



Original Research Article

The relationship of severity of malocclusion as assessed by IOTN and DAI indices with perception of individuals towards orthodontic treatment-A Questionnaire study

Snehal N Patel^{1,*}, Sheron Bhanat¹, Roopal Patel¹, Dolly Patel¹

¹Dept. of Orthodontics and Dentofacial Orthopedics, AMC Dental College and Hospital, Ahmedabad, Gujarat, India



ARTICLE INFO

Article history:

Received 23-09-2020

Accepted 25-09-2020

Available online 18-11-2020

Keywords:

Questionnaire survey

Perception towards treatment

IOTN and DAI Index

ABSTRACT

Background: The orthodontic objectives are best achieved when the individual is treated as a whole. It is important to understand the perception of individuals towards the orthodontic procedure.

Objectives: The aim was to evaluate the perception and explore the reasons responsible for the patient wanting to undergo orthodontic treatment.

Materials and Methods: A questionnaire survey was done on 150 individuals reporting to Department of Orthodontics, IOTN and DAI indices on same individuals were recorded.

Results: Out of 150 individuals, in this study, 44% individuals were the first one to notice malocclusion, while mothers were the first to notice malocclusion in 34.66% individuals. Most of the individuals expected positive change in aesthetics and self confidence, improvement in dental health and carrier opportunities after orthodontic treatment. TMJ disorder, speech problem and chewing problem were noticed by 4 individuals.

Conclusion: It was concluded that 1) Aesthetics was the main factor for seeking orthodontic treatment followed by functional needs. Although aesthetics is the prime concern of individuals seeking for orthodontic treatment, only 12% subjects need indispensable treatment need according to DAI index. Treatment need differs on aesthetics (DAI) and severity of malocclusion (IOTN). When severity of malocclusion is taken into account 88% subjects needed little or borderline treatment. On determining treatment need considering aesthetics 84% subjects needed little or borderline treatment which reflects the awareness of the people concerned about their aesthetics.

© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Introduction

Orthodontic correction plays a major role in alleviating psychological and social handicap by correcting several malocclusive traits.. Crowded, irregular, and protruding teeth have been a problem since antiquity and attempts to correct this disorder go back at least to 1000 BC. Malocclusion has been considered the third highest oral health priority by the World Health Organization.¹ Since the state of malocclusion has such critical importance, it is imperative that factors associated with a individual

wanting to treat his/her malocclusion should be well understood. Evaluating these factors helps us understand individual's psychology towards the treatment need and priorities of patient and thus enabling us to provide a "patient satisfactory" treatment.

Orthodontic rehabilitation is an elective procedure in most patients. Subjects with severe malocclusion might not feel the need to get the malocclusion corrected while subjects with minimal malocclusion might have a strong desire to get the malocclusion treated. The desire for orthodontic treatment seems to be influenced by various factors such as demographics, ethnicity, economical background, gender and many more.² Understanding this factors

* Corresponding author.

E-mail address: snehalpatel15jan@gmail.com (S. N. Patel).

can help the clinician estimate the cooperation during treatment, the prognosis of the case, and posttreatment satisfaction. Orthodontists should recognize this network of interrelations with the aim of achieving a favorable outcome for the patient.

It is famously said that beauty is in the eyes of beholder but it has been attempted to quantify aesthetics in the form of indices such as Dental Aesthetic Index (DAI) given by W.H.O in 1989 and Index Of Orthodontic Treatment Need (IOTN) index (P.H Brook and W.C Shaw in 1989). The indices associates aesthetic and dental health components mathematically to produce a single score that combines both aspects of occlusion, including patient perceptions.³

Quantifying a regional population and studying various perception factors of individuals according to severity of malocclusion can help us understand individual's psychology. This can help us plan treatment protocol, selection of appliance and also in patient counselling when needed. Thus the aim of this study was to explore the perception of individuals regarding awareness of their malocclusion and its correlation with desire for orthodontic treatment using DAI and IOTN index.

