Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 15 [7] June 2026. 69-73

Online ISSN 2277-1808
Journal's URL: http://www.bepls.com
CODEN: BEPLAD

REVIEW ARTICLE **OPEN ACCESS**

Orthodontic Indices: A Review Article

Sonia Prakash[1], Namrata Dogra[2], Tarun Kumar[3]
[1-3]Department of Orthodontics and Dentofacial Orthopaedics, Faculty of dental Sciences, SGT University, Gurugram, Haryana, India.
*Corresponding Author:
Dr. Sonia Prakash
Email ID: aditiprakash2111@gmail.com

ABSTRACT
Orthodontic indices are standardized tools designed to quantify malocclusion, assess treatment need, determine treatment complexity, and evaluate treatment outcomes. They play a crucial role in clinical decision-making, epidemiological surveys, resource allocation, and quality assurance in orthodontics. Over the years, multiple indices have been developed, ranging from diagnostic classifications to epidemiologic, treatment priority, complexity, and outcome indices. This review provides a concise overview of the evolution, indications, advantages, and limitations of commonly used orthodontic indices, including Angle's classification, Occlusal Index, Little's Irregularity Index, Treatment Priority Index, Dental Aesthetic Index, Index of Orthodontic Treatment Need, and Index of Complexity, Outcome and Need. Recent advances, including the application of artificial intelligence, are also discussed.
Keywords: *Orthodontic indices, Malocclusion, Treatment need, Epidemiology, Outcome assessment*

Received 10.03.2026 Revised 27.05.2026 Accepted 09.06.2026

INTRODUCTION

Ideal dental occlusion is fundamental for efficient mastication, clear speech, temporomandibular joint stability, periodontal health, and harmonious facial esthetics; however, malocclusion is highly prevalent and presents with wide variations in severity, functional impact, and psychosocial implications. Because orthodontic diagnosis and treatment planning inherently involve a degree of clinical judgment, variability may occur among practitioners in assessing severity and determining treatment need. To minimize this subjectivity and ensure standardized evaluation, orthodontic indices were developed as objective, numerical or categorical scoring systems that quantify occlusal deviations using defined criteria and graded scales. These indices serve multiple purposes, including assessment of malocclusion prevalence in epidemiological surveys, determination of treatment need in clinical and public health settings, evaluation of treatment complexity, and measurement of treatment outcomes for quality assurance and research comparisons [1].

The Index of Orthodontic Treatment Need and the Dental Aesthetic Index are commonly used to assess treatment necessity, while the Peer Assessment Rating and the Index of Complexity Outcome and Need evaluate treatment improvement, complexity, and outcome. Most orthodontic indices assess key occlusal traits such as overjet, overbite, crossbite, crowding, spacing, missing teeth, molar relationship, and aesthetic impairment, often assigning weighted scores according to severity [2].

An ideal index should be valid, reliable, simple, reproducible, sensitive, and clinically meaningful; however, no single index fulfills all these criteria perfectly, and each has limitations such as inadequate consideration of skeletal discrepancies, functional disturbances, or patient perception. Therefore, the choice of index depends on the specific clinical, research, or public health objective, but collectively, orthodontic indices play an indispensable role in providing standardized, objective, and comparable methods for diagnosing malocclusion and determining orthodontic treatment need [3-5].

Orthodontic indices may broadly be classified into:

1. Diagnostic classifications
2. Epidemiologic indices
3. Treatment priority (need) indices
4. Treatment complexity indices
5. Treatment outcome indices

DIAGNOSTIC CLASSIFICATION

Angle's Classification of Malocclusion

Angle's classification remains the most widely used diagnostic system based on the anteroposterior molar relationship. It categorizes malocclusion into Class I, Class II (Divisions 1 and 2), and Class III. Despite its simplicity and universal acceptance, it does not assess severity, transverse or vertical discrepancies, or distinguish between skeletal and dentalcomponents [1].

Figure 1. Angle's classification of malocclusion showing Class I, Class II (Div 1 & 2), and Class III molar relationships. [1]

EPIDEMIOLOGIC INDICES:

Epidemiologic indices are designed to record the prevalence and distribution of malocclusion in populations.[2]

Occlusal Index [8]

The Occlusal Index introduced by Summers (1971) is a structured tool designed to measure the presence and severity of malocclusion in a systematic manner. It considers multiple occlusal features—such as molar alignment, horizontal and vertical overlap of incisors (overjet and overbite), crossbite, positional irregularities of teeth, and tooth loss. Each characteristic is assigned a weighted score, which collectively reflects the overall extent of occlusal discrepancy. This scoring system supports uniform diagnosis, facilitates comparison across different study groups, and is widely applicable in epidemiological surveys and orthodontic treatment planning [8].

