

## An Overview to Depict the Role of Invisalign to Fix Deep Bite

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### Abstract

To achieve a more appealing smile, an orthodontic technique known as Invisalign might be utilised. Invisalign procedures may be beneficial if you have an overbite, crossbite, or deepbite. Transparent plastic aligner trays are used to gradually straighten the teeth during the operation. Patients may maintain their oral health and wellbeing by simply removing the trays, without having to worry about brackets and wires that may make it difficult. The primary goal of this study is to evaluate previous studies and review all available evidence on how Invisalign can treat deep bites. The comprehensive search will use Medline, PubMed Central, Embase, and other databases. The literature review is completed in English with the goal of reviewing the material that describes how Invisalign can treat deep bites. In recent years, the importance of appearance in personal and professional lives has spurred significant interest in orthodontic treatment among adults. The transparency of the Invisalign appliance boosts its visual appeal for mature patients who are hesitant using conventional labial fixed braces.

**Keywords:** Orthodontic treatment, Invisalign, Deep bite, Clear aligners, Plastic aligners, orthodontic therapy.

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### INTRODUCTION

An orthodontic procedure called Invisalign can be used to achieve a more attractive smile. It can also be used to adjust the bite in patients with mild to severe misalignment [1]. A person may be benefitted from Invisalign procedures if they have an overbite,

crossbite, or deepbite. The procedure involves using transparent plastic aligner trays to progressively straighten the teeth. By simply removing the trays, patients may maintain their oral health and wellbeing without worrying about brackets and wires that might make it difficult [2].



Image showing a Deep Bite

Invisalign's clarity and absence of sophisticated technology are its key benefits. While Invisalign is not fully invisible, it is significantly less noticeable in the mouth than metal braces and many people also find it to be more pleasant. Because they are

practically invisible on your teeth, Invisalign may be a more aesthetically acceptable option [3]. They enjoy a lot of popularity among adults in part because of this. Braces might not be the best option for you if you

worry that they will make you less likely to smile or cover your lips [4].

A "clear aligner" is the generic term for this class of appliance, while Invisalign is a brand name. Invisalign can help straighten your teeth and fix a crooked bite, much like conventional braces can [5]. A dentist uses digital scans or imprints of your teeth to create a series of aligners for you. Your teeth are put under pressure by these aligners as they reposition them into their new places. Before moving on to the next aligner in the series, you usually wear an aligner for 1 to 2 weeks. Dentists occasionally advise using attachments with clear aligners like Invisalign. These connections are tiny, button-like structures that are firmly attached to your teeth [6].

When using Invisalign, the aligners' shape is different from the shape of your teeth, which forces your teeth into their new position. While producing the desired movement, the aligner occasionally needs a little assistance. Attachments have a role in this. These can be required if your treatment calls for more intricate tooth movement. Little, tooth-colored structures known as attachments affix to your teeth. They are constructed from a substance known as composite resin, which is also used to make dental fillings. Each attachment is extremely specifically shaped so as to encourage a particular movement. The attachment is then moved by your aligner applying pressure to it. Moreover, attachments can assist your aligner stay in place over your teeth by anchoring it [7].

The use of Invisalign aligners, on the other hand, has received more attention in recent years [8]. Many commercial brands with various components in their composition are being offered on the global market [9]. Therefore, it is crucial to understand the structural, mechanical, and elastic qualities of the material that will be utilised because, in theory, the aligners should be flexible for insertion and removal yet rigid enough to produce the force required to move the teeth in the appropriate direction. Hence, the hunt is on for a thermoplastic substance that exhibits linear force behaviour, is hardy and long-lasting, and promotes efficient tooth movement. In this study we will review the role of Invisalign to treat a deep bite during orthodontic therapy [10].

## AIM AND OBJECTIVES

This study's main objective is to assess past studies and review all of the available material on how Invisalign can treat deep bites.

## METHODOLOGY

The thorough search will be conducted utilising Medline, PubMed Central, Embase, and other databases. Literature review is done in English with the purpose of reviewing the literature on the subject

describes how Invisalign can correct deep bites. Data was taken from the web databases and tabulated using the already developed data extraction forms. The details were contained in the pre-designed data extraction form regarding the invisalign features and study citation to correct deep bite. Extracted Medline and PubMed Central information will be inserted into the previously generated data extraction form by the principal researcher. The result is seen and the outcomes are recorded.