2. Material and Methods

A total 150 individuals, were included who were visiting the Department of Orthodontics and Dentofacial Orthopaedics, AMC Dental College, Ahmedabad for the first time. The present questionnaire survey received approval from institutional review board. The survey was conducted using structured questionnaire. Individuals who were willing to participate in the study and who were yet to start orthodontic treatment, 18 years and above were included. Mentally challenged and medically compromised patients were excluded. Questionnaire interview was held with every individual irrespective of their age, by a single investigator. The questionnaire consists of 10 questions involving psychosocial aspects of patients including dental awareness, dental satisfaction, effect of dental malocclusion, factors which influence patients in seeking treatment, main reason for seeking treatment and expected social changes once orthodontic therapy is completed.⁴ All individuals were examined by a single examiner by using a mouth mirror and a periodontal probe. The questions asked are given below

Questionnaire

- 1) **Are you aware of dental malocclusion?**
A) Yes B) No
- 2) **Who is the first person to notice your dental malocclusion?**
A) Self B) Mother C) Father D) Dentist E) Others
- 3) **Who is the first person to suggest orthodontic treatment?**
A) Parents B) Relatives/Friends C) Self D) Dentist E) Others wearing appliance

4) **Do you think your self confidence will Improve after orthodontic treatment?**

A) Yes B) No

5) **Are you expecting good career opportunities after your orthodontic treatment?**

A) Yes B) No

6) **Do you think your biting and chewing will Improve after orthodontic treatment?**

A) Yes B) No

7) **Do you have any problem while speaking?**

A) Yes B) No

8) **Do you think your dental health will Improve after orthodontic treatment?**

A) Yes B) No

9) **Do you think your facial and dental appearance will Improve after orthodontic treatment?**

A) Yes B) No

10) **Do you have any pain/clicking sound around your ears(at the temporomandibular joint)**

A) Yes B) No

2.1. Clinical examination

The clinical examination was performed by a single investigator using a mouth mirror, and a periodontal probe. The need of treatment owing to severity of malocclusion was determined by IOTN index, while the need of treatment owing to aesthetics was determined by DAI index.

The IOTN index is a rating system that is used to determine whether individuals qualify for orthodontic treatment. It has two components aesthetic component and dental health component. The dental health component assesses various parameters like overjet, overbite, crossbite, contact point displacement. The Index places patient in five treatment grade from "no treatment need" to "treatment need" that correlate reasonably well with clinician's judgement of need for treatment. The dental health component is derived from occlusion and alignment and an aesthetic component derived from comparison of dental appearance to standard photographs. When there was a possibility of categorizing a patient in more than one grade the higher grade was assigned.

DAI is a rank-ordered on a continuous scale to assess severity levels in order to prioritize treatment need. DAI scores have also been found to be significantly associated with the perception of treatment need by individual.^{3,5,6} It involves evaluation of 10 aesthetic components which were measured. The components of DAI index with its assigned score is given below:

3. Results

A total of 150 individuals were interviewed for the questionnaire out of which 66 were male and 84 were female. Descriptive data of the study was assessed in tabular