Facial Diagnostic Index (FDI) [9]

The Facial Diagnostic Index (FDI), proposed by Baumrind in 1966, represents an early attempt to incorporate craniofacial morphology into the objective assessment of malocclusion. In contrast to conventional orthodontic indices that predominantly focus on dental irregularities—such as crowding, spacing, or overjet—the FDI prioritizes the evaluation of underlying skeletal relationships and facial harmony. It systematically examines deviations in craniofacial proportions, including anteroposterior and vertical discrepancies, thereby providing a more comprehensive appraisal of facial imbalance. By emphasizing skeletal disharmony rather than isolated occlusal traits, the index enhances diagnostic precision and supports more biologically oriented treatment planning. The FDI is particularly valuable in research and clinical contexts where understanding the structural basis of malocclusion is essential for accurate classification and therapeutic decision-making [9].

Little's Irregularity Index

Little's Irregularity Index, introduced by Little in 1975, is a quantitative and reproducible metric designed to assess the alignment of the mandibular anterior dentition. The index is calculated by summing the linear horizontal displacements between the anatomical contact points of the six lower anterior teeth, thereby providing a direct measure of anterior crowding. Unlike subjective assessments of alignment, this method offers precise numerical values that enhance reliability and facilitate longitudinal comparison. Owing to its simplicity, sensitivity, and ease of application, the index has become a standard tool in orthodontic

research, particularly in studies investigating treatment outcomes, long-term stability, and post-retention relapse. Its focus on measurable tooth displacement makes it especially valuable for evaluating subtle changes in alignment over time [10].

Table 1. Epidemiologic orthodontic indices and their applications Treatment Priority(Need)Indices

Index	Developer	Primary Purpose	Key Limitations
Occlusal Index (OI)	Summers, [8]	Quantifies severity of malocclusion for epidemiologic studies	Low reproducibility; limited assessment of dynamic occlusion
Facial Diagnostic Index (FDI)	Baumrind, [9]	Evaluates facial proportions and soft tissue esthetics	Influenced by soft-tissue variability; subjective elements
Little's Irregularity Index	Little, [10]	Measures mandibular anterior crowding	Does not assess vertical, transverse, or esthetic factors

Treatment Priority Index (TPI) [11]

The Treatment Priority Index (TPI), developed by Grainger in 1967, is a composite scoring system designed to quantify the severity of malocclusion and establish treatment priority. The index integrates multiple occlusal characteristics—including molar relationship, overjet, overbite, tooth displacement, and other occlusal anomalies—into a single weighted score that reflects overall orthodontic need. By assigning differential weights to specific traits based on their clinical significance, the TPI provides a structured and objective framework for ranking patients according to treatment urgency. Its ability to translate complex occlusal findings into a unified numerical value has made it particularly valuable in epidemiological surveys, resource allocation, and public health orthodontic programs. The index remains an important tool for large-scale assessment where standardized criteria are essential for planning and prioritizing care.

Dental Aesthetic Index (DAI)

The Dental Aesthetic Index (DAI) is a standardized orthodontic index that integrates objective clinical measurements with societal perceptions of dental appearance to assess malocclusion and treatment need. It combines specific occlusal traits—such as missing visible teeth, spacing, crowding, overjet, open bite, and molar relationship—into a single regression-based score. This score categorizes individuals into four levels of treatment requirement, ranging from little or no need to mandatory intervention. By linking physical characteristics with esthetic acceptability, the DAI provides a practical and internationally recognized tool for epidemiological surveys and public health planning. However, its emphasis on visible anterior traits means that certain functional or posterior occlusal discrepancies may be underrepresented in the overall assessment [12].

