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RESEARCH ARTICLE

THE INDEX OF ORTHODONTIC TREATMENT NEED- A REVIEW

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ABSTRACT

Malocclusion is one of the commonest dental problems. Correction of malocclusion requires evaluation before planning Orthodontic treatment. Evaluating various types of malocclusion is an important aspect for planning Orthodontic treatment. An epidemiologist uses orthodontic indices as a tool to analyse the prevalence and severity of various types of malocclusion. There are several methods of grading and assessing malocclusion. The index of orthodontic treatment need (IOTN) is one among them. The aim of this review article is to brief about IOTN orthodontic index, its method of application and the various advantages and limitations of using this index.

Key words:

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INTRODUCTION

Malocclusion is the second most common oral health problem¹. People having malocclusion are in need for orthodontic treatment. People having malocclusion are in need for orthodontic treatment. Presence of malocclusion leads to various oral health problems by affecting the functional needs and also compromising on dentofacial esthetics, speech, mandibular function and psychological well being of individual³. Before 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 malocclusion⁵.

Of these, the most popular indices have been Summers' Occlusal index⁶, the Treatment Priority Index (TPI)⁷, the Handicapping Malocclusion Assessment Record⁸, the Need for Orthodontic Index⁹ and the Index of Orthodontic Treatment Need (IOTN)¹⁰. 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 need⁵. The IOTN has been gaining international recognition as a method of objectively assessing treatment need¹¹. Hence, the present review articles attempt to discuss the IOTN index and the various advantages

of using this index to determine the Orthodontic treatment need for an individual with malocclusion.

The Index Of Orthodontic Treatment Need⁵

The Index of Orthodontic Treatment Need was developed in UK by Brook & Shaw in 1989. It was introduced as Index of Orthodontic Treatment Priority and later renamed as 'IOTN'¹². It is a clinical index which prioritizes and classifies malocclusion according to treatment needs ultimately to compare populations. IOTN index is a modification of the index used by the Swedish Dental Health Board which was used to record the need for Orthodontic treatment on dental health and functional grounds. The IOTN index is one of the commonly used quantitative types of Occlusal indices that assess the Orthodontic treatment need among children and adults. 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.

Dental Health Component (DHC)

The DHC of IOTN is an adaptation of an index used by the Swedish Medical Health Board (SMBI)^{13, 14, 15}. The original form of this Swedish Index was developed having four categories of need (grade 1 to 4). Later on, Linder-Aronson & Co-workers in 1976 revised the index and added a fifth

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category, the grade zero, and describing subject with no need for treatment (Table 1).

Table 1 The Modified 5-grade index 9ISMHB) for orthodontic treatment need (Swedish Medical Health Board, 1996; Linder-Aronson, 1974, 1976)

Grade		
4	Very urgent need	Aesthetically and/ or functionally handicapping anomalies, such as cleft lip and palate, extreme post-normal or pre-normal occlusion, retained upper incisors, extensive aplasia. Pre-normal forced bite, deep bite with gingival irritation not only on papilla incisive, large overjet with lower lip behind upper centrals, extremely open bite, crossbite causing transverse forced bite, scissors bite interfering with articulation, several frontal crowding or spacing, retained canines, aesthetically and/ or functionally disturbing rotations.
3	Urgent need	Aesthetically and/ or functionally disturbing proclined or retroclined incisors, deep bite with gingival contact but without gingival irritation, severe crowding or spacing of deciduous molars and permanent teeth, moderate frontal rotation. Mild deviations from normal(ideal) occlusion, such as pre-normal occlusion with little negative overjet, post-normal occlusion without other anomalies, deep bite without gingival contact, open bite with frontal opening, crossbite without a forced bite, mild crowding or spacing, mild rotations of only little aesthetic and / or functional significance.
2	Moderate need	Mild deviations from normal(ideal) occlusion, such as pre-normal occlusion with little negative overjet, post-normal occlusion without other anomalies, deep bite without gingival contact, open bite with frontal opening, crossbite without a forced bite, mild crowding or spacing, mild rotations of only little aesthetic and / or functional significance.
1	Little need	Normal (ideal) occlusion without deviations.
0	No need	Normal (ideal) occlusion without deviations.

Grade 5 (Need treatment)

- 5*i* Impeded eruption of teeth (except for third molars) due to crowding displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.
- 5*h* Extensive hypodontia with restorative implications (more than 1 tooth missing in any quadrant) requiring pre-restorative orthodontics.
- 5*a* Increased overjet greater than 9 mm.
- 5*m* Reverse overjet greater than 3•5 mm with reported masticatory and speech difficulties.
- 5*p* Defects of cleft lip and palate and other craniofacial anomalies.
- 5*s* Submerged deciduous teeth.

