

Understanding the Use and Objectives of Malocclusion Indices for Evaluation of Malocclusion Traits and Orthodontic Treatment Needs

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ABSTRACT

Background: The malocclusion indices have been used routinely by researchers to gather data regarding the prevalence of orthodontic treatment needs and trait. The scoring methods of malocclusal indices can be used to generate data regarding the actual load of the malocclusion which can be used for resource and fund allocation and identify the actual orthodontic treatment needs. This article will provide an insight to the various orthodontic indices and its specific indications.

Keywords: Index of Orthodontic Treatment Need, orthodontic treatment need, subjective orthodontic need.

INTRODUCTION

The evaluation of malocclusion is critical in establishing the diagnosis and treatment need of the orthodontic patient. The major concern in studying malocclusion is the availability of a suitable method for recording the presence and severity of orthodontic problem. Thus, orthodontic indices were developed for use in clinical and epidemiological studies related to malocclusion. The scores numerically the relative status of a population on a graduated scale with defined upper and lower limits. Although many indices have been developed but none of the indices can be considered ideal for all purpose [1-3]. Evaluation of orthodontic needs, both self perceived and actual needs on the basis of personal, sociodemographic and psychological factors help determine the planning of resources and orthodontic services. The use of malocclusion indices provides us with an objective method of scoring the malocclusion needs and prevents unnecessary referrals by general practitioners. The scoring method can be beneficial in evaluation of level of interest and motivation

towards orthodontic treatment which can be useful in planning educational programs in school to create awareness towards orthodontic treatment [4-6].

General Requirements of index:

The index should be easy to apply so that there is no undue time loss during field examinations. The examination process should not require expensive equipment. The Criteria for the index should be clear and unambiguous, with mutually exclusive categories. The index should be valid and should be able to measure what it is intended to measure, so it should correspond with the clinical stages of the disease under study at each point. The index should be sensitive and should be able to detect the condition when it is present. The reliability of the index should be high (both intra-rater and inter-rater reliability). The index should be precise and accurate to avoid misleading results and lastly the index should be safe and none demanding to the subjects. (Table 1)

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Table 1: Requirements of an ideal index.

1	It should have a graduated scale with upper and lower limit.
2	It should be equally sensitive throughout the scale.
3	The index should be reproducible.
4	The index should be simple and accurate.
5	It should be cost effective when applied on large population for screening.
6	It should be reliable.
7	It should be valid.
8	It should be specific.
9	It should be accurate and precise

Table 2: Indication of indices.

1	Indices are used extensively to determine the prevalence of the disease.
2	Indices are used for resource allocation.
3	Planning and promoting treatment standards.
4	Assessment of the outcome of treatment.
5	In quality assurance and research
6	For policy framing and fund allocation

Table 3: Classification of Malocclusion Indices.

Diagnostic indices	Epidemiologic indices	Orthodontic treatment need indices	Orthodontic Treatment Outcome indices	Orthodontic Treatment Complexity Indices
Angle Classification System (1899)	Summers' Occlusal Index (1971)	Handicapping Labio-lingual Deviation index (HLD)	Peer Assessment Rating Index (PAR)	Index of Orthodontic Treatment Complexity (IOTC)
Classification of Ballard & Wayman (1964)	Little's Irregularity Index	Dental Aesthetic Index (DAI)	Index of Complexity, Outcome & Need (ICON) (2000)	Index of Complexity, Outcome & Need (ICON)
Five-point system of Ackerman & Proffit (1969)		Index of Orthodontic treatment Need (IOTN) (Brook & Shaw, 1989)		
		Index of Complexity, Outcome & Need (ICON) (Daniel & Richmond, 2000)		

Use of Malocclusion indices:

Malocclusion is becoming prevalent and has shown to be affecting the quality of life of patients. Research has made it evident that the main motivation of patients opting for orthodontic treatment is aesthetics. [7, 8, 9] There are two components to be considered while selecting patients for orthodontic treatment. The first

component is the objective need of the patient while the other is the subjective need. The objective need of the patients is based on the doctors' clinical diagnosis and the subjective need is on the basis of patient's self-perception of aesthetics. It is important to assess the patients' aesthetic needs so as to evaluate whether the expectation of the patient is realistic or unrealistic [10, 11, 12] Occlusal indices are required for estimation and categorization of

treatment need and treatment priority. The main use of indices are to determine the disease load by determining the prevalence of the disease or trait. The information provided by the indices can be used to assess the outcome of the treatment and it can also be helpful in deploying resources and fund allocation. The indices can provide information which can be used by the stake holders in the formulation of new policy or to modify the existing one. (Table 2)

Types of malocclusion indices:

Five distinct Type of Indices have been defined, each for a distinct purpose. Diagnostic indices include Angle's classification with its subclasses which is commonly used to describe incisor and molar relationships making the communication between orthodontist easy. The other classification systems under this category are the Ballard classification and the Five-point system of Ackerman & Proffit. [13-15] Epidemiologic indices record the prevalence of malocclusion in a given population. Other indices in this category score tooth alignment in a way that allows study of tooth irregularity and periodontal disease Eg: Epidemiologic registration of malocclusion by Bjork, Krebs, and Solow the FDI method of Summer's occlusal index. [16, 17] Treatment need (treatment priority) indices allow classification of malocclusion according to the level of treatment need. These indices score for each trait or component that is then weighted to calculate an overall score. In this method assigning treatment priority is done by establishing a list of conditions or traits in categories that represent the extent to which treatment is considered necessary. Eg: i) Draker's HLD index. ii) Grainger's treatment priority index. iii) Salzman's handicapping malocclusion assessment. iv) IOTN (index of treatment need). [18-22] Treatment outcome indices have been developed to evaluate treatment success. PAR and Summer's index have been used to assess the outcome of treatment. Treatment complexity index measures treatment complexity but there is no ideal index of this kind presently available although the need of such an index has been long felt in the field of orthodontics. [23-25] (Table 3)

IOTN (index Orthodontic of treatment need):

To estimate the need for orthodontic services in a population, treatment requirements must be determined. [26] Few occlusal indexes have been developed to categorize treatment need severity. Basically these indexes measure the deviation from normal. The Index of Orthodontic Treatment Need (IOTN) and the Grade Index Scale for Assessment Treatment Need measure malocclusion grades based on the severity and type of malocclusion. The IOTN was developed by Brook and Shaw. [22] It is one of the most frequently used diagnostic tools in orthodontics; it evaluates malocclusion on the basis of both normative and subjective treatment needs. [27] The IOTN follows the World Health Organization's guidelines for ideal index. [28] Quite a few studies have shown the validity of the IOTN. It has high ranking in the terms of accuracy, reproducibility and validity. It is easy to use and can be performed quickly. Many researchers have considered it as a powerful tool to assess treatment needs. [29-31] IOTN is a valuable tool for screening and has been used on the population in the western region of the Kingdom of Saudi Arabia.

IOTN comprises of two components. First is the dental health component (DHC). It represents the normative component of the index and has five grades ranging from "no treatment need" at grade 1 to "extreme need" at grade 5. It evaluates severity using specific malocclusion characteristics such as overjet, cross bite, displacement, overbite, and missing teeth. The other component is the aesthetic component (AC). The aesthetic components represents the subjective component of the index. It has 10 photographs of the anterior teeth, ranging from grade 1 as "the most attractive" to grade 10 as the "least attractive" dental appearance. It provides a pictorial assessment of patients' perception of their aesthetic treatment needs. The limitation of AC index is that it does not measure occlusal traits and that it is subjective. Documented Literature has shown a range of agreement between normative and self-perceived treatment needs from absent to moderate associations. Esthetic treatment mandates that the patient and the clinician have mutual agreement on the severity of the presenting malocclusion. Such agreement of perception affects treatment demands, improves patient understanding, and assists in better communication between clinicians and patients. It is important to evaluate the degree of agreement between the

patient's and the clinician's perceptions of the severity of malocclusion, that is, knowing the degree of agreement between the normative and subjective needs of the patient on the basis of the severity of malocclusion.

Estimation of self-perceived and actual need for orthodontic treatment is required in planning orthodontic services and evaluating the required resources and manpower. Moreover, unnecessary referrals by general practitioners and lengthy waiting lists for orthodontic treatment can be reduced and free treatment can be provided to those who actually have dire need for treatment. It can be beneficial in predicting patients' level of interest and motivation toward the orthodontic treatment, which could help in planning educational programs in media to increase patient's awareness and to overcome obstacles and barriers in seeking treatment.

Perceptive or self assessed need to dental care is associated with certain signs and symptoms, socio-demographic factors and experience with previous dental treatment. Reported studies have shown that the perception on orthodontic treatment need is different for patient and professional. It seems that normative need (actual need as assessed by dental professionals) may not be matched to patients' perceptions unless the condition has progressed sufficiently to be symptomatic. Several indices were designed to evaluate malocclusion, such as the IOTN, PAR (Peer Assessment Rating Index) and ICON (Index of Complexity, outcome and Need). The IOTN and the ICON can serve as neutral method to determine treatment needs and to allocate financial resources for orthodontic cases. The IOTN and the ICON are similar mainly measure treatment needs of patients. The IOTN has been used more frequently in literature to evaluate the actual and perceptive treatment needs in different ethnic backgrounds. The IOTN is simpler than the ICON in assessing treatment needs since ICON was developed to measure complexity of treatment in addition to treatment needs.^[41]

Conclusion:

There are numerous orthodontic indices developed over the years. These orthodontic indices have been used frequently for epidemiological studies and for framing policies by the stake holders to designate

resources and necessary funds. Although many indices are in use but an ideal index is still not available.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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