**Original Research**

# Orthodontic Treatment Need and Demand in 12 To 14 Year Old School Children

## Suman Yadav[1], Sujit Panda[1], Kanu Priya[1], Pratik Verma[2], Neha Srivastava[3], Simran Kour[4]

*[1] Departments of Orthodontics and Dentofacial Orthopedics, Dental College and Research Centre, Kanpur*
*[2] Departments of Orthodontics and Dentofacial Orthopedics, Dental institute , RIMS, Ranchi*
*[3]Prosthodontics and Crown and Bridge and Implantology, Rama Dental College and Research Centre, Kanpur*
*[4]Departments of Orthodontics and Dentofacial Orthopedics, Private practitioner*

A R T I C L E I N F O



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A B S T R A C T

Introduction: Malocclusion is a developmental problem, which proceed in social, psychological and functional problems for patients.

Aim: The Purpose of this study was to assess the need for orthodontic treatment using the Index of Orthodontic Treatment Need (IOTN) between the 12–14-year-old students of Kanpur schools and to evaluate the difference in orthodontic treatment need and demand in terms of genders in Dental Health Component (DHC) and Aesthetic Component (AC).

Materials and Methods: A cross-sectional descriptive study was accomplish on 305 subjects (120 male and185 female) students aged 12–14 years, were clinically examined. DHC was evaluated by a calibrated examiner. AC was determined using 10standard photographs shown to students. Data were analyzed using chi-squared test to determine differences in treatment needs between subgroups of the subjects.

Results: There was a definite need for orthodontic treatment amongst the females (42.7%) than the males (35%).The results of the present study unveil  that 72.3% subjects demanded orthodontic treatment from the study sample (51.8% using the DHC-IOTN component and 92.3% using the AC-IOTN) component which means that demand exceeds need.

Conclusion: According to DHC of the IOTN, approximately one-third of the population had a definite need for orthodontic treatment, and crowing was the most prevalent malocclusion. Although IOTN is a valid screening tool, patient's perception of orthodontic treatment does not always correlate with professional assessment.

## INTRODUCTION

Planning orthodontic treatment within a public health system requires information on the orthodontic treatment needs of the child population[1]. The goal of orthodontic treatment is to attain optimal occlusion within the framework of function, stability and esthetics. Area of oral-facial region is  of serious concern  because it draws the most attention from other people in interpersonal interactions and is the primary source of vocal, physical, and emotional communication. Results shows that , the patients who cast about orthodontic treatment are concerned with improving their appearance and social acceptance, often more than they are with improving their oral function or health[2].  When an orthodontist plans orthodontic treatment for an individual with malocclusion, one has to evaluate the degree of severity of malocclusion to accurately plan the orthodontic treatment. Hence, many orthodontic indices were developed so as to categorize the malocclusion into various groups according to severity of malocclusion[3]. Many indices have been developed with the intention of categorizing malocclusions into various groups, according to the urgency and need for treatment.

The most popular indices have been Summers Occlusal Index[4], the Treatment Priority Index (TPI),[5] the Handicapping Malocclusion Assessment Record, the Need for Orthodontic Index[6] and the Index of Orthodontic Treatment Need (IOTN).[7]

* Corresponding author*: Dr. Suman Yadav, Department of Orthodontics and Dentofacial Orthopedic, Rama Dental College and Research Centre, A-1/8, Lakhanpur, Kanpur. Pin-208024  (INDIA) Email: sumanyadav8887@gmail.com Phone – 7905506605

Among all these indices, the Index of Orthodontic Treatment Need Index has been a reliable epidemiological tool, which benefits local health services in planning their budget, and improve focus of services by inducing greater uniformity and standardization in the assessment of Orthodontic treatment need.[8] Orthodontic treatment need using the IOTN varies in children and adolescents in different populations. Whilst many indices exist to record malocclusion, it is important to distinguish those that classify malocclusions into types[9] and those that record prevalence in epidemiological studies[10], from those indices that attempt to record treatment need or priority.

## Material and methods

**Source of data**:

Data was collected from schools of Kanpur.

This study was carried out on 305 subjects (120 male and185 female) students aged 12–14 years, were clinically examined.