## Criteria for Inclusion and Exclusion

To determine which ones were appropriate for the study, the initial list of publications or cases was examined. Any papers or case studies using Invisalign to treat deep bites in people of both sexes meet the inclusion criteria for this study (males and females). Except from research using invisaligners, all articles or cases that are not in the English language or that treat non-human subjects are excluded from the study.

## Data Extraction and Quality Assessment

Data extraction processing was done on studies that matched the requirements for inclusion. Finding out the role of invisaligners to fix deep bite is the main objective of the systematic study. Data were obtained through reviewing the research. The following information was gathered to understand the study on invisaligners strategies: author, year, purpose, findings, summary, and conclusion.

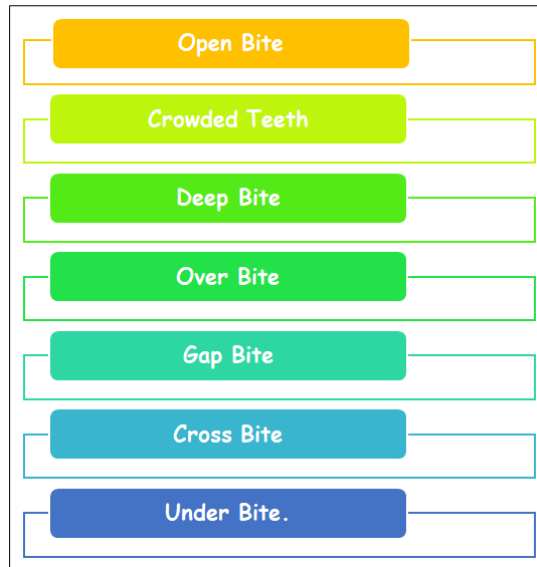
## RESULTS

Utilising cutting-edge 3D computer imaging technology, Invisalign treatment is essentially an invisible way to straighten your teeth. Using the present and final positions of your teeth after they have been straightened, Invisalign technology creates a treatment plan that gradually realigns your teeth. During various phases of treatment, Invisalign moves your teeth by applying a controlled force to various parts of your teeth [11]. Simply explained, with each new set of aligners you wear; only certain teeth can shift. Compared to metal braces, this method of straightening your teeth is far more regulated and less uncomfortable.

Medical-grade thermoplastic in clear form makes up Invisalign. There is no pain while you sleep because the material is smooth. The invisaligners are easy to remove; it can be removed whenever you want. These mouth guards are much thinner than the typical mouth guard and are clear [12]. The invisaligners promote improved gum health. They can be taken off, so you can clean and floss as usual. Moreover, they are not made of metal, so you need not worry about your gums getting cut. It possess no dietary restrictions. Any form of food can be taken, even the chewing gum by removing the aligners. No frequent visits are required at the dentist, as nothing has to be tightened because it's not working with metal wires [13].

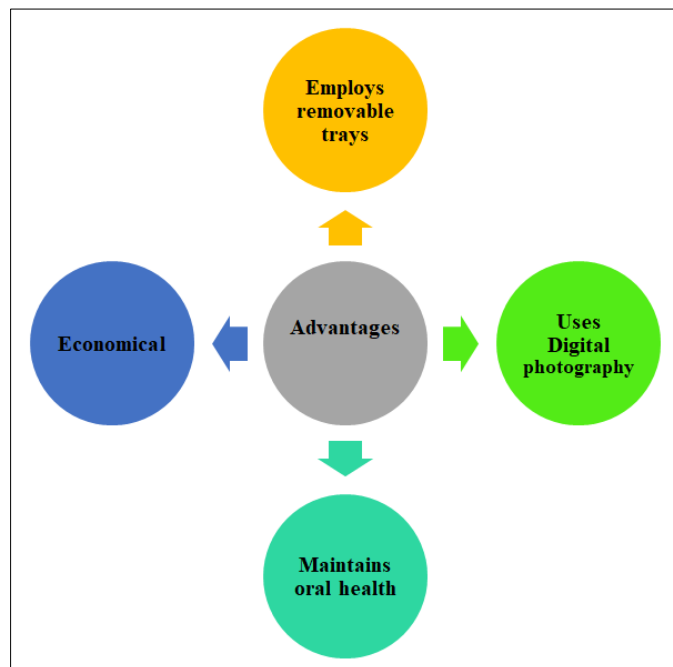
**Use of Invisalign to Treat Dental Problems**

Invisalign can be used to manage the following dental conditions:



**Advantages:**

1. It employs removable trays rather than brackets that are bonded to the teeth and connected with wires to straighten the teeth.
2. It delivers exact treatment because the trays were made using digital photography.
3. It permits people to have a completely new smile without hiding behind metal appliances. Patients can maintain their oral health and fitness by brushing and flossing while using removable Invisalign trays.
4. It costs less than conventional braces and is more covert.

