Evaluation of Awareness and Perception of Clear Aligner Orthodontic Treatment Among Students of Hawler Medical University.

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Background and Objectives: The growing emphasis on appearance has led to an increased interest in orthodontic treatment among adults, particularly those who are highly self-conscious about their looks. Clear Aligner Therapy, a nearly invisible and effective method for aligning teeth, represents the latest generation of aesthetic orthodontic treatments. This study aims to assess the awareness and perception of Clear Aligner Therapy among students at Hawler Medical University.

Materials and Method: A cross-sectional study was conducted using an online questionnaire comprising four sections: demographics, general dental and orthodontic awareness, knowledge of Clear Aligner Therapy and Fixed Orthodontic Therapy, and optional comments and questions.

Results: A total of 383 participants, with an average age of 20.54 years, completed the questionnaire. The majority (89.6%) were Kurds and 63.2% females. Among the participants, 68.2% had visited a dentist as needed, 72.3% had family members with malocclusions, 41% had sought orthodontic consultation. Additionally, 86.2% were familiar with Fixed Orthodontic Therapy, 63.2% had heard of Clear Aligners, 30.5% had undergone orthodontic treatment, and 8.5% individuals had received Clear Aligner Therapy.

Conclusion: The knowledge level of Hawler Medical University students regarding Clear Aligner Therapy was determined to be moderate. Despite the fact that they possessed a general understanding of its characteristics and application, their involvement in the treatment and its procedures was limited. Previous orthodontic treatments recipients', satisfaction with their smile, overall concern about teeth, previous orthodontic consultation, and knowledge of Fixed Orthodontic Therapy all notably demonstrated significant associations with the awareness of Clear Aligner Therapy.

Keywords: Clear Aligner, Orthodontic treatment, Esthetic treatment, Awareness, Perception, Hawler Medical University.

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INTRODUCTION

The demand for orthodontic treatment among adults has been on the rise in recent years due to the increasing importance of appearance in both personal and professional lives. As a result, there has been a growing interest in Clear Aligner Therapy (CAT), a new generation of aesthetic orthodontic treatment methods. CAT involves the use of nearly invisible, transparent, thin, removable plastic aligners that effectively move, By adjust, and align teeth to achieve the desired position.[1]

Adults often prefer not to wear traditional Fixed Orthodontic Therapy (FOT) equipment, such as wires, bands, and brackets, even though they require orthodontic treatment. Aesthetics play a significant role in the decision-making process for patients seeking orthodontic treatment, and orthodontists recognize the importance of addressing these concerns.

utilizing computer-assisted technology (CAD-CAM) to create clear plastic overlays, the CAT system provides adult patients with a visually appealing solution for full-mouth orthodontic treatment that is both effective and enhances their quality of life.[2]

Traditional orthodontic procedures have been associated with compromises in facial appearance, which raises concerns among patients pursuing orthodontic treatment. To overcome these limitations, esthetic tools and methods have been introduced in the clinical practice.[3]

The concept of an alternative to FOT was first introduced in 1946 by Dr. Harold Dean Kesling and further developed by Nahoum, Ponitz, McNamara, and Sheridan. Recent advancements in transparent thermoplastic materials and computer technology, such as CAD-CAM, stereolithography, and tooth movement simulation software, have assisted these ideas. CAT is an extension of the use of tooth positioners, initially introduced by TP Orthodontics in 1945, and has become increasingly available and effective in aligning teeth in various malocclusions.[4]

CAT has been used in dentistry since the late-1990s. The aligners are made from thin, clear plastic material that fits over the surfaces of the teeth. Initially, CAT was primarily used for minor cases of crowding or spacing. However, with advancements in aligner materials and computer design software for tooth movement, the scope of CAT has significantly expanded, proving successful in treating a wide range of malocclusions, from mild to severe.[5]

Compared to FOT appliances, CAT aligners are transparent and removable, making them more desirable to patients for aesthetic reasons. The aligners are typically worn for a minimum of twenty hours per day and replaced every two weeks. CAT also offers improved oral hygiene compared to FOT, as it can be easily removed, allowing the patients to maintain their regular oral hygiene routines and reducing the likelihood of discoloration and decay associated with conventional orthodontic appliances. Additionally, CAT allows for greater dietary flexibility, as there are fewer restrictions on food and drink choices.[6] Several cross-sectional studies have shown that CAT has advantages in terms of chair time and treatment duration, particularly for mild-to-moderate cases.