Grade 4 (Need treatment)

- 4*h* Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis.
- 4*a* Increased overjet greater than 6 mm, but less than or equal to 9 mm.
- 4*b* Reverse overjet greater than 3•5 mm with no masticatory or speech difficulties.
- 4*m* Reverse overjet greater than 1 mm but less than 3•5 mm with recorded masticatory and speech difficulties.
- 4*c* Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position.
- 4*l* Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.
- 4*d* Severe contact point displacements greater than 4 mm.
- 4*e* Extreme lateral or anterior open bites greater than 4 mm.
- 4*f* Increased and complete overbite with gingival or palatal trauma.
- 4*t* Partially erupted teeth, tipped and impacted against adjacent teeth.
- 4*x* Presence of supernumerary teeth.

Grade 3 (Borderline need)

- 3*a* Increased overjet greater than 3•5 mm, but less than or equal to 6 mm with incompetent lips.
- 3*b* Reverse overjet greater than 1 mm, but less than or equal to 3•5 mm.
- 3*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.
- 3*d* Contact point displacements greater than 2 mm, but less than or equal to 4 mm.
- 3*e* Lateral or anterior open bite greater than 2 mm, but less than or equal to mm.
- 3*f* Deep overbite complete on gingival or palatal tissues, but no trauma.

Grade 2 (Slight)

- 2*a* Increased overjet greater than 3•5 mm, but less than or equal to 6 mm

- with competent lips.
 - 2*b* Reverse overjet greater than 0 mm but less than or equal to 1 mm.
 - 2*c* Anterior or posterior crossbite with less than or equal to 1 mm discrepancy between retruded contact position and intercuspal position.
 - 2*d* Contact point displacements greater than 1 mm but less than or equal to mm.
 - 2*e* Anterior or posterior open bite greater than 1 mm but less than or equal to 2 mm.
 - 2*f* Increased overbite greater than or equal to 3•5 mm without gingival contact.
 - 2*g* Pre- or post-normal occlusions with no other anomalies (includes up to half a unit discrepancy).
- Grade 1 (None)**
- 1• Extremely minor malocclusions including contact point displacements less than 1 mm.

Table 2 - The full IOTN DHC table

The DHC represents biological or anatomical aspect of IOTN that record need for treatment on dental health and functional grounds. The DHC may be applied both clinically ant to study casts. When applied to study casts there are minor differences in the definition of some traits. To record the DHC, a specially designed ruler is used (figure 1).

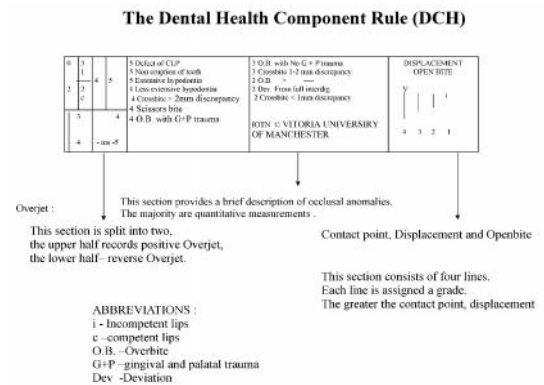


Figure 1 IOTN DHC Ruler

As explained in table 2 and 3, the DHC has five grades ranging from grade one, ‘no need’, to grade five, ‘very great need’. A grade is allocated to the severity of the worst occlusal trait and describe the priority of treatment. In recording the worst trait following hierarchical scale is used in a descending order¹⁶.

Hierarchical scale

1. Missing teeth (including aplasia, displaced & impacted teeth)
2. Overjets (including reverse sagittal overjets)
3. Crossbites
4. Displacements
5. Overbites
6. Pneumonic acronym: **MOCDO**

The hierarchical scale has two components

1. The dentition is assessed systematically, thus ensuring that all relevant occlusion anomalies are recorded.
2. If two or more occlusal anomalies are of the same DHC grade, the most severe one is scored.

Table 3 Dhc Component, Using The Mocdo Acronym

IOTN Dental Health Component	5	4	3	2	1
Missing teeth	5h = extensive hypodontia restorative implications >1 tooth missing per quadrant requiring pre-restorative orthodontic treatment 5s = submerging primary teeth 5i = impeded eruption/impaction	4h = less extensive hypodontia requiring orthodontic treatment for pre-restorative or space closure.			
Overjet	5a = OJ >9 mm 5m = ROJ >3.5 mm + masticatory and speech difficulties	4a = OJ 6.1-9 mm 4b = ROJ > 3.5 mm with no masticatory and speech difficulties	3a = OJ 3.6-6 mm + incompetent lips 3b = ROJ 1.1-3.5 mm	2a = OJ 3.6-6 mm + competent lips 2b = ROJ 0.1-1 mm	
Crossbite		4c = x-bites + >2 mm discrepancy between RCP and ICP 4l = posterior lingual x-bite	3c = x-bite + 1.1 – 2 mm discrepancy between RCP and ICP	2c = x-bite with up to 1 mm discrepancy between ICP and RCP	
Displacement of contact point		4d = contact point displacement >4 mm 4t = partially erupted teeth, tipped and impacted against teeth 4x = supplemental teeth	3d = contact point displacement 2.1- 4 mm	2d = contact point displacement 1.1 – 2 mm	Minor irregularity
Overbite (including open bite)		4e = lateral or anterior open bite >4 mm 4f = increased + complete OB + Gingival or palatal trauma	3e = lateral or anterior open bite 2.1- 4 mm 3f = increased + complete OB with no gingival trauma	2e = lateral or anterior open bite 1.1 – 2 mm 2f = increased OB >3.5 mm and no gingival contact.	