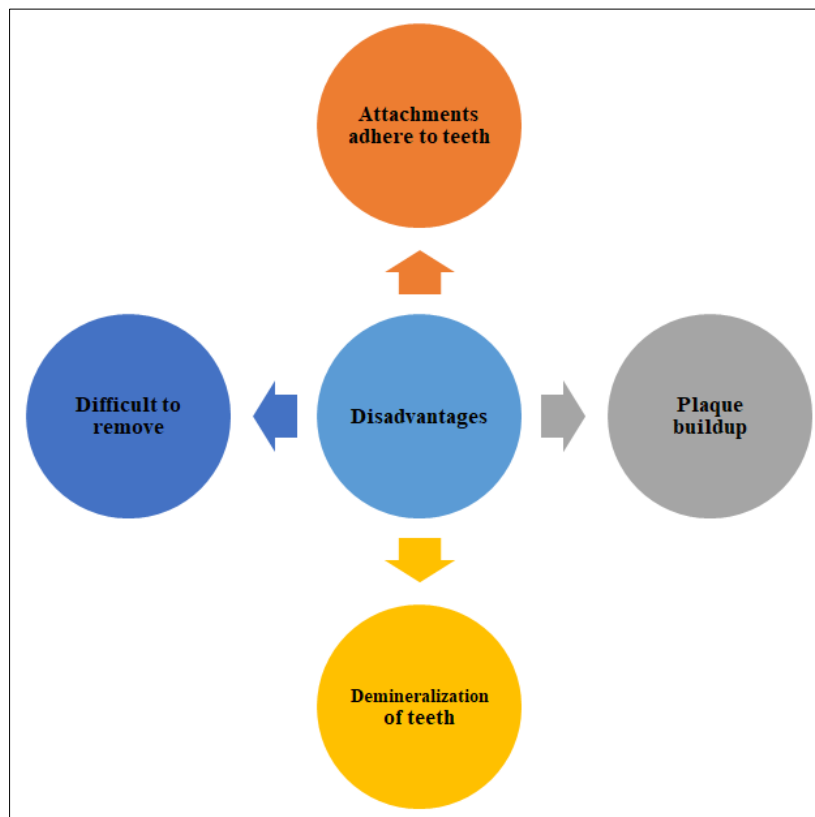


**Disadvantages:**

1. The attachments adhere to the outside of your teeth like the brackets of conventional braces. These could offer a favourable spot for plaque to accumulate.
2. When you have attachments, if you don't maintain appropriate oral hygiene, plaque build-up around the attachments may eventually cause staining or discoloration in these locations.

3. Regular brushing and flossing can prevent cavities from forming and eventually prevent demineralization, or the loss of tooth minerals.

4. Your aligner may be held in place by attachments. After getting attachments, you could find that your aligner fits more firmly, making removal slightly more difficult.



The treatment scope of invisible orthodontics without brackets has gradually increased over the past few years as a result of ongoing innovation in the fields of materials science and biomechanics, going from straightforward crowding alignment and gap closure to subtraction or non-reduction treatment of mild and moderate malocclusions [14]. The technology behind invisible braces, which don't require brackets, has both the advantages of three-dimensional design and the drawbacks of controlling tooth movement in three dimensions. Hence, before selecting eligible cases for treatment, orthodontists must thoroughly comprehend the characteristics of invisible orthodontics without brackets. In order to get the optimum clinical outcome, orthodontists must simultaneously completely utilize their clinical knowledge in the creation of three-dimensional orthodontic solutions and properly foresee the variations in performance of various forms of tooth movement [15].

