



ORIGINAL RESEARCH PAPER

Orthodontics

THE KNOWLEDGE OF DENTAL STUDENTS ABOUT INVISIBLE ORTHODONTICS - A QUESTIONNAIRE STUDY

KEY WORDS: Orthodontic treatment, clear aligners, aesthetics, invisible orthodontics, removable.

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ABSTRACT

Aim: The survey was conducted to evaluate the knowledge about Orthodontic treatment with aligners among dental students. **Materials and methods:** The pre-structured questionnaire consisting of 20 questions was prepared and sent to 302 dental students studying at Adhiparasakthi Dental College and Hospital, Melmaruvathur, Tamil Nadu via Google Forms. **Results:** A total of 302 students participated in the survey, in which 125 were male and 177 were female. 49 were 3rd year students, 96 belonged to the 4th year and 157 were CRI. Chi-square test was used to analyse the responses given by dental students and evaluate statistical significance of results. In this study, both male and females were aware about orthodontic aligner therapy and males were more confident with their smile regardless of the malocclusion. Both interns and undergraduates students were aware that aligners are removable. Interns possess more knowledge about aligner therapy than undergraduates. **Conclusion:** This study concluded that majority of the dental students had knowledge about aligners as a treatment modality, that aligners are removable and help in better oral hygiene maintenance.

INTRODUCTION

In modern dentistry, orthodontic aligners play a major role in correction of malocclusion. Clear aligners are more popular among general practitioners and lately patients visit dentists asking for orthodontic treatment with aligners as it reduces the treatment time and the number of visits [1] [2] [3]. The initial concept of aligner was introduced by Kesling in 1945. This new appliance was developed out of a desire to make a straight forward appliance that could guide all of the teeth into the best possible relationship with one another without the use of bands or wires, that would be effective under functional forces, that would produce arch form in accordance with type, that would further achieve the desired harmony between facial features and tooth arrangement, and that would also function as a retainer to preserve a healthy bite. During the development of this appliance, it was discovered to be the most useful for the teeth's ultimate aesthetic alignment and retention. The positioner appliance is initially made from a single piece of malleable rubber from a wax model that allows for patterning. It is intended to cover the labial and lingual surfaces of the maxillary and mandibular dentition in addition to entirely filling the motorway space. The device was designed to treat minor dental irregularities such mesial-distal or buccal-lingual connections, residual overbites, and spacing [4]. Clear aligners are similar to Essix retainers. It was made from a sheet of 0.030" thick thermoplastic polyester [5]. Although the idea of using aligners in orthodontics has been around for a while, planning and fabrication processes have always been done manually, through time-consuming processes like sequential wax set-ups. Rapid prototyping methods and current developments in CAD/CAM have made it possible to produce clear thermoplastic aligners industrially. And also the fabrication of aligners using 3D treatment planning software. This software comes with 3D scanners and printers to allow the fabrication of aligners [6] [7]. Patients also find them easy to wear and maintain oral hygiene. In recent years, there has been a rise in Direct to consumer (D2C) aligners which is to be condemned because an Orthodontist who is specialised in aligning teeth, is not involved in the process. Companies that offer the 3D treatment planning software to the orthodontist's practise also make aligners in-house. The orthodontist can directly manufacture their own aligners using this software and 3D scanners and printers

In the present study, 20 questions was prepared and sent to the dental students (including Third year, final year students and interns) studying at Adhiparasakthi Dental College and Hospital, Melmaruvathur, Tamil Nadu through Google forms. Totally 302 students participated in the questionnaire study. The students were between 19 and 25 years of age. The aim of this study was to evaluate 1) the students' knowledge about orthodontic aligners; 2) Awareness about aligners in treating malocclusion; 3) Knowledge about price of aligners and 4) Awareness about better oral hygiene maintenance with braces and aligners.

Statistical Analysis

In this study, the dental students recorded their responses regarding dental visit, whether they had undergone orthodontic treatment or not and how confident they are with their smile, knowledge about aligners, choice of treatment with fixed/ ceramic braces and clear aligner and the cost of clear aligners.