Despite its advantages, CAT has some limitations. It is considered less efficient than FOT for certain malocclusions and specific types of tooth movements, such as buccolingual inclination (torque), although it is possible that some of the limitations previously associated with CAT have been addressed, at least partially, in updated the versions of the therapy. Notably, advancements in CAT technology, such as precision cuts, precision bite ramps, and tooth attachments, have contributed to more accurate tooth movements.[8] The Invisalign system, which utilizes computer-based online software, allows orthodontists to plan the treatment in advance and share the expected final results with patients. This technology enables a better understanding of the treatment process and outcomes, enhancing communication between the orthodontist and the patient.

It is generally agreed upon that CAT may not be suitable for managing orthodontic cases with skeletal disharmonies or severe crowding.[9]However, with the increasing global demand for CAT, it is crucial to evaluate the awareness and perceptions of this treatment option in different regions. To the best of our knowledge, no previous study has investigated the perceptions of CAT specifically in the Kurdistan region. Therefore, our aim is to determine the level of awareness and the overall perception of CAT in this region.

The objectives of this study were to determine the percentage of awareness of the students of Hawler Medical University (HMU) of Clear Aligner Therapy and to evaluate the preferences of students for different orthodontic treatments.

MATERIALS AND METHODS

This study employed a survey-based observational descriptive (cross-sectional) study design, conducted among students of Hawler Medical University (HMU). A randomized sampling method was used to select participants. A digital survey created using Google Drive forms was distributed to all undergraduate students of HMU, aged

between 17-30 years. A total of 383 participants (10.46%) out of 3661 HMU students completed the questionnaire.

The first section of the questionnaire collected general information about the participants, including ethnicity, age, gender, marital status, income, educational level, and area of residence. While the second section assessed the participants' general awareness of dental and orthodontic issues, their willingness and motivation to undergo orthodontic treatment, as well as their concerns about their dentition and satisfaction with their smile. In the third section, participants were evaluated for their knowledge regarding Clear Aligner Therapy (CAT) and conventional Fixed Orthodontic Therapy (FOT). They were asked to compare the two treatments in terms of esthetics, cost, hygiene, efficiency, time, comfort, and phonetics. The questionnaire included closed-ended questions with "yes" or "no" responses, multiple-choice questions, open-ended questions, and a 3-point Likert scale. And in the end, participants had the option to provide additional comments and ask questions. They were also given the opportunity to submit their email addresses for further contact.

Data entry, evaluation, and descriptive and inferential statistics were performed using SPSS software version 22 and Microsoft Excel 2016. The association between categorical variables was assessed using the Chi-squared test. P-values less than 0.05 and 0.001 were considered statistically significant and highly significant, respectively.

RESULTS

A total of 383 students from HMU, 141 male and 242 female, aged between 17-29 years with a mean age of 20.54 years filled out the survey which was distributed to students' chat groups across all its colleges, the descriptive statistics are shown in Table 1 and Table 2.

The third part of the survey was dedicated to evaluating the awareness of participants of the dominant features of both CAT and FOT. As shown in table 3.

At the end of part 3, The participants were asked about their overall preferences between CAT and FOT as well as the reasons behind their judgment (they were able to select more than one option for justifying their predilection) which is shown in Figure 1.

Those factors that might influence the knowledge about CAT among the total of 242 participants who knew about CAT are displayed in Table 4.

The relation between the 100 participants who elected themselves for CAT to some other related questions is shown in Table 5.