**Method of collection of data:**

MATERIAL REQUIRED –

1. Disposable Gloves and mouth mask.

2. Natural light Room

3. Pmt Set

4. Divider and metallic scale for taking measurements.

5. IOTN index for determining DHC and AC.

IOTN has to record:

(a) Functional and dental health indications for treatment.

    (b) Aesthetic impairment.

## Methodology:

This descriptive/analytical study was carried out on 305 male and female students aged 12–14, who were chosen randomly from Secondary schools of Kanpur. Prior permission was taken from Director, Higher Education, District Education Officer and Heads of the concerned schools. After getting ethical clearance from the education ethical committee of Rama Dental College .A simple random sample of a total of 305 students was taken, which consisted of 120 males and 185 females from randomly selected five senior secondary schools in Kanpur city. The students were examined in a naturally lit room using disposable gloves and mirror. Clinical examinations were carried out without radiography and diagnostic dental casts.

Clinical examination was carried out to assess DHC of IOTN index by a calibrated examiner in the following manner:

**Dental health component**

*Grade 5*

Very great

Defects of deft lip and/or palate.

Increased overjet greater than 9 mm.

Reverse overjet more than 3.5 mm with reported masticatory or speech difficulties.

Obstruct eruption of teeth not third molars due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any other pathological cause.

restorative implications along with Extensive hypodontia (more than one tooth missing in any quadrant) requiring pre-restorative orthodontics.

*Grade 4*

Great

Increased overjet more than 6 mm but less than or equal to 9 mm.

Reverse overjet more than 3.5 mm with no reported masticatory or speech difficulties.

Reverse overjet more than 1 mm but less than or equal to 3.5 mm with reported masticatory or speech difficulties.

Anterior or posterior crossbites with more than 2 mm displacement between retruded contact position and intercuspal position.

Posterior lingual crossbites with no occlusal contact in one or both the buccal segments.

Servere displacement of teeth more than 4 mm.

Large lateral or anterior open bite more than 4 mm.

Increased and complete overbite causing notable indentations on the palate or labial gingivae.

Patient referred by colleague for collaborative care e.g. periodontal, restorative or TMJ considerations.

Less extensive hypodontia requiring orthodontic space closure to obviate the need for a prosthesis (not more than 1 tooth missing in any quadrant).

### Grade 3
Moderate

Increased overjet more than 3.5 mm but less than or equal to 6 mm with incompetent lips at rest.

Reverse overjet more than 1 mm but less than or equal to 3.5 mm.

Increased and complete overbite with gingival contact but without indentations or signs of trauma.

Anterior or posterior crossbite with less than or equal to 2 mm but more than 1 mm displacement between guided position ( retruded contacts position) and intercuspal position.

Moderate lateral or anterior open bite more than 2 mm but less than or equal to 4 mm.

Moderate displacement of teeth more than 2 mm but less than or equal to 4 mm.

### Grade 2
Little

Increased overjet more than 3.5 mm but less than or equal to 6 mm with lips competent at rest.

Reverse overjet more than 0 mm but less than or equal to 1 mm.

Increased overbite greater than 3.5 mm with no gingival contact.

crossbite with less than or equal to1 mm (Anterior or posterior )with less than or equal to1 mm displacement between retruded contact position and intercuspal position.

Minor lateral or anterior open bites more than 1 mm but less than or equal to 2 mm.

Pre-normal or post-normal occlusions with no other anomalies.

Displacement of teeth more than 1 mm but less than or equal to 2 mm.

### Grade 1
None

Other variations in occlusion including displacement less than or equal to 1 mm.

Grade 1and 2 were designated as no/ little need, grade 3 as moderate/ borderline need and grade 4and 5 as extreme/definite need.