The Aesthetic Component

For this component the SCAN index (standardized Continuum of Aesthetic Need) was utilized¹⁷. This scale was constructed using dental photographs of 1000 12 year olds collected during a large multidisciplinary survey. The Aesthetic component measures aesthetic impairment and justifies treatment on social – psychological grounds¹⁸. It consists of a 10- point scaled illustrated by a series of photographs that were rated for attractiveness by a panel of lay judges and were selected as being equidistantly spaced through the range of grades.

A rating is allocated for overall dental attractiveness rather than specific similarities to the photographs. The final value reflects the treatment need on the grounds of aesthetic impairment and by implication of the social psychological need for orthodontic treatment (figure 2).

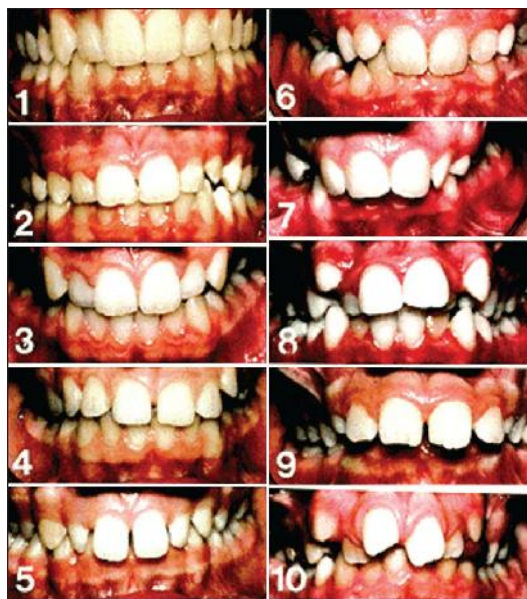


Figure 2 IOTN AC Scale

Table 4 Aesthetic Component: Levels Of Dental Attractiveness On A Scale Of 1- 10

Score	Need for treatment
1/2	No need
3/4	Slight need
5/6/7	Moderate need
8/9/10	Definite need

The Modified Iotn¹⁹ -

The modified IOTN is a two – grade scale,

- Grade 1- No Need
- Grade 2- Definite Need,

Instead of five grade scale with 30 sub categories, the modified IOTN is based on idea that the IOTN is not an index to measure the complexity; and therefore, there is no benefit in recording the occlusal anomaly that placed the child in treatment need category. The modified IOTN simplifies identifying people in need of treatment and improves the reliability and validity of the index. By using the modified IOTN, every case with IOTN DHC 4 and / or IOTN AC 8 is classified as being in need of treatment. Since its introduction, few epidemiological studies used the modified IOTN; the index has been simplified to two categories: Definite Need for Treatment and No Definite Need for Treatment.

Advantages of Iotn Index-

1. IOTN is a clinical index to assess Orthodontic treatment need.
2. The index can be used either directly on the patient or on the plaster models.
3. The validity and reliability of the IOTN have been verified^{20, 21, and 22}.
4. IOTN is one of the most commonly used occlusal indices to assess the Orthodontic treatment need among children and adults.

5. The index defines specific, distinct categories of treatment need, whilst including a measure of function²³.
6. The use of IOTN index allows improved focusing of services and has the potential to induce greater uniformity throughout the profession and standardization in the assessment of Orthodontic treatment need.
7. IOTN has gained international recognition as a method of objectively assessing treatment need²⁵.
8. The IOTN data gives support for early Orthodontic treatment need.
9. IOTN is objective, synthetic and allows for comparison between different population groups.
10. IOTN is proved to be an easy-to-use and reliable method to describe the need for Orthodontic treatment need.
11. The DHC of IOTN helps in determining manpower requirements for planning Orthodontic treatment need.
12. The Aesthetic component of IOTN reflects the social and psychological need for Orthodontic treatment need.

Limitations Of Iotn Index

1. Sometimes there might be a discrepancy between the Dental Health Component and Aesthetic Component grades of IOTN index.
2. The Aesthetic Component of IOTN assesses the aesthetic aspects of malocclusion only in the frontal view and highlights the subjective nature of it.
3. Because of the above two limitations of using IOTN, any clinician who is interested in using the IOTN index should receive proper training and undergo the calibration process²⁶.

CONCLUSION

The Index of Orthodontic Treatment Need has proved to be a reliable, reproducible Orthodontic Treatment Need Index due to its simplicity and objective nature of application. The IOTN assesses the need for Orthodontic treatment according to the highest potential risk to the integrity of the teeth or supporting structures from the malocclusion. The IOTN index has been used as a helpful sieve in allocating treatment services where resources are limited in a fair and transparent way. The use of IOTN index is hence recommended in order to prioritize the treatment need of malocclusion. The use of this index in epidemiological surveys and in clinical settings should be encouraged.

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