The indication for clear aligner treatment has expanded from simple crowding or spacing to moderate malocclusion, including extraction or non-extraction instances, as biomaterial and biomechanics have been increasing and evolving rapidly. In order to select the appropriate indications and achieve positive treatment outcomes, orthodontists must be fully aware of the

characteristics and weaknesses of this appliance, taking into account both the advantage of its prospective three-dimensional digital planning and the disadvantage of its limited capability of three-dimensional tooth movement control [16].

The need for adult patient's cosmetic orthodontic treatment alternatives has grown significantly in recent years. With the rise in popularity of clear aligner, thorough treatment with more difficult dental movements is now possible. Also, the growing use of technology in dental procedures has increased the attraction of invisalign aligners to both patients and doctors [17].

There is a growing desire for more cosmetic appliances due to the rise in adult orthodontic patients, necessitating alternatives to the traditional fixed orthodontic device. Thus, significant work has been put in the creation of materials that mimic the color of the teeth to provide better aesthetics. At first, aesthetic brackets constructed of various materials were employed with high clinical acceptability, including polycarbonate and polycrystalline or monocrystalline ceramics [18].

## DISCUSSION

Hypothesis testing and the creation of novel products progress the discipline of orthodontics. To keep up with the expanding industry, orthodontists must consider how to develop as skilled clinicians. Technology-enabled innovation will make it possible to provide healthcare that is more precise, effective, and communication-enhancing. Orthodontists must not only consider the patient's needs today, but also be able to make use of the new technology equipment at their disposal to produce the most stable, health-promoting, and aesthetically pleasing results. The orthodontist's main objective is to enhance the patient's overall quality of life [19].

Over the past few decades, the general public's perspective of quality of life has altered. Modern times have brought us a new definition of quality of life that places a greater emphasis than ever before on youth and beauty. The number of elective cosmetic operations and plastic surgeries has significantly increased. Similar to how children's orthodontic care has increased recently, so has adult orthodontic care. Adults who seek orthodontic treatment are motivated by the emphasis on facial and dental aesthetics in modern society. Adult patients can now enjoy not just an aesthetic treatment process but also an aesthetic treatment outcome thanks to the development of new aesthetic gadgets like Invisalign. There has been a dramatic increase in Invisalign cases due to the rising demand for aesthetics [20].

Pain is a complex feeling that is triggered by painful stimuli. As a result, it is critical to comprehend the pain pattern throughout orthodontic treatment because pain and discomfort are two of the primary factors influencing the patient's Quality of Life during treatment. Furthermore, one of the biggest reasons for delaying orthodontic therapy is fear of discomfort, and past research have found that 8% to 30% of patients abandon orthodontic treatment due to pain encountered during the early phases of treatment.

Numerous brand-new alternative orthodontic equipment have been developed since the invention of conventional fixed orthodontic appliances to help patients reach the skeletal, alveolar, and oral objectives specified by orthodontists. Any novel appliance that is introduced comes with the challenging task of assessing its clinical performance and efficacy. The ability and experience of the doctor have a significant role in determining how well an appliance performs and what impact it has on patients. The literature is currently lacking in articles that assess the impacts and results of cases treated with Invisalign. Clinicians have found it challenging to assess the appliance's performance due to a paucity of studies in case-controlled situations [21].

Regarding the indications for aligner treatment, there is significant debate. According to

Align Technology, 90% of orthodontic patients qualify for Invisalign treatment. These patients include individuals who have skeletal restricted arches, mild to moderate crowding (1–6 mm), and relapse after fixed appliance therapy. The goal of evidence-based medicine is to offer the optimal treatment that is supported by a wide range of reliable data. The indications, treatment outcomes, and appliance restrictions could not be conclusively determined, according to a recent systematic assessment of the Invisalign System. Changes to the appliance have been made after this systematic review was done, and randomised clinical trials that adhere to the CONSORT (Consolidated Standards of Reporting Trials) declaration have also been encouraged.

Because previous studies had shown subpar treatment outcomes, removable appliances have faced a lot of criticism in the past. According to research by Richmond and Shaw, 50% of cases that had received removable appliances had either not improved or had actually gotten worse. Therefore, it has been strongly advised that removable appliances only be taken into account in cases of tipping, block movements, overbite reduction, space maintenance, and retention.