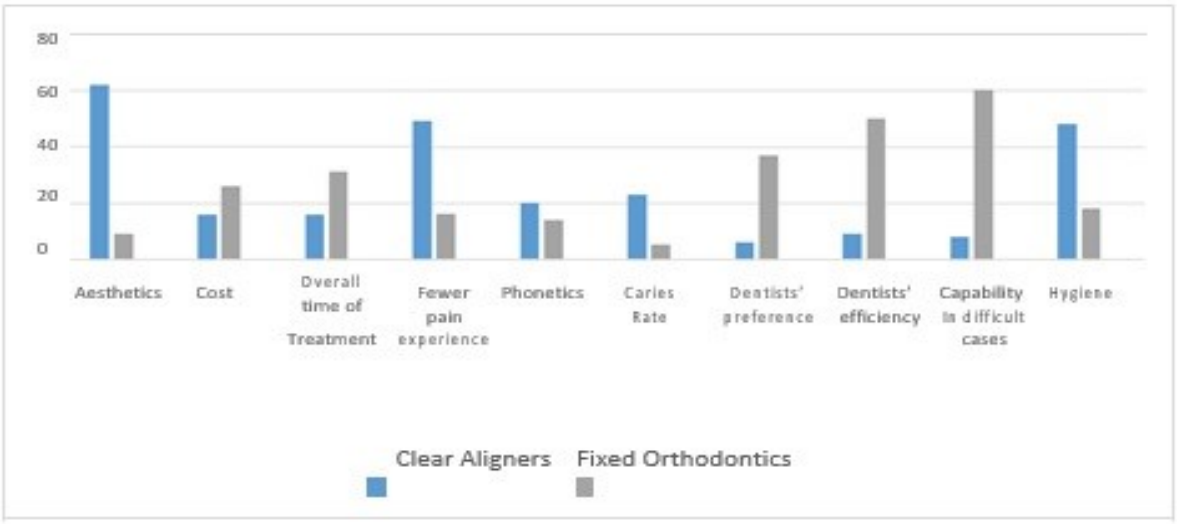

Figure 1: Factors affecting preferences for CAT or FOT.

Table 1: Descriptive Statistics about demographics and general dental awareness.

Questions	Variables	Frequency	Percentage
Ethnicity	Kurds	343	89.6%
	Arabs	20	5.2%
	Assyrians/Chaldeans	12	3.1%
	Others	8	2.1%
Gender	Female	242	63.2%
	Male	141	36.8%
Residence	Inside Erbil city	303	79.1%
	Outside Erbil city	80	20.9%
College	Dentistry	188	49.1%
	Medicine	102	36.6%
	Health Sciences	31	8.1%
	Pharmacy	42	11%
	Nursing	20	5.2%
Family Income (Per Month)	+3,000,000IQD	70	18.3%
	1,500,000-3,000,000IQD	109	28.5%
	800,000-1,500,000IQD	134	35%
	-800,000IQD	70	18.3%
Have you ever visited a dentist?	Yes (Upon need)	263	68.7%
	Yes (regularly)	87	22.7%
	No	33	8.6%
Do you think that you or anyone in your family have a malocclusion that needs to be treated orthodontically?	Yes	277	72.3%
	No	106	27.7%
Have you ever visited a dentist for an orthodontic reason?	Yes	157	41%
	No	266	59%
How much do you care about your teeth?	Concerned	200	52.2%
	Neutral	135	35.2%
	Not Concerned	48	12.5%
Do you know about FOT?	Yes	330	86.2%
	No	53	13.8%
If yes, how do you know about FOT?	Advertisement	11	3.3%
	Dentists	130	39.3%
	Friends/Family	112	33.9%
	Social/Digital Media	43	13%
	Others	34	10.3%
Have you ever had orthodontic treatment before?	Yes	117	30.5%
	No	266	69.5%
If yes, what type of orthodontic treatment have you gone through?	FOT	91	77.7%
	Removable Orthodontics	16	13.6%
	CAT	10	8.5%

Table 2: Descriptive Statistics about awareness toward Clear Aligner Therapy.

