

CLEAR ALIGNERS VS. FIXED ORTHODONTIC APPLIANCES: A SYSTEMATIC REVIEW

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the
degree of Master of Business Administration
(MBA)

in

Hospital

and Health Management/Pharmaceutical Management/Rural
Management

by

Dr. Richa Dwivedi

Under the Supervision and Guidance of

Dr. Deepti Sharma

TITLE OF THE DISSERTATION

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**DECLARATION BY
STUDENT**

I hereby declare that this dissertation titled Clear aligners vs. Fixed orthodontic appliances: A systematic review is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Name of the student: Dr. Richa Dwivedi

Date

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Richa Dwivedi** in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur has successfully completed her internship at **Invisalign India LLP**. during April 04, 2022, to June 25, 2022.

Shubhangi Swaraj

Shubhangi Swaraj Senior
Manager Human Resource ,
India
Invisalign India LLP

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1. Chapter 5

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Abbreviations

1. FOA- Fixed orthodontic appliances
2. VAS- Visual Analogue Scale
3. CAT- Clear aligner therapy
4. OHRQoL- oral health-related quality of life

Abstract

Title- A systematic review of clinical effectiveness of Clear Aligner treatment as compared to fixed appliances treatment.

Introduction- Fixed orthodontic appliances (FOA) are the therapy of choice for most patients, particularly during childhood and adolescence. This technique is not very popular for adult orthodontics due to aesthetic concerns. As a result, new orthodontic techniques have been created to improve the appearance of teeth and make oral hygiene routines easier. One of the most common concerns among patients seeking orthodontic treatment is aesthetics. Investigators have established various methods, such as ceramic or composite braces, lingual orthodontics, and clear aligners, to address the growing aesthetic need for an alternative to traditional braces. Clear-aligner systems made significant development in the 1990s as computer technology advanced, and they have been gaining popularity since then. Clear aligners are available in a variety of brands nowadays. Invisalign, which has been available since 1999 and offers not only improved aesthetics but also the convenience of removal during food and beverage uses as well as oral maintenance, is an alternative for FOA. They both use the same material—semi elastic polyurethane, a thin, translucent plastic—but the cost and software approach are different.

Research Question- Clear Aligners vs. Fixed appliances- Which is a better treatment option for correcting maligned teeth?

Objectives-

1. To understand the effectiveness of orthodontic treatment with clear aligners in comparison to fixed orthodontic treatment in patients with permanent dentition.

2. List the different types of orthodontic treatment, the reasons why patients might prefer one over the other, and how gender and age might influence preference.
3. Provide historical context for clear aligners and their pros and cons.

Keywords; Clear aligners, fixed orthodontic appliances, efficiency, effectiveness

Background

For those that require it, Orthodontic therapy is both a dental therapy and an aesthetic service. It's crucial to comprehend how orthodontic intervention decisions are made thanks to the high expenses of undergoing this kind of treatment and also the widespread myth that it's a cosmetic service.

In the year 1997, there were two university students; Zia Chishti and Kelsey Worth created the first clear aligner system in history. For those trying to find discrete treatment, the Invisalign method used a series of clear plastic aligners that might be taken out. You need to keep in mind that before this, braces, and wire treatments, additionally as retainers and positioners, were required for anyone who needed their teeth straightened. just by using distinct removable aligners, teeth may well be dramatically moved. although the pair had made something truly original, it had been even more impressive since this type of transparent teeth straightener was the primary to be remade using numerous computer-aided models supported one imprint. Naturally, this implied that dentists had more duties to fulfil.

This review's objective was to conduct an intensive literature search and synthesize the available scientific data regarding the effectiveness, efficiency, benefits, and disadvantages of CAT as compared to FAT among patients of any age with permanent dentition who received traditional treatment and people who received clear aligner therapy.

Methodology

Study method: Published articles, case studies, and literature reviews were searched in electronic databases. All articles that qualified for inclusion had their reference lists checked for extra research.

Sample size: The electronic database identified 15 relevant articles, case studies and literature reviews.

Types of Studies:

Randomized controlled trials, prospective studies, cross-sectional, comparative studies, qualitative studies, and literature reviews which examined the effects of CAT with FAT, were acceptable for this study.

Participants:

Patients of any age with permanent dentition, who were undergoing/underwent treatment with the new clear aligners therapy and those who were treated with the traditional fixed appliances therapy.

Data collection:

Rummaging through research papers and articles that compared the Clear Aligner therapy with fixed appliance therapy on a variety of factors, such as efficiency, effectiveness, impacts on periodontal health, and aesthetics, served as the foundation for data collecting.

The data collection format was in the following form:

- Title/author/year of study

- Study design/setting
- Number/age/gender of subjects
- Comparative factor of study

Ethical Considerations:

1. Consent for publication: Not required

2. Plagiarism- Plagiarism occurs when you present someone else's work as your own. When someone replicates another person's work without giving them due credit, even unintentionally, it is considered theft. Research communication presents a moral conundrum because disparaging other researchers may be profitable. This is troublesome because, even if your ideas have been used before, you could still profit by marketing them as unique and inventive. You might be violating someone else's copyright, going against morality, or squandering time and money if you do this.

3. Misconduct in research

Research misconduct includes faking or fabricating data, manipulating data analysis, and misrepresenting ends up in study reports. this sort of educational dishonesty exists. Research misconduct isn't an easy error or a disagreement over data processing; these behaviours are intentional and should have significant consequences. Research misconduct may be a grave ethical concern because it's going to compromise institutional credibility and scientific integrity. It results in the waste of cash and resources which will are better allocated to a different research.