Most studies believe that a deep bite is difficult to cure with aligners, as are anterior intrusion and posterior extrusion, but not all studies agree. According to a recent evaluation by Papadimitriou [22] of the literature on the efficacy of Invisalign therapy on various forms of malocclusions undertaken, Invisalign was found to be beneficial for tipping and rotating motions. Furthermore, the results of Invisalign therapies may be equivalent to those of fixed multibracket therapies in adult patients with minimal or medium crowding who do not require extractions.

Malocclusions with a deep bite, on the other hand, are more difficult to treat. A Douglas Henik *et al.*, study compared patients with skeletal deep bites who had Invisalign and virtual bite ramps to individuals who received fixed orthodontic equipment. This study found no difference in treatment effectiveness between fixed and Invisalign technology [23].

Furthermore, the correction of a deep bite was challenging with the clear aligners, according to Yang Liu and Wei Hu. Deep bite correction entails either posterior tooth extrusion or anterior tooth intrusion, or both motions. The choice is determined by several factors, including the amount of gum exposed by the incisors during a grin and the vertical dimension. The incisors were easily inserted, but the posterior teeth were not favoured by Invisalign because covering the occlusal surface inhibited their extrusion [21].

Educating patients on the benefits and drawbacks of clear aligner therapy or clear braces is heavily dependent on patient expectations and

compliance. First, as a provider, the orthodontist must rule out traditional braces by communicating clearly with the patient. If the patient wants no treatment obligations, is consistent in attending the office on a monthly basis, and wants the dentist to handle all of the treatment, conventional braces are the sole option. Clear aligner therapy can be ruled out right away. If patients want to benefit from clear aligner therapy, the pros and cons must be given to them. First, the patient must comprehend their obligations and responsibilities. They must wear the aligners for a minimum of 22 to 23 hours every day.

One of the advantages of aligner systems is the ability to view the eventual outcome of straight teeth and the evolution of tooth movement through the various phases. It is critical to consistently inspire each patient during treatment to properly wear aligners in order to reap the benefits of the treatment, as well as to maintain patient compliance and patient self-discipline.

## CONCLUSION

The importance of appearance in personal and professional lives has sparked significant interest in orthodontic treatment among adults in recent years. The Invisalign appliance's transparency increases its aesthetic appeal for adult patients who are uncomfortable using traditional labial fixed orthodontic appliances. Despite claims of evident aligner effectiveness, evidence is often inadequate. The only substantial effectiveness of transparent aligners over conventional systems that is supported by current evidence appears to be reduced treatment duration and chair time in mild-to-moderate instances.

## Limitations

Despite the fact that orthodontic treatment with Invisalign is a widely used treatment option, no clear recommendations about other indications of the system can be made based on solid scientific evidence, aside from non-extraction treatment of mild to moderate malocclusions in patients.

**Ethical Considerations:** Compliance with ethical standards.

## Ethical Approval

This proposal contains systematic review that has no survey studies with human participants performed by the authors.

## CONFLICT OF INTEREST

The authors do not have any commercial associations that might pose or create a conflict of interest with information presented in this communication. No intramural or extramural funding supported any aspect of this work.