Questions	Variables	Frequency	Percentage
Have you ever heard of Clear Aligner orthodontic treatment before?	Yes	242	63.20%
	No	141	36.80%
How do you know about Clear Aligner?	Advertisement	19	7.80%
	Dentists	96	39.60%
	Friends/Family	41	17%
	Social/Digital Media	68	28%
	Others	18	7.50%
Will you elect yourself for Clear Aligner orthodontic treatment?	Yes	100	41.30%
	No	142	58.70%
Have you, your friend, or a member of your family gone through Clear Aligners treatment?	Yes	77	31.80%
	No	165	68.20%
If you have been through Clear Aligner, how many trays have you used during treatment?	1tray	4	40%
	2trays	3	30%
	3trays	1	10%
	6trays	1	10%
	25trays	1	10%
If yes, how long the Clear Aligners had been used?	2months	1	10%
	3months	1	10%
	6months	2	20%
	10months	1	10%
	12months	1	10%
	16months	1	10%
	24months	1	10%
	30months	1	10%
	36months	1	10%
What is the expected time for Clear Aligners compared to FOT?	More	75	31%
	Less	38	15.70%
	Sameinterval	22	9%
	Donot Know	107	44.20%
Do you think someone can switch to Clear Aligner from	Yes	92	38%
	No	20	8.20%
	Do not Know	130	53.70%
Do you think that the Clear Aligners are effective?	VeryEffective	34	14%
	RelativelyEffective	135	55.8%
	SlightlyEffective	32	13.20%
	Donot Know	41	17%
Satisfaction Rate post (after) Clear Aligner Therapy.	Satisfied	2	20%
	Neutral	5	50%
	Dissatisfied	3	30%
Satisfaction Rate post (after) Fixed Orthodontic Therapy.	Satisfied	53	58.20%
	Neutral	21	23%
	Dissatisfied	17	18.70%

Table 3: Comparison between CAT and FOT features among participants.

Properties	CAT		FOT	
	Frequency	Percentage	Frequency	Percentage
Hygienic(Easiness to clean)	208	%85.9	34	%14
Have better outcome/result	39	%16.1	203	%83.8
Less painful	227	%93.8	15	%6.2
More aesthetic	207	%85.5	35	%14.4
No Speech/Phonetic disturbances	136	%56.1	106	%43.8
Lesser food Restrictions	188	%77.7	54	%22.3
Psychologically more accepted (More Confident)	201	%83	41	%17
Less irritating (Peaceful to Oral Mucosa)	207	%85.5	35	%14.5
Lower caries rate	183	%75.6	59	%24.4

Table 4:The relation of knowledge about CAT to other factors.

Variables		Respondents who know about clear aligners		P. Value
		Frequency	Percentage	
College	Dentistry	143/188	%76	**0.001
Residency	Inside Erbil	206/303	68%	0.013*
Gender	Female	173/242	71.4%	0.001**
Concerned about their teeth	Concerned	144/242	59.5%	0.004*
Visiting the dentist	Yes (regularly)	56/87	64.3%	0.001**
Previous orthodontic consultation	Yes	120/157	76.4%	0.001**
Knowing about FOT	Yes	229/242	94.6%	0.001**
Went through orthodontics	Yes	92/117	78.6%	0.001**

Table 5:.The relation of the election of CAT to some other factors among participants.

Variables		Self-electors for Clear Aligners		P.Value
		Frequency	Percentage	
Previous orthodontic consultation	Yes	60/157	%38.2	*0.007
	No	40/226	%17.7	
Went through orthodontics	Yes	43/100	%43	*0.001
	No	57/100	%57	
Know someone who had Clear Aligner	Yes	35/100	%35	**0.001
	No	65/100	%65	

*Means significant,** means highly significant.

DISCUSSION

This study aimed to assess the knowledge and perception of students at Hawler Medical University (HMU) regarding Clear Aligner Therapy (CAT) as a treatment option. The findings shed light on the strengths and weaknesses of CAT by exploring the participants' knowledge of aligners, their preferred source of information, and their preference for aligners and Fixed Orthodontic Treatment (FOT).

The study sample predominantly consisted of Kurds (Table 1), reflecting the demographic composition of the Kurdistan region. Additionally, a higher proportion of female participants was observed, which agrees with previous studies indicating that females seek orthodontic treatments more frequently than males.[10,11,12]

The average age of participants in the sample was 20.54 years, reflecting the predominantly young population of college students. This may explain the limited number of cases undergoing CAT in the study, as CAT is more commonly sought by adults aged 28-38 years,[10,11,12]and this might be one of the reasons for the deficient cases undergoing CAT in this study, moreover most of the patients seeking CAT were employees.[13]

Regarding the sources of information, the study found that participants primarily gained knowledge about FOT from dentists and family/friends, while information about CAT was more influenced by dentists and social/digital media (Table 2). This differs from previous studies that emphasized social media as the primary source of knowledge,[14] as the treatment is less popular but declined to be so in the future.