Index of Orthodontic Treatment Need (IOTN)

The Index of Orthodontic Treatment Need (IOTN) is a widely accepted instrument for determining the necessity of orthodontic care by integrating both clinical and perceptual dimensions. It comprises two complementary components: the Dental Health Component (DHC), which evaluates the severity of occlusal traits in relation to functional impairment, and the Aesthetic Component (AC), which assesses dental attractiveness using a standardized visual scale. This dual-approach framework enables a balanced appraisal of treatment need, incorporating both objective clinical findings and subjective esthetic considerations. The IOTN is extensively utilized in clinical practice, epidemiological research, and healthcare planning to prioritize patients and allocate orthodontic resources efficiently [13].

Treatment Complexity and Outcome Indices

The Treatment Complexity Index (TCI) is a structured tool developed to quantify the anticipated difficulty and resource implications of orthodontic care. It integrates multiple determinants—such as the severity of malocclusion, presence of skeletal discrepancies, and the scope of required therapeutic interventions—into a composite score that reflects overall case complexity. By translating clinical findings into an objective measure, the TCI facilitates systematic case stratification and supports evidence-based decision-making in treatment planning. The index is particularly valuable for optimizing patient allocation across clinicians with differing levels of expertise and for managing clinical workload efficiently. Furthermore, it enhances patient–clinician communication by providing a clear framework for discussing treatment challenges, expected duration, and procedural demands, thereby contributing to more informed consent and realistic expectation setting [14].

Treatment outcome indices provide an objective means of evaluating the effectiveness of orthodontic interventions by comparing occlusal status before and after treatment. Among these, the Peer Assessment Rating (PAR) Index is one of the most extensively used tools, quantifying improvements in alignment, overjet, overbite, and buccal occlusion. Such indices enable standardized assessment of treatment success,

facilitate clinical audits, and contribute to quality assurance in orthodontic care. They are also valuable in research settings for comparing treatment modalities and long-term stability [14].

Table 2. Treatment Priority Orthodontic Indices and Their Clinical Indications

Index	References	Primary Focus	Clinical Use
Treatment Priority Index (TPI)	[11]	Severity of malocclusion	Ranking patients according to treatment urgency
Dental Aesthetic Index (DAI)	[12]	Dental esthetics	Screening and public health resource allocation
Index of Orthodontic Treatment Need (IOTN)	[13]	Dental health & esthetics	Identifying orthodontic treatment need
Index of Complexity, Outcome and Need (ICON)	[14]	Need, complexity & outcome	Case selection, treatment planning, audit

Figure 2. Pre- and post-orthodontic treatment comparison used for outcome assessment

ADVANCES IN ORTHODONTIC INDICES

Recent advances in orthodontic indices have been driven by digital technology and artificial intelligence (AI), leading to more objective, efficient, and reproducible methods of assessing malocclusion. Traditional indices often relied on manual measurements on study models or cephalometric tracings, which were time-consuming and subject to inter- and intra-examiner variability. With the introduction of digital models, 3D imaging, and computer-assisted analysis, many of these limitations have been significantly reduced [8].

Artificial intelligence—particularly machine learning and deep learning algorithms—has enabled automated landmark detection on cephalometric radiographs, cone-beam computed tomography (CBCT), and digital dental casts. AI systems can identify anatomical reference points, measure skeletal and dental relationships, and compute index scores with minimal human intervention. These systems are also capable of automated occlusal trait scoring, including crowding, overjet, overbite, crossbite, and spacing, thereby facilitating rapid assessment of treatment need using established indices such as the Index of Orthodontic Treatment Need and the Dental Aesthetic Index [6].

Furthermore, predictive AI models are being developed to estimate treatment complexity, duration, and potential outcomes by analyzing large datasets of treated cases. Integration with digital workflows—such as intraoral scanners and aligner planning software—allows real-time diagnostic support and simulation of treatment effects. These advancements enhance standardization, reduce examiner bias, and improve large-scale epidemiological data collection [7].

However, despite their promise, AI-based orthodontic indices require large, diverse datasets for proper validation to ensure accuracy across different populations and malocclusion types. Ethical concerns such as data privacy, algorithm transparency, and potential over-reliance on automated systems must also be addressed. Therefore, while AI represents a significant advancement in orthodontic assessment, it should complement—not replace—comprehensive clinical judgment and individualized patient evaluation.