The Aesthetic Component (AC) was recorded after the students were shown the 10 case photographs and they chose the photographs in collaboration with the examiner. According to the scan scale of the photograph

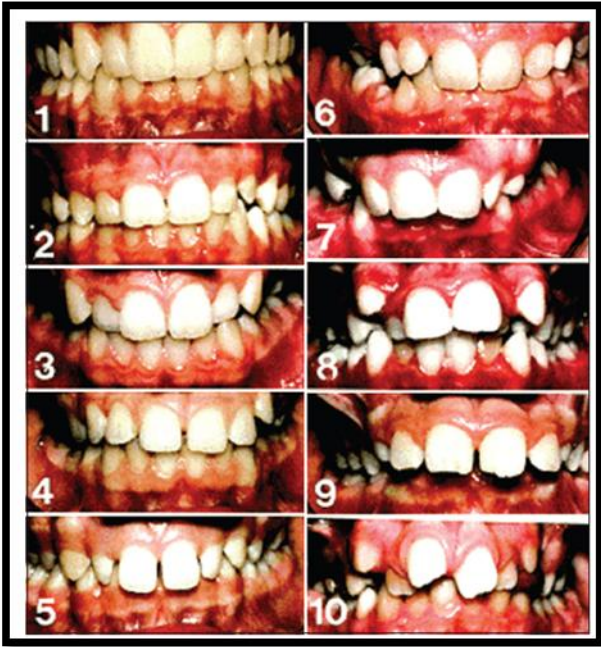,photograh (1 to 4) no need , (5 to 7) borderline , (8 to 10) definite need.



**Fig 1: Scan scale of 10 case photographs**

To evaluate the demand for orthodontic treatment, each student was asked verbally 'if it is necessary, would you like to have your teeth straightened'.

**Statistical Analysis:**

Data was analysed using IBM SPSS Statistics- version 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) Descriptive statistics included calculation of means, standard deviation, median and percentages. Data distribution was assessed for Normality using Shapiro-Wilk test to check whether a sample came from a normally distributed population or not.

To evaluate either there is a significant difference between the expected frequencies and the observed frequencies in one or more categories ,chi-square test is used. Hence, the test was used to determine the difference between the treatment needs amongst the groups. Chi- square value was calculated using the following formula:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Wilcoxon Ranksum test was used to compare continuous type of non-parametric data among unrelated groups. It was calculated using the following formula

$$z = \frac{R - \mu_R}{\sigma_R}$$

where

$$\mu_R = \frac{n_1(n_1 + n_2 + 1)}{2}$$

$$\sigma_R = \sqrt{\frac{n_1 n_2(n_1 + n_2 + 1)}{12}}$$

$R$ = sum of ranks for smaller sample size ($n_1$)
$n_1$ = smaller of sample sizes
$n_2$ = larger of sample sizes
$n_1 \geq 10$    and    $n_2 \geq 10$

All values were considered statistically significant for a value of $p<0.05$.
The present study was carried out on 305 patients with 120 males and 185 females to evaluate the need of orthodontic treatment.

**Result**

The mean age and standard deviation (13.56 years ±0.615) of the study participants. The minimum age of the participants was 12 years and the maximum age of the participants was 14 years .The present study comprised of 120 (39.3%) males and 185 (60.7%) . From the subjects' point of view in males and females, picture 6 was the highest (18.3% & 15.1% respectively) rated photograph which indicated borderline or moderate orthodontic treatment. However, there were no statistically significant differences found between the males and females (Chi square value- 6.30, p = 0.178) In males there was only 12.6% definite need for the orthodontic treatment whereas in females it was 13%. However, 46.5% females had no need for the orthodontic treatment when compared with the males (45.8%) shows :1
The need for the orthodontic treatment for both the genders depending upon the dental health component.

37.5 % males and 33.0 % females had a need of moderate orthodontic treatment (Grade 3). There were statistically significant differences found between males and females (Chi square value- 6.43, p <0.001.There was a definite need for orthodontic treatment amongst the females (42.7%) than the males (35%). (table :2)

The mean difference was more in the aesthetic component (4.79) than the dental health component (3.19). However, there were statistically significant differences found between both the components (p <0.001) according to Wilcoxon sign rank test.( table :3)

The association of Dental Health component and aesthetic components with demand for orthodontic treatment. In the Dental Health Component, the need for orthodontic treatment is 51.8% whereas in the aesthetic component there is 92.3% need for orthodontic treatment.(table: 4)