There was some confusion among participants regarding CAT, as a considerable proportion mistakenly associated CAT with thermoplastic retainers used after FOT. Participants lacked information about the expected treatment duration and the possibility of switching between FOT and CAT. These findings indicate a deficiency in knowledge among participants, most of whom had only heard about CAT incidentally and lacked personal experience or exposure to the treatment.

Satisfaction with the current results of CAT was low, with 30% of participants expressing dissatisfaction. Similar levels of satisfaction have been reported in other studies.[12,15] Additionally, 15.1% of participants reported dissatisfaction after FOT treatment.

Comparing CAT with FOT, participants expected CAT to provide better aesthetics, increased self-confidence, greater comfort, improved hygiene, easier eating, and improved pronunciation. These findings which are also shown in Table 3 are consistent with previous studies highlighting the advantages of CAT in these areas.[15,16]Participants also perceived CAT to be associated with fewer oral mucosal injuries and dental caries, being consistent with findings by (Alajmi et al, 2020), The study found that only 16.1% of participants expected a greater outcome from CAT compared to FOT. This aligns with the preference for FOT in terms of inconveniences caused by wearing aligners, as reported by Ke et al.[17] when participants were asked about the effectiveness of CAT, 55.8% considered it relatively effective, while only 14% believed it to be very effective.

In terms of overall preference as illustrated in Figure 1, the study revealed that 44.4% of participants preferred FOT, while 35.4% chose CAT. Additionally, 20.2% did not have an absolute preference. These findings differ from previous studies,[14,18] where the majority of participants preferred CAT over FOT. The lower preference for CAT in this study may be attributed to the relatively new introduction of CAT to the market in the Kurdistan region and the limited evidence of its ability to produce good results in the community.

Participants were asked to justify their preferences, and it was found that the percentage of dentists recommending Clear Aligners was the lowest, while it was one of the highest for FOT. This discrepancy may be attributed to the lack of experience among dentists with CAT, influencing their recommendation of treatment modalities to patients.

The study revealed that the awareness of CAT among participants was 63.2%,

which was lower than a previous study.[14]Females, students studying Dentistry, and those residing in Erbil demonstrated higher awareness, because they are more acquainted with the treatment. Additionally, participants with higher monthly incomes tended to have greater awareness of CAT, possibly because they visit the dentist more frequently and can afford the higher cost associated with CAT.

Participants who visited the dentist regularly, sought orthodontic consultations, had previous orthodontic treatment, and who were aware of FOT demonstrated higher awareness of CAT. The prevalence of malocclusion in participants or their families was high (72.3%), which significantly influenced awareness of orthodontics. Participants who had previous orthodontic
consultations or treatments, or knew someone who had undergone treatment, also displayed greater awareness of CAT (Table 4).

Only 41.3% of participants self-elected for CAT, and this preference was significantly associated with previous orthodontic consultations, previous orthodontic treatments, and knowledge of someone who had undergone CAT (Table 5). The low percentage of participants electing for CAT might be related to the perception that only 22% considered it to be very effective.

CONCLUSION

The study found that most participants had limited knowledge about Clear Aligner Therapy (CAT). Female participants were more aware of CAT, and dentists were their main source of information for both CAT and Fixed Orthodontic Therapy (FOT).

Participants perceived CAT to have advantages such as less speech disruption, fewer food restrictions, less pain, better hygiene, aesthetics, and confidence. However, overall preference was still in favor of FOT, mainly influenced by dentists' preference.

There was an association between awareness of CAT and factors such as orthodontic consultation, previous orthodontic treatments, regular dental visits, concern about teeth, and awareness of FOT. These findings suggest that increased awareness and engagement with dental professionals play a significant role in influencing treatment preferences and decisions.

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