The statistical analysis was done using Chi-square test to evaluate the response of the participants. The significance level of the result was set at 0.05

RESULTS

In this current study, 302 students participated in the survey out of which 125 were males and 177 were females. The questionnaire consisted of questions like their dental visit, whether they had undergone any orthodontic treatment before, and whether they noticed any irregular alignment of teeth while smiling. We also asked if they were confident with their smile, their knowledge of aligners, their awareness of the cost of aligner therapy, and the importance of aesthetics in orthodontics.

Females (71.1%) visit a dentist or orthodontist more than males (68.8%). In the response, there is not much difference between the genders when visiting a dentist, with a (P value of 0.655) as shown in Table I. And also, Table I shows that most students, male (72.8%) and female (65.53%), have not undergone orthodontic treatment, with a statistical (P value of 0.181).

Table II shows that the majority of males (72%) and females (66.1%) have not undergone any orthodontic therapy. However in males, 20% of the students had undergone

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treatment with fixed braces, 5.6% of the students had undergone treatment with removable braces, and 2.4% of students had treatment with both fixed and removable braces. Most of the males (50.4%) and females (47.54%) were completely confident while smiling, (with $P=0.05$ which is statistically significant)*. Among males, (42.4%) were fairly confident, (6.4%) were slightly confident, and (0.8%) were not confident while smiling with their teeth visible, as shown in Table III.

When asked about how long a patient should wear aligners in a day, males (46.4%) and females (28.24%) responded that they are supposed to wear aligners for 18 hours in a day, with statistical significance (P value **0.007**). Among males (31.2%), responded that they are supposed to wear aligners for 22 hours a day (Table IV)

Table V shows that the majority of the students (77.55%) in 3rd year, (93.75%) in 4th year, and (87.89%) in CRI think that aesthetics is important in orthodontics (statistically insignificant; P value of 0.073). And also, Table V shows that most of the 3rd year students (87.75%), 4th year students (90.62%), and CRI students (89.17%) think that clear aligners are highly aesthetic when compared with braces (P value 0.211).

Table VI shows that males (68%) and females (61.58%) notice irregular alignment of teeth while smiling (P value 0.252). And also table VI, which shows (77.55%) of 3rd year students, (91.66%) of 4th year students, and (97.45%) of CRI are aware of aligners as an orthodontic treatment option which is (statistically significant P value **0.000**).

Table VII shows that most of the CRI (98.72%) as well as 4th years (97.9%) and 3rd years (91.83%) are aware that aligners are removable with a P value of 0.029, and also that the CRI (91.71%) as well as 4th years (91.66%) and 3rd years (79.59%) think that clear aligners help maintain better oral hygiene when compared to conventional braces with a statistical significance P value **0.038**.

Table VIII shows that 38.4% of females and 24.8% of males think that the cost of the clear aligners depends upon the complexity of the case, with statistical significance (P value **0.001**).

Table IX shows that, when given an orthodontic treatment choice, majority of students, males (56%) and females (59.88%), prefer clear aligners over fixed metal and fixed ceramic braces (P value 0.767).

Table X shows that most students CRI (65.6%) as well as 4th years (62.5%) and 3rd years (34.69%) have heard about aligners from dentist, with statistical significance (P value **0.000**).

DISCUSSION

In the past decade, orthodontic aligner treatment has gained more recognition among dentist as well as patients. In the early stages, aligner therapy was used for minor tooth movement and also for retention purposes in final cases.

302 students at Adhiparasakthi Dental College and Hospital, Melmaruvathur, Tamil Nadu State, in the age group of 19–25 years participated in the took part of survey. A total of 20 questions are given to the students studying in the 3rd, 4th year and CRI through a Google Form. This study aimed at evaluating the students' knowledge about orthodontic aligners and awareness about orthodontic treatment among dental students.

A chi-square test was done to find the significance of the correlation between females and males and also between the 3rd and 4th years of CRI regarding orthodontic therapy,

awareness among aligners, and knowledge of orthodontic aligners.

The results show that, both males and females have knowledge about aligners as an orthodontic therapy, and both males and females have visited a dentist. Among these, most of the students have not undergone orthodontic treatment.

Most of the males (50.4%) are completely confident when smiling with their teeth visible. Most of the students think that aesthetics is important in orthodontics; among these students in their 4th year (93.75%) are more concerned about aesthetics being important in orthodontics.