## REFERENCES

1. Azaripour, A., Weusmann, J., Mahmoodi, B., Peppas, D., Gerhold-Ay, A., Van Noorden, C. J. F., & Willershausen, B. (2015). Braces versus Invisalign®: gingival parameters and patients' satisfaction during treatment: a cross-sectional study. *BMC oral health*, 15(1), 1-5.
2. Bouchez, R. (2010). Clinical success in Invisalign orthodontic treatment. Paris: Quintessence International.
3. Lagravere, M. O., & Flores-Mir, C. (2005). The treatment effects of Invisalign orthodontic aligners: a systematic review. *The Journal of the American Dental Association*, 136(12), 1724-1729.
4. Zheng, M., Liu, R., Ni, Z., & Yu, Z. (2017). Efficiency, effectiveness and treatment stability of clear aligners: A systematic review and meta-analysis. *Orthodontics & craniofacial research*, 20(3), 127-133.
5. Kravitz, N. D., Kusnoto, B., BeGole, E., Obrez, A., & Agran, B. (2009). How well does Invisalign work? A prospective clinical study evaluating the efficacy of tooth movement with Invisalign. *American Journal of Orthodontics and Dentofacial Orthopedics*, 135(1), 27-35.
6. Grünheid, T., Loh, C., & Larson, B. E. (2017). How accurate is Invisalign in nonextraction cases? Are predicted tooth positions achieved?. *The Angle Orthodontist*, 87(6), 809-815.
7. Pavoni, C., Lione, R., Laganà, G., & Cozza, P. (2011). Self-ligating versus Invisalign: analysis of dento-alveolar effects. *Annali di stomatologia*, 2(1-2), 23-27.
8. Gu, J., Tang, J. S., Skulski, B., Fields Jr, H. W., Beck, F. M., Firestone, A. R., ... & Deguchi, T. (2017). Evaluation of Invisalign treatment effectiveness and efficiency compared with conventional fixed appliances using the Peer Assessment Rating index. *American Journal of Orthodontics and Dentofacial Orthopedics*, 151(2), 259-266.
9. Drake, C. T., McGorray, S. P., Dolce, C., Nair, M., & Wheeler, T. T. (2012). Orthodontic tooth movement with clear aligners. *International Scholarly Research Notices*, 2012, 657973.
10. Hennessy, J., & Al-Awadhi, E. A. (2016). Clear aligners generations and orthodontic tooth movement. *Journal of orthodontics*, 43(1), 68-76.
11. Hennessy, J., Garvey, T., & Al-Awadhi, E. A. (2016). A randomized clinical trial comparing mandibular incisor proclination produced by fixed labial appliances and clear aligners. *The Angle Orthodontist*, 86(5), 706-712.
12. Ravera, S., Castroflorio, T., Garino, F., Daher, S., Cugliari, G., & Deregisbus, A. (2016). Maxillary molar distalization with aligners in adult patients: a multicenter retrospective study. *Progress in orthodontics*, 17, 1-9.
13. Danz, J. C., Greuter, C., Sifakakis, I., Fayed, M., Pandis, N., & Katsaros, C. (2014). Stability and

- relapse after orthodontic treatment of deep bite cases—a long-term follow-up study. *European journal of orthodontics*, 36(5), 522-530.
14. Adobes-Martin, M., Montoya-Morcillo, M. L., Zhou-Wu, A., & Garcovich, D. (2021). Invisalign treatment from the patient perspective: A Twitter content analyses. *Journal of Clinical and Experimental Dentistry*, 13(4), e376-e382.
  15. Nota, A., Caruso, S., Ehsani, S., Ferrazzano, G. F., Gatto, R., & Tecco, S. (2021). Short-term effect of orthodontic treatment with clear aligners on pain and sEMG activity of masticatory muscles. *Medicina*, 57(2), 178.
  16. Krieger, E., Seiferth, J., Marinello, I., Jung, B. A., Wriedt, S., Jacobs, C., & Wehrbein, H. (2012). Invisalign® Treatment in the Anterior Region. *J. Orofac. Orthop./Fortschr. Kieferorthopädie*, 73, 365–376.
  17. Wragg, P. F., Jenkins, W. M., Watson, I. B., & Stirrups, D. R. (1990). The deep overbite: prevention of trauma. *British Dental Journal*, 168(9), 365-367.
  18. Miller, R. J., & Derakhshan, M. (2002). The Invisalign System: case report of a patient with deep bite, upper incisor flaring and severe curve of Spee. *Seminars in Orthodontics*, 8, 43–50.
  19. Zhao, Z. H. (2019). Clear aligner therapy: risks and clinical strategies. *Zhonghua Kou Qiang Yi Xue Za Zhi*, 54, 798–802.
  20. Rossini, G., Parrini, S., Castroflorio, T., Deregiibus, A., & Debernardi, C. L. (2015). Efficacy of clear aligners in controlling orthodontic tooth movement: a systematic review. *The Angle Orthodontist*, 85(5), 881-889.
  21. Liu, Y., & Hu, W. (2018). Force changes associated with different intrusion strategies for deep-bite correction by clear aligners. *The Angle Orthodontist*, 88(6), 771-778.
  22. Papadimitriou, A., Mousoulea, S., Gkantidis, N., & Kloukos, D. (2018). Clinical effectiveness of Invisalign® orthodontic treatment: a systematic review. *Progress in orthodontics*, 19(1), 1-24.
  23. Henick, D., Dayan, W., Dunford, R., Warunek, S., & Al-Jewair, T. (2021). Effects of Invisalign (G5) with Virtual Bite Ramps for Skeletal Deep Overbite Malocclusion Correction in Adults. *Angle Orthod.*, 91, 164–170.