Table 1: Dental Health Component of IOTN index

IOTN SCALE	Missing teeth	Overjet	Crossbite	Displacement of contact point	Open bite	Overbite
Grade 5 (Extreme/ Need Treatment)	5.i Impeded eruption 5.h Extensive hypodontia with preprosthetic orthodontics 5.p Cleft lip and palate 5.s Submerged teeth	5.a >9mm overjet 5.m > -3.5mm reverse overjet with masticatory and speech difficulty				
Grade 4 (Severe/ Need Treatment)	4.x Supernumerary teeth 4.t Partially erupted teeth, tipped, and impacted against adjacent teeth 4.h Less extensive hypodontia requiring pre-restorative orthodontics	4.a Overjet >6mm but ≤9mm 4.b Reverse overjet >3.5mm with no masticatory and speech difficulty 4.m Reverse overjet >1mm but ≤ 3.5mm with masticatory and speech difficulty	4.c Anterior or posterior crossbite >2mm 4.l Posterior lingual crossbite with no functional occlusal contact	4.d >4mm severe contact point displacement	4.e Extreme lateral or anterior open bite >4mm	4.f Increased and complete overbite with gingival or palatal trauma
Grade 3(Moderate/ Borderline need)		3.a Increased overjet >3.5mm but ≤6mm with incompetent lips 3.b Reverse overjet >1mm but ≤3.5mm	3.c Anterior or posterior crossbites with >1mm but ≤2mm	3.d >2mm but ≤4mm	3.e Lateral or anterior open bite >2mm but ≤4mm	3.f Deep overbite complete on gingival or palatal tissue but no trauma
Grade 2 (Mild/Little need)		2.a Increased overjet >3.5mm but ≤6mm with competent lips 2.b Reverse overjet >0mm but ≤1mm	2.c Anterior or posterior crossbite ≤1mm discrepancy	2.d >1mm but ≤2mm	2.e Anterior or posterior open >1mm but ≤2mm	2.f ≥3.5mm, without gingival contact
Grade 1 (No need)				Contact point displacement <1mm		

Table 2: Dental Aesthetic Index Scoring System

Dental Aesthetic Index component	Rounded weight
1. Number of missing visible teeth (incisors, canine, and premolars in maxillary and mandibular arch)	6
2. Crowding in incisal segment (0=no segment crowded, 1=1 segment crowded, 2= 2 segments crowded)	1
3. Spacing in incisal segment (0= no spacing, 1= 1 segment spaced,2=2 segments spaced)	1
4. Midline diaestema in millimetres	3
5. Largest anterior maxillary irregularity in millimetres	1
6. Largest anterior mandibular irregularity in millimetres	1
7. Anterior maxillary overjet, in millimetres	2
8. Anterior mandibular overjet, in millimetres	4
9. Vertical anterior openbite, in millimetres	4
10. Anteroposterior molar relationship, largest deviation from normal either left or right (0=normal, 1=1/2 cusp mesial or distal, 2= 1 full cusp or more mesial or distal)	3
11. Constant	13
Total	DAI score

Table 3: Dental Aesthetic Index Scoring System

Malocclusion severity	Treatment need	DAI Score
Without abnormality or mild malocclusion	Little or no need	≤25
Defined malocclusion	Elective	26 to 30
Severe malocclusion	Highly desirable	31 to 35
Very severe or disabling malocclusion	Indispensable	≥35

