grades 8-10 represented definite need for orthodontic treatment

For the intra and inter-examiner reliability 40 subjects were re-examined and rescored for Dental Health Component and Aesthetic Component.

DATA ANALYSIS PROCEDURE

Data was analyzed by using SPSS version 10.0. The variables are grades of Dental Health Component and Aesthetic component. The frequency (percentage %) for each of the three categories of Dental Health Component and Aesthetic Component of Index of Orthodontic Treatment Need was calculated. With the help of Chi-Square test association was found between the grades of Dental Health Component and Aesthetic Component. Mean and Standard Deviation for the age of the patients for DHC and AC grades was calculated. Frequency of DHC and AC grades according to the gender was calculated. The kappa statistics were used to determine the intra and inter-examiner reliability.

RESULTS

The study group consisted of 300 subjects with age range of 13 to 30 years. The mean age calculated for the over all sample was 18 ± 4.8 years. The frequency of patients according to the age is given in figure 2. Mean and standard deviation of patient's age for DHC and AC are given in Table 2.

The frequency for each grade of dental health component and aesthetic component is assessed in four age groups 13 to 16 years, 17 to 20 years, 21 to 25 years and 26 to 30 years The distribution of Dental Health

Component of IOTN in the sample is given in graph (figure 3). Percentages of DHC for the categories of no treatment need (grade 1-2), moderate treatment need (grade 3) and definite treatment need (grade 4-5) according to age groups are given in table 3.

The distribution of Aesthetic Component grades in the sample is given in graph (figure 4). The percentages for the categories of no treatment need (grade 1-4), moderate treatment need (grade 5-7) and definite treatment need (grade 8 -10) according to age groups

TABLE 1: INDEX OF ORTHODONTIC TREATMENT NEED: DENTAL HEALTH COMPONENT (DHC)

Grade 1 (none)	
1	Extremely minor malocclusions including displacements less than 1 mm.
Grade 2 (little)	
a	Increased overjet greater than 3.5 mm but less than or equal to 6 mm with competent lips.
b	Reverse overjet greater than 0 mm but less than or equal to 1 mm.
c	Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and intercuspal position.
d	Displacement of teeth greater than 1 mm but less than or equal to 2 mm.
e	Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm.
f	Increased overbite greater than or equal to 3.5 mm without gingival contact.
g	Prenormal or postnormal occlusions with no other anomalies. Includes up to half a unit discrepancy.
Grade 3 (moderate)	
a	Increased overjet greater than 3.5 mm but less than or equal to 6 mm with incompetent lips.
b	Reverse overjet greater than 1 mm but less than or equal to 3.5 mm.
c	Anterior or posterior crossbites with greater than 1 mm but less than or equal to 2 mm discrepancy between retruded contact position and intercuspal position.
d	Displacement of teeth greater than 2 mm but less than or equal to 4 mm.
e	Lateral or anterior open bite greater than 2 mm but less than or equal to 4 mm.
f	Increased and complete overbite without gingival or palatal trauma.
Grade 4 (great)	
a	Increased overjet greater than 6 mm but less than or equal to 9 mm.
b	Reverse overjet greater than 3.5 mm with no masticatory or speech difficulties.
c	Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position.
d	Severe displacements of teeth greater than 4 mm.
e	Extreme lateral or anterior open bites greater than 4 mm.
f	Increased and complete overbite with gingival or palatal trauma.
h	Less extensive hypodontia requiring prerestorative orthodontics or orthodontic space closure to obviate the need for a prosthesis.
I	Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.
m	Reverse overjet greater than 1 mm but less than 3.5 mm with recorded masticatory and speech difficulties.
t	Partially erupted teeth, tipped and impacted against adjacent teeth.
x	Supplemental teeth.
Grade 5 (very great)	
a	Increased overjet greater than 9 mm.
h	Extensive hypodontia with restorative implications (more than I tooth missing in any quadrant) requiring prerestorative orthodontics.
i	Impeded eruption of teeth (with the exception of third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth, and any pathologic cause.
m	Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties.
p	Defects of cleft lip and palate.
s	Submerged deciduous teeth