Review of Literature

Title	Authors (Year)	Salient features
Braces versus Invisalign: gingival parameters and patients' satisfaction during treatment: a cross-sectional study	A.Azaripour, J. Weusmann, B. Mahmoodi, D. Peppas, A. Gerhold-Ay, C. J. F. Van Noorden, and B. Willershausen (2015)	Study location: Dental clinics Sample size: 100 The inclusion criteria were met, and a complete of 100 orthodontic patients were included. The patients ranged in age from 11 to 62. Study type: Cross-sectional study Features: This study aims to comprehend the oral hygiene and the content of patients undergoing treatment using traditional orthodontic fixed appliances and those using clear aligners- Invisalign. The chief hypothesis of this experiment was that patients who were treated with Invisalign had better dental hygiene and periodontal health as compared to those treated with FOA. The second theory was that throughout treatment, Invisalign patients had an improved Quality of life. quality of life than FOA.
Orthodontic Treatment with Clear Aligners and	İpek Tamer, Evren Öztaş, and Gülnaz Marşan (2019)	Features: The authors discuss the scope, limitations, effectiveness, efficacy, and stability of treatment results achieved. The

Chapter 5

Discussion

A summary of all the articles and research papers that were reviewed, highlighting the treatment effectiveness of clear aligners versus fixed appliances. The advantages and disadvantages of transparent aligners over fixed orthodontic appliances are discussed. The articles also explored various treatments that can be carried out with clear aligners. Due to this topic being relatively unexplored and plenty of advances in the clear aligner system (specially with Invisalign) that have not been explored yet, an honest effort to carry out this research with high quality and to avoid any biasness was attempted. An attempt was also made to include all relevant available data.

Despite the manufacturers' helpful advice, doctors are divided on the appropriateness and effectiveness of aligner systems. The primary goal of this research was to look through the literature to determine the efficacy, capabilities, and limitations of clear-aligner therapy in general, rather than focusing on a specific product.

Family members, particularly mothers, can have a significant impact on whether or not orthodontic treatment should be performed. Apart from this, the concerns of both; parents and patients about orthodontic treatment, as well as its consequences on self-confidence, behaviour, dental health and also the aesthetics need to be considered. Another essential factor for the decision-making process is the family support and the effect of family members' thoughts and attitudes towards the treatment. The economic status and cultural background of patients are two other aspects that can influence this form of treatment.

It Is evident from this systematic review, that there needs to be more high-quality prospective studies with major focus on the advances in clear aligner systems that should be carried out in the future. A regulated procedure including control samples would also add to a better understanding of comparative analysis between CAT vs. FAT.

Lastly, the retention of the clear aligners as compared to conventional fixed appliances is another major area that needs to be explored.

The table below highlights the various advantages and disadvantages of clear aligners.
(Table 5.1)

Advantages	Disadvantages
1. Clear aligners can straighten your teeth in half the time it takes with traditional braces.	1. Clear aligners are not the best choice for extreme cases.
2. Unlike traditional braces, clear aligners are not attached to your teeth. Instead, they are placed over the teeth and worn for at least 22 hours per day. This implies you can eat and drink without them.	2. Buttons and other auxiliaries need to use to keep the aligners in place.
3. Fewer dental visits	3. It's normal to feel self-conscious when wearing transparent aligners for the first time. You can have difficulty pronouncing specific words, or even speaking in general.
4. Improved periodontal health	4. Expensive as compared to fixed appliances

Table 5.2

Clinical Outcome assessment of Clear aligners vs. Fixed orthodontic appliances

Outcomes	Therapy	Better	Deteriorate	No change
Esthetics	Clear aligners			
	Fixed appliances			
Periodontal health	Clear aligners			
	Fixed appliances			
Retention post treatment	Clear aligners			
	Fixed appliances			
Treatment visits	Clear aligners			
	Fixed appliances			
Oral hygiene	Clear aligners			
	Fixed appliances			
Patient experience	Clear aligners			
	Fixed appliances			
Complex cases (Extrusion, mesialisation, rotation)	Clear aligners			
	Fixed appliances			

Chapter 6

Conclusion:

Even though clear aligners have gained immense popularity with the amount and complexity of cases being treated with it, this technology is still facing challenges in handling every type of malocclusions. Clear aligners are efficient when it comes to cases of minor to moderate crowding or diastema space closure, expansion of the posterior arch, intruding (pushing inside) of one or two teeth, extractions of the lower incisors, and the molars tipping distally. When it comes to complex tooth movements like extruding (pushing outside), correcting drastic cases of rotation, up- righting the molars, and closure of extraction spaces, the efficiency of clear aligners is limited. However, the Invisalign system has attachments that may aid in incisor extrusion, molar transition, and extraction space closure.

Concerns about the clear aligner system's effectiveness continue as interest and demand for it grow. The effectiveness and efficacy of transparent aligners have received scant clinical attention to far. it's unable to objectively measure the effectiveness of clear aligner systems because previous research has mainly comprised of case studies or product descriptions.

From all the studies and research papers, it's apparent that clear aligners are always chosen over fixed orthodontic appliances in terms of patient comfort and aesthetics.

The popularity and utility of the clear aligner procedure have increased recently. However, a major discrepancy observed in the studies comparing clear aligners with conventional orthodontic appliances was, a lack in methodology with an increased risk of biasness, fewer number of comparison groups or blinding procedures, and a limited number of participants that lack of authenticity and end result of the study.

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