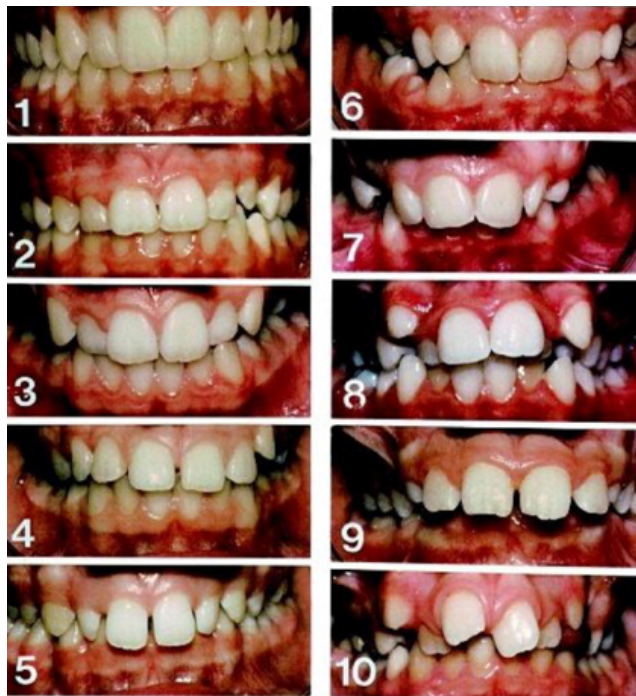


Fig. 1: Aesthetic component of IOTN index

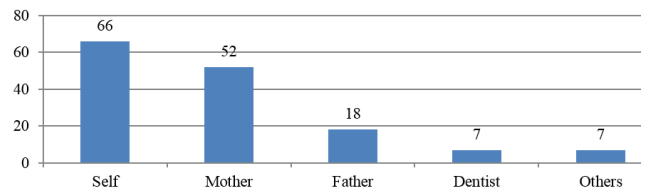


Fig. 2: First person to notice dental malocclusion in patients

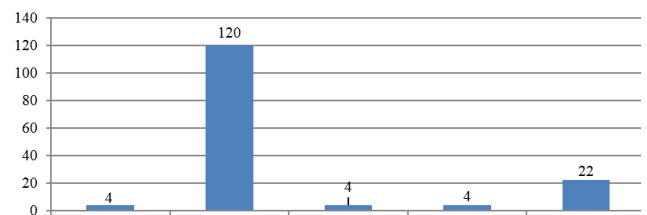


Fig. 3: first person to suggest orthodontic treatment to patients

and bar graphs.

4. Discussion

William Osler, a Canadian scientist has quoted “The good physician treats the disease; the great physician treats the

patient who has the disease”. To stand true to this quote, it is essential for us to understand complete psychology of patient’s seeking orthodontic treatment and treat them accordingly. Malocclusion can have psychological impact, the intensity of social setback can vary from very little to as much as being socially handicapp. Thus it is imperative that an orthodontist has sound knowledge of patient’s perception and attitude towards the treatment before commencing any procedure. The relationship between professionally assessed and self perceived treatment need is of interest to providers of orthodontic services.⁷ Understanding the factors involved

Table 4: Esthetic and functional perception of population

Individual perception towards orthodontic treatment	Total	Frequency
Positive change in Self-confidence	148	98.66%
Positive change in Aesthetics	142	94.66%
Expectation in improvement in Dental Health	144	96%
Expectation of good carrier opportunity	141	94%
Chewing, TMJ, speech problem	4	2.66%

Table 5: Population division for treatment need according to IOTN index

No need of treatment	4%
Mild/ Little need of treatment	44.66%
Moderate/Borderline treatment	36%
Great need of treatment	10%
Very great need of treatment	0.4%

Table 6: Population division for treatment need according to DAI index

Little or no treatment need	31%
Elective treatment need	57%
Highly desirable treatment	8%
Indispensable treatment	4%

in demand for orthodontic treatment enables a better planning of resources as well as better assessment of treatment needs and priorities.⁸

Regardless of severity of malocclusion, the first person to notice malocclusion is the patient itself followed by mother of the patient [Figure 2]. The first person to insist for treatment was parents/guardians followed by self motivation [Figure 3]. It is clear that individuals may be the first one to notice malocclusion but it is parents that are keen for treatment. Stejpan Spalj et al² found similar results in their study.

The population also has high expectation regarding esthetics and ultimately confidence in social life. S Nagarjan et al⁶ in their study found aesthetic to be the major reason for seeking orthodontic treatment. 94% population believed that orthodontic treatment will bring positive change in their aesthetics and 98.66% population believed the treatment will increase their self-confidence. It shows how much an individual expects from an orthodontic treatment. Abdullah A et al⁹ evaluated perception of 115 individuals based on a structured questionnaire and stated that expected improvement in career opportunities, social life and self-confidence following orthodontic treatment were sought by most of the patients in his survey.

The treatment need based on malocclusion severity/IOTN index revealed that 4% needed no treatment, 44.66% had mild/little need of treatment, 36% population had moderate/borderline treatment need, 10% population were in great need of treatment, 0.4% were in very great need of treatment, according to IOTN scale. Chaitra K et al¹⁰ recorded IOTN indices on 1000 students and reported that 44.4% needed definite orthodontic treatment.

The treatment need of population based on DAI index (aesthetic component) revealed that 31% population needed no or little treatment, 57% population needed elective treatment, 8% population had highly desirable treatment need, 4% population had indispensable treatment need. Venkatesh Babu and Gopu H⁵ assessed the treatment need in 120 individuals based on DAI index, they stated that 28.57% of children didn't need any orthodontic treatment, 21.42% belonged to treatment elective group, 23.68% under treatment highly desirable group and 39.47% were grouped under indispensable treatment group.