TABLE 2: MEAN AND STANDARD DEVIATION OF PATIENT AGE FOR DHC AND AC

Orthodontic Treatment Need		Age of patients		
		Mean	N	Std. Deviation
Dental Health Component	No/little treatment need (grade 1-2)	19.500	20	5.3558
	Moderate treatment need (grade 3)	18.774	53	4.5431
	Great treatment need (grade 4-5)	17.696	227	4.8326
	Total	18.007	300	4.8365
Aesthetic Component	No/little treatment need (grade 1-4)	18.758	95	4.9866
	Moderate treatment need (grade 5-7)	18.552	96	4.4648
	Definite treatment need (grade 8-10)	16.872	109	4.8498
	Total	18.007	300	4.8365

TABLE 3: PERCENTAGES (%) OF DHC CATEGORIES ACCORDING TO THE AGE GROUPS

Age Groups	Dental Health Component		
	No/Little treatment need	Moderate treatment need	Definite treatment need
13 – 16	2.3%	6.67%	39%
17 – 20	1.3%	5%	15.3%
21 - 25	2%	4.3%	14.3%
26 - 30	1%	5	7%

p = .428

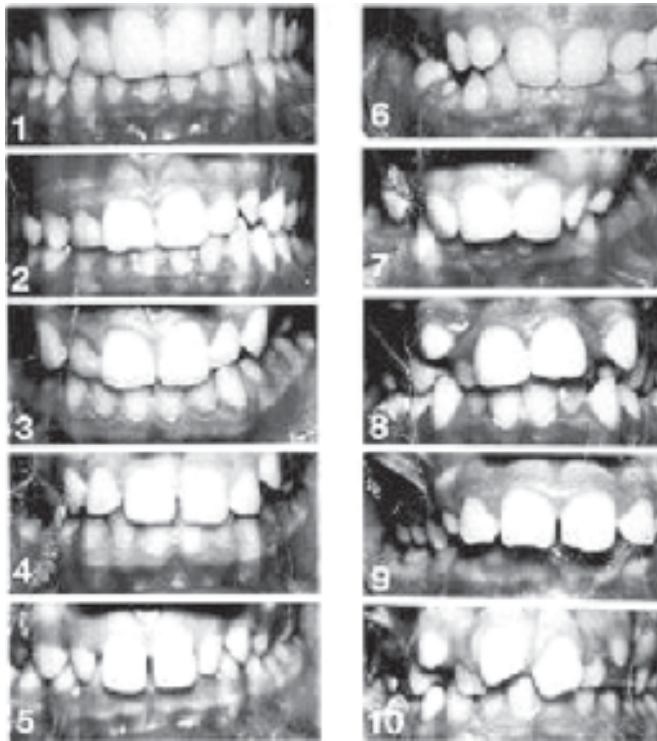


Fig 1: Index Of Orthodontic Treatment Need, Aesthetic Component (AC).

The Scan Scale Was First Published By The European Orthodontic Society. (Evans MR, Shaw WC. Eur J Orthod 1987; 9:314-8)⁶

are given in table 4. Frequency of patients according to age groups is given in table 5.

Chi-Square test revealed highly significant p value (p= .000) that shows strong association between aesthetic component and dental health component as given in table 6.

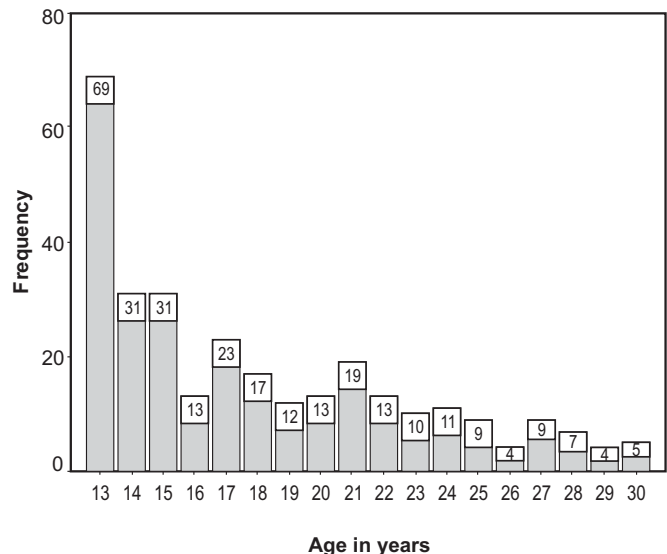


Fig 2: Chronological age frequencies in a sample

TABLE 4: PERCENTAGES (%) OF AC CATEGORIES ACCORDING TO THE AGE GROUPS

Age Groups	Aesthetic Component		
	No/little treatment need	Moderate treatment need	Definite treatment need
13 - 16	13.3%	12.3%	22.3%
17 - 20	6.3%	9.3%	6%
21 - 25	9%	7%	4.65
26 - 30	3%	3.3%	3.3%