LIMITATIONS OF ORTHODONTIC INDICES

Despite their significant role in standardizing the assessment of malocclusion, orthodontic indices possess inherent limitations. Most indices primarily evaluate static occlusal traits—such as crowding, overjet, overbite, and molar relationships—without adequately considering the dynamic aspects of occlusion, including functional movements, temporomandibular joint function, and neuromuscular adaptation. Skeletal discrepancies, growth potential, soft tissue profile, and facial harmony may not be

comprehensively represented in many commonly used indices.
Additionally, orthodontic indices often emphasize measurable clinical parameters while underestimating subjective factors such as patient perception, aesthetic concerns, psychosocial impact, and quality of life. A malocclusion that appears minor by index scoring may have significant emotional or social consequences for the patient, and conversely, a high index score may not correspond to the patient's perceived need for treatment. Cultural differences in aesthetic standards may further influence the interpretation of certain components, particularly those related to appearance.
Some indices are time-consuming, technique-sensitive, or require radiographic evaluation, limiting their practicality in large-scale surveys. Inter-examiner variability, though reduced, is not completely eliminated. Moreover, no single index comprehensively evaluates dental, skeletal, functional, and aesthetic components together.
Therefore, while orthodontic indices are valuable tools for epidemiological studies, treatment prioritization, and outcome assessment, they should be regarded as adjuncts rather than substitutes for comprehensive clinical examination, individualized diagnosis, and professional judgment.

CONCLUSION

Orthodontic indices are indispensable tools in modern orthodontics, providing a structured and standardized approach to the assessment of malocclusion. They facilitate objective diagnosis, enable large-scale epidemiological surveys, assist in prioritizing treatment need in public health systems, and support the evaluation of treatment outcomes and clinical performance. By converting clinical observations into measurable scores, these indices reduce subjectivity and enhance comparability among clinicians, institutions, and populations.
However, no single index is comprehensive enough to address all diagnostic, functional, skeletal, and psychosocial aspects of malocclusion. Each index is designed with a specific purpose—whether assessing treatment need, severity, complexity, or outcome—and must be selected accordingly. When used judiciously and interpreted in conjunction with thorough clinical examination, radiographic evaluation, and patient-centered considerations, orthodontic indices significantly improve objectivity, consistency, and quality of orthodontic care.

REFERENCES

1. Angle EH. (1899). Classification of malocclusion. Dent Cosmos. 41:248–264.
2. Russell AL. (1966). Epidemiology of oral disease. Public Health Rep. 1966;81(7):671–679
3. Mohlin B, Kurol J. (2003). A critical view of treatment priority indices in orthodontics. Swed Dent J. 27(1):11-21.
4. Brook PH, Shaw WC. (1989). The development of an index of orthodontic treatment priority. Eur J Orthod. ; 11 (3) :30 9–320.
5. Daniels C, Richmond S. (2000). The development of the Index of Complexity, Outcome and Need (ICON). J Orthod. ;27(2):149–162.
6. Zhang C, He W, Chen B, et al. (2023). Artificial intelligence in ortho dontics: current applications, challenges, and future directions. Angle Orthod. 93(4):505–516.
7. Summers CJ. (1971). The Occlusal Index: A system for identifying and scoring occlusal disorders. *American Journal of Orthodontics*. 59(6):552–567.
8. Little RM. (1975). The irregularity index: a quantitative score of mandibular anterior alignment. *Am J Orthod*. ;68(5):554–563.
9. Baumrind S. (1966). A reconsideration of the use of indices in orthodontic diagnosis. *Am J Orthod*. ;52(12):883–893.
10. Cons NC, Jenny J, Kohout FJ. (1986). DAI: The Dental Aesthetic Index. *Iowa City: College of Dentistry, University of Iowa*.
11. World Health Organization. (1997). *Oral health surveys: basic methods*. 4th ed. Geneva: WHO.
12. Grainger RM. (1967). Orthodontic treatment priority index. *Public Health Service Publication No. 1000, Series 2, No. 25*. Washington, DC: U.S. Government Printing Office.
13. Brook PH, Shaw WC. (1989). The development of an index of orthodontic treatment priority. *Eur J Orthod*. ;11(3):309–320.
14. Richmond S, Shaw WC, O'Brien KD, Buchanan IB, Jones R, Stephens CD, et al. (1992). The development of the PAR Index (Peer Assessment Rating): reliability and validity. *Eur J Orthod*. 14(2):125–139.

CITATION OF THIS ARTICLE

Sonia P, Namrata D, Tarun K. Orthodontic Indices: A Review Article. Bull. Env. Pharmacol. Life Sci., Vol 15 [7] June 2026. 69-73