Further studies are required to improve our understanding of perceived need for orthodontic treatment, by including parameters like age, especially in developing countries like India where perception of individuals may differ in rural and urban areas.

5. Conclusion

This survey was an attempt to evaluate perception of individuals towards orthodontic treatment. It is important that patients are motivated enough to opt for orthodontic treatment despite having less psychological impact. The uptake of orthodontic care may be influenced by awareness, concern for dental appearance, perceived need and DAI score and IOTN score. This survey concludes that:

1. Aesthetics was the main factor for seeking orthodontic treatment followed by dental health needs.
2. In young adults, awareness from parents is more while with increasing age self awareness is the factor that brings an individual to orthodontic treatment.

3. Although aesthetics is the prime concern of individuals seeking for orthodontic treatment, only 12% population need indispensable treatment need according to DAI index. Thus the objective need of treatment is more than assessed subjective need for treatment.
4. Treatment need differs on aesthetics (DAI) and severity of malocclusion (IOTN). When severity of malocclusion is taken into account 88% population need little or borderline treatment. On determining treatment need considering aesthetics 84% population needed little or borderline treatment.

6. Source of Funding

No financial support was received for the work within this manuscript.

7. Conflict of Interest

The authors declare they have no conflict of interest.

References

1. Proffit WR, Fields HW, Sarver DM. Contemporary orthodontics. St. Louis, Mo: Elsevier/Mosby; 2013.
2. Spalj S, Slaj M, Varga S, Strujic M, Slaj M. Perception of orthodontic treatment need in children and adolescents. *Eur J Orthod.* 2010;32(4):387–94. doi:10.1093/ejo/cjp101.
3. Jenny J, Cons NC. Establishing malocclusion severity levels on the Dental Aesthetic Index (DAI) scale. *Aust Dent J.* 1996;41(1):43–6. doi:10.1111/j.1834-7819.1996.tb05654.x.
4. Lakshmi GM. Reasons for Seeking Orthodontic Treatment among South Indian Population-A Questionnaire Study. *J Pharm Sci Res.* 2016;8(7):692–5.
5. Bahu V, Gopu H. Assessment of Orthodontic Treatment Needs According to Dental Aesthetic Index. *J Dent Sci Res;*2:1–5.
6. Nagarajan S, Pushpanjali K. The relationship of malocclusion as assessed by the Dental Aesthetic Index (DAI) with perceptions of aesthetics, function, speech and treatment needs among 14- to 15-year-old schoolchildren of Bangalore. *Oral Health Prev Dent.* 2010;8:221–8.
7. Hamamci N, Basaran G, Uysal E. Dental Aesthetic Index scores and perception of personal dental appearance among Turkish university students. *Eur J Orthod.* 2009;31(2):168–73. doi:10.1093/ejo/cjn083.
8. Marques. Factors associated with desires for orthodontic treatment among Brazilian adolescents and their parents. *BMC Oral Health.* 2009;.
9. Abdullh A, Yassin Z, Zamzam N. Fabio et al, The impact of malocclusion on adolescents' dissatisfaction with dental appearance and oral functions. *Annal Dent Univ Malaya.* 2001;8:403–9.
10. Chaitra K. Orthodontic Treatment: Need and Demand in North Karnataka School Children . *J Clin Diagn Res.* 2014;8:ZC37–42.

Author biography

Snehal N Patel, Post Graduate Student

Sheron Bhanat, Reader

Roopal Patel, Post Graduate Guide Reader

Dolly Patel, Dean & HOD

Cite this article: Patel SN, Bhanat S, Patel R, Patel D. The relationship of severity of malocclusion as assessed by IOTN and DAI indices with perception of individuals towards orthodontic treatment-A Questionnaire study. *IP Indian J Orthod Dentofacial Res* 2020;6(4):245-250.