p = .010

TABLE 5: FREQUENCY OF PATIENTS ACCORDING TO AGE CATEGORIES

Age groups	Frequency	Percent	Valid Percent	Cumulative Percent
13 - 16	144	48.0	48.0	48.0
17 - 20	65	21.7	21.7	69.7
21 - 25	62	20.7	20.7	90.3
26 - 30	29	9.7	9.7	100.0
Total	300	100.0	100.0	

TABLE 6: AESTHETIC COMPONENT AND DENTAL HEALTH COMPONENT CROSSTABULATION

Aesthetic Component	Dental Health Component				Total
	No/little treatment need (grade 1-2)	Moderate treatment need (grade 3)	Great treatment need (grade 4)	Very great treatment need (grade 5)	
No/little treatment need (grade 1-2)	8	16	4		28
No/little treatment need (grade 3)	4	9	12	2	27
No/little treatment need (grade 4)	5	11	21	3	40
Moderate treatment need (grade 5)	2	9	24	1	36
Moderate treatment need (grade 6)	1	6	23	1	31
Moderate treatment need (grade 7)		1	21	7	29
Great need for treatment (grade 8)		1	47	15	63
Great need for treatment (grade 9)			7	24	31
Great need for treatment (grade 10)			11	4	15
Total	20	53	170	57	300

p= .000

TABLE 7: GENDER DISTRIBUTION IN DENTAL HEALTH COMPONENT DHC AND AC

	Orthodontic Treatment Need	Gender of the patient		Total
		Male	Female	
Dental Health Component	No/little treatment need (grade 1-2)	7	13	20
	Slight or moderate treatment need (grade 3)	13	40	53
	Definite treatment need (grade 4-5)	94	133	227
	Total	114	186	300
Aesthetic Component	No/little treatment need (grade 1-4)	30	65	95
	Slight or moderate treatment need (grade 5-7)	30	66	96
	Definite treatment need (grade 8-10)	54	55	109
	Total	114	106	300

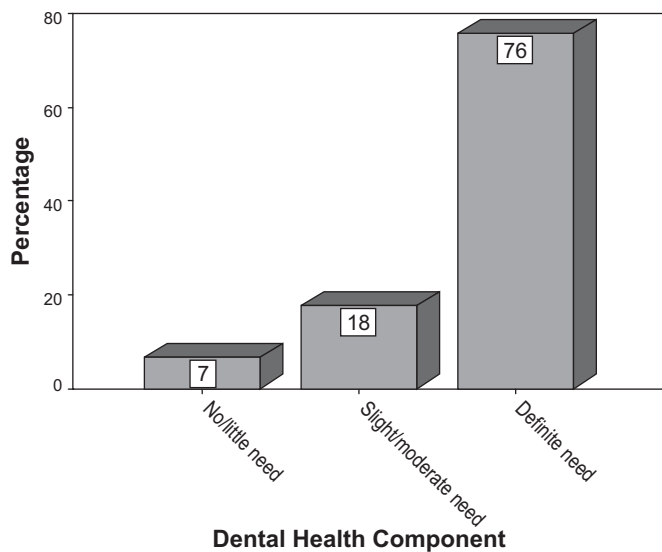


Fig 3: Percentage of Dental Health Component in sample

Total of 186 (62%) females and 114 (38%) males were reported. Table 7 shows gender distribution according to DHC and AC of IOTN.

The kappa values for intra-examiner reliability were found 1.00 (DHC) and 0.95 (AC) whereas for inter-examiner were recorded as 0.99 (DHC) and 0.87 (AC).

DISCUSSION

With the increasing oral health awareness, demand for orthodontic treatment has also been increasing in Pakistan. The International use of IOTN allows the comparison of orthodontic treatment need in Pakistan with the treatment need in other population.