**Table:1 shows the need for orthodontic treatment for both the genders based on aesthetic component**

| S.No | Gender | No need | Boderline need | Definite need | Mean ± S.D | Chi-Square⊥ (p value) |
|---|---|---|---|---|---|---|
| 1. | Male | 45.8% | 41.6% | 12.6% | 4.78 ± 2.34 | 6.30 (0.178) |
| 2. | Female | 46.5% | 40.5% | 13% | 4.80 ± 2.38 | |

**Table:2 shows the need for orthodontic treatment for both the genders based on Dental Health component**

| S.No | Gender | No need | Boderline need | Definite need | Mean ± S.D | Chi-Square⊥ (p value) |
|---|---|---|---|---|---|---|
| 1. | Male | 27.5% | 37.5% | 35% | 3.15 ± 1.042 | 6.43 (<0.001*) |
| 2. | Female | 24.3% | 33.0% | 42.7% | 3.22 ± 1.116 | |

*Statistically significant p <0.05, ⊥ Chi square test

**Table: 3 shows the mean ± S.Ds and mean ranks of Dental Health component and aesthetic components**

| S.no | Components | N | Mean ± S.D | Mean rank | p⊥ |
|---|---|---|---|---|---|
| 1. | Aesthetic | 305 | 4.79 ± 2.365 | 138.55 | 0.001* |
| 2. | Dental Health | 305 | 3.19 ± 1.087 | 71.45 | 0.001* |

*Statistically significant p <0.05, ⊥ Wilcoxon sign rank test

**Table:4 shows the association of Dental Health component and aesthetic components with demand for orthodontic treatment**

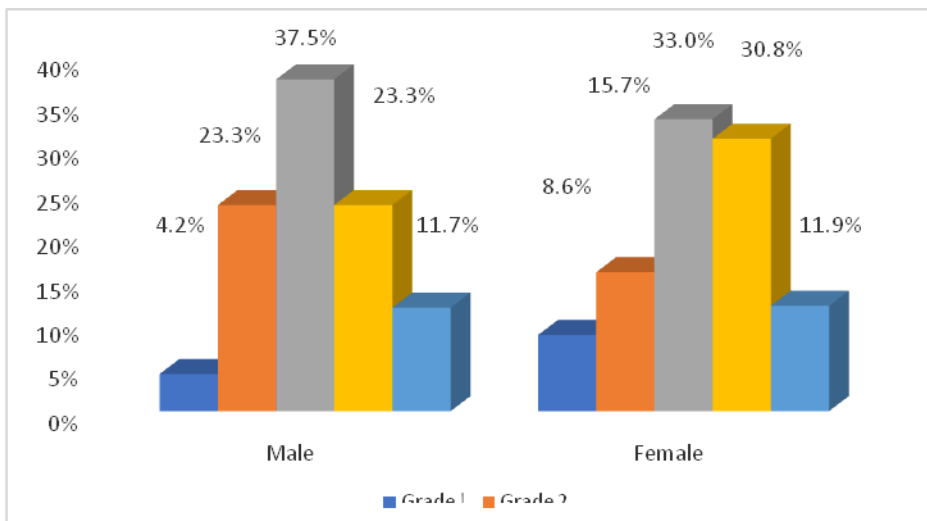| S.no | Variable | Total | Demand | No Demand |
|------|----------|-------|--------|-----------|
| 1. | Dental Health Component | 305 | 51.8% | 48.2% |
| 2. | Aesthetic Component | 305 | 92.3% | 7.7% |