In this study the estimated frequency in definite treatment need category (grades 4 and grade 5) of DHC for 300 sample size is 75% whereas 6.7% and 17.7% frequencies recorded for no/little treatment need and moderate treatment need category. Similar results are found in Turkish population by Güray et al (1994), in which out of 572 subjects 72•26% were in great treatment need. Our results also coincide with the studies conducted in UK by Brook and Shaw (1989) and Richmond et al (1994). In former study 222 cases were included with result of 19.7% for moderate treatment need and 74.4% for great treatment need category while the later study showed 19.0% in moderate treatment need and 78.0% in great treatment need for 1025 cases. Firestone et al (1999) yield the similar

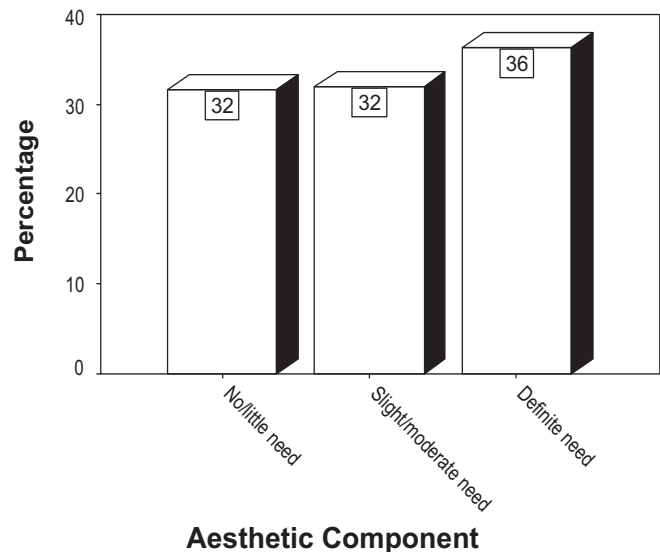


Fig 4: Percentage of Aesthetic Component in sample.

results 14.3% for moderate treatment need and 81.6% for great treatment need. A study conducted in Turkish population by Ucuncu and Ertugay (2001) closely match with our results with 12.0% for moderate treatment need and 83.2% for great treatment need. The frequencies for great treatment need in mentioned studies coincide with the results of this study but they were conducted on the referred population.¹³ Our sample consisted of both referred and non-referred patients.

In relevance to the studies conducted in Pakistan, results of this study closely matched to the Bashir U and Waheed M study on IOTN conducted in Lahore.⁹ Sample size selected in this study was also 300 and 60% of population was found to be in definite treatment need that match to the results of this study with 75% patients reported in great treatment need. The study of Fida M carried out in Karachi yield dissimilar results with 40% of 125 subjects were in objective need of orthodontic treatment as recorded on casts.¹⁰ Differences in results are due to difference in sample selection and method of study. Significant characteristic as oral hygiene, periodontium health, lip incompetence, impaired speech and masticatory problems or temporomandibular joint disorders can be judged precisely from the direct examination of patient than from the cast.

Regarding Aesthetic component of IOTN, Brook and Shaw (1989), Richmond et al., (1994) and Ucuncu

and Ertugay (2001) closely match with our results.¹³ The percentages for definite treatment need according to AC were 31.4%, 47.0% and 36.8% respectively evaluated for referred population. In relation to the Pakistani studies, results of this study closely matched with Bashir U and Waheed M study conducted in Lahore.⁹ The estimated frequencies for the AC in mentioned study are 34.6% for no/little treatment need, 32.7% for moderate treatment need and 32.7% for definite treatment need.

In the present study highly significant association is found between the DHC and AC ($p = .000$) as given in table 6. The kappa values also showed excellent reproducibility for intra-examiner and inter-examiner reliability.

From the included age range of 13 to 30 years, maximum number of patients reported for 13 to 16 years group (48%) and minimum number is seen for 25 to 30 years age group (9.7%) as given in table 5. Whereas equal percentage of patients is recorded for the age groups 17 to 20 (21.7%) and 21 to 30 (20.7%). For the over all sample in this study, the mean age for definite treatment need in DHC is 17.7 ± 5 years and for AC is 17 ± 4 years as given in table 2.

In this study 38% (114) of males and 62% (86) of females are reported. The number of female patients seeking orthodontic treatment is greater than males. Bashir U and Waheed M study showed similar results with 67.6% females as compared to 32.4% males, as recorded for 300 sample size.⁹ In our study gender distribution for DHC showed slight difference in definite treatment need category i.e. 31.3% males and 44.3% females but no difference for definite need is found according to the AC (18% males and females). Results of this study showed insignificant difference among genders for orthodontic treatment need.

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