**GRAPHS**



**Fig:1 shows the need for orthodontic treatment for both the genders based on Dental Health component**
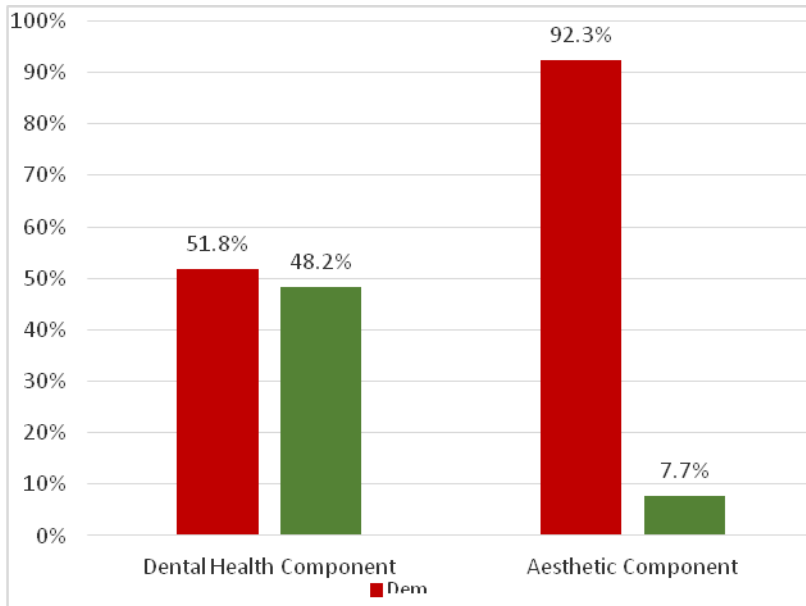
**Fig: 2 shows the association of Dental Health component and aesthetic components with demand for orthodontic treatment**

## Discussion

The current study involves careful evaluation of orthodontic treatment need and demand in Kanpur children. There has been an increase in the use of IOTN, recently. The validity of the use of IOTN index has also been verified by several researchers (Richmond et al., 1994, Burden et al., 1994, Burden and Holmes 1994, Shaw et al., 1995).

The IOTN has two separate components; a clinical component called the Dental Health Component (DHC) and an Aesthetic Component (AC). DHC and AC are two separate components and are not combined together. Both DHC & AC are recorded separately.

DHC has five grades ranging from grade 1 to grade 5 'no need for treatment'to 'very great need'. A grade is according to the severity of the worst single trait and describes the priority for treatment, which identifies and records only the most severe occlusal trait of a malocclusion.

The Aesthetic component consists of a 10-point scale illustrated by a series of photographs, A scale of 10 color photographs showing different levels of dental attractiveness was used, grade 1representing the most attractive and grade 10 the least attractive dentitions. The grades shows 1-4 'no or little need',grades 5, 6, and 7 'borderline need', and grades 8, 9,and 10 to represent a clear need for treatment on aesthetic grounds.

The present study was carried out on 305 students aged 12–14 year in Kanpur. Depending upon the dental health component, there was a definite need for orthodontic treatment amongst the females (42.7%) than the males (35%). Aesthetic Component in males there was only 12.6% definite need for the orthodontic treatment whereas in females it was 13%. However, 46.5% females had no need for the orthodontic treatment when compared with the males (45.8%).

In the present study the need for treatment was 38.8 % (based on DHC) which was similar to studies in Turkey (38.8%)[11], Ireland (36%)[12], Syrian (38%)[13], Sweden (37%)[14], and Iran(36.1%)[15] but more than in Brazil (34.2%)[16], Jordan (34%)[1], in Italy (27.3%)[17] Norway (26.1%)[18], Kuwait (29.3%)[19], Spain (21.8%)[20], France (21.3%)[21] and was less than in Asians men (50.1%) [21] and Malaysia(49.9%)[23].

Regarding AC, the results of this study (12.8%) is similar to Syrian (10.2%)[13] and more than those in France (7%)[21], Sweden (2.2–3.9%)[14], Jordan(7%)[1], Shiraz, Iran(4.1%)[24] and Italy (3.2–8.6%)[17] and less than in Saudi Arabia[25] (16.1%) ,Malaysia (46.7%)[23]. The variations between the present AC scores and those found in the literature may be attributed to possible cultural differences regarding the esthetics perceived by different populations.

The results of the present study revealed that 72.3%

subjects demanded orthodontic treatment from the study sample (51.8% using the DHC-IOTN component and 92.3% using the AC-IOTN) component which means that demand exceeds need .

## Conclusion

1. Orthodontic treatment need in Kanpur children is 38.7% (DHC).

2. Orthodontic treatment demand in Kanpur children is 72.3% .

3. There was significant difference in the treatment need between boys and girls and need was more in girls according to DHC.

4. There was no significant difference in the treatment need between boys and girls according to AC.

5. The finding of the present study remains significant in providing the first data on the orthodontic status and treatment needs of 12 to 14 year-old school children in Kanpur.

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