Both genders notice an irregular alignment of teeth while smiling. 3rd years, 4th years, and CRI know about aligners as an orthodontic treatment option, however CRI (97.45%) have more knowledge about clear aligners than 3rd years (77.55%) and 4th years (91.66%). Most of the CRI (98.72%) as well as 4th years (97.9%) and 3rd years (91.83%) are aware that aligners are removable.

Majority of CRI (91.71%), as well as 4th years (91.66%) and 3rd years (79.59%), are of the opinion that clear aligners help maintain better oral hygiene.

Most of the students in CRI, as well as 4th and 3rd years, have heard about aligners from dentist. Also, most of the females (38.4%) and males (24.8%) are of the opinion that the cost of the clear aligners depends on the complexity of the case.

In a study conducted by Kinnari et al. in the Karnavati School of Dentistry, Uvarsad, Gandhinagar, most of the dental students were aware of orthodontic aligner therapy [8]. Gabriele Rossini's orthodontic aligner therapy was determined to be helpful in the systemic review in regulating various treatment modalities [9].

According to the d'Apuzzo et al. study, aligner therapy performed better in females than in males [10]. A study conducted by Kumar et al. among the population in Chennai, Tamil Nadu, concluded that the population was aware of aligners.

According to the d'Apuzzo et al. study, aligner therapy performed better in females than in males [11]. Gaurav Acharya et al. conducted a further study among dental students at KIST Medical College, finding that both genders had good knowledge of orthodontic treatment but were unaware of orthodontic aligners [12].

This survey has given us a clear idea that dental undergraduates have fairly good knowledge about clear aligners as an orthodontic treatment modality. However, many more studies are required to assess the awareness of orthodontic treatment with clear aligners among the general population.

CONCLUSION

In the survey questionnaire,

1. Dental students were more aware of the orthodontic aligner treatment.
2. Most of the dental students have visited a dentist.
3. Both dental students and CRI were aware that aligners are removable.
4. Dentists were the source of knowledge about aligners.
5. Most of the dental students were of the opinion that the cost of aligners depends on the complexity of the cases.
6. Males were more confident with their smile while their teeth were visible.
7. Most of the students were of the opinion that aligners help maintain better oral hygiene than conventional braces.

The Knowledge of Dental Students about Invisible Orthodontics - A Questionnaire Study

1. Name
2. Age
3. Gender
4. Year of study
5. University/College
6. Have you ever visited a dentist/orthodontist? Yes/No
7. Have you undergone orthodontic treatment before? Yes/No
8. If yes, what kind of orthodontic treatment? Fixed braces/Removable braces/Both/None
9. Have you noticed/ has someone told you that you have irregular alignment of your teeth while smiling? Yes/No
10. How confident are you while smiling with your teeth visible? Completely confident/ fairly confident / slightly confident / not confident
11. Do you have any knowledge about aligners as an option for orthodontic treatment? Yes/no
12. If yes, how did you get to know about it? Family /Friends /Social media/ Dentist/ Advertisement (television/newspaper)/ None
13. Do you think aesthetics is important in orthodontics? Yes/No/Maybe
14. Which among the following orthodontic treatment option do you think is highly aesthetic? Metal braces/ Ceramic braces/Clear aligners
15. Are you aware that aligners are removable? Yes/No
16. How long do you have to wear aligners in a day? 18 hours/ 22 hours/ during day time/ only at night
17. Which among the following treatment option do you think can help to maintain better oral hygiene? Metal braces/ Ceramic braces/ Clear aligners
18. If your alignment of teeth is irregular, which treatment would you opt for? Fixed metal braces/ Fixed ceramic braces/ Removable clear aligners
19. How much do you think clear aligners cost? 50,000- 75,000/ 75,000- 1,00,000/ More than 1 lakh/ Depending on the complexity of the case
20. Which aligner brand have you heard of? Invisalign/ Toothsi/ Flash aligners/ Inhouse aligners/ None

FIGURE 1 : Pre- structured questionnaire for survey

Table I: Comparing the responses when asked about having ever visited a dentist or orthodontist and whether they had undergone any orthodontic treatment based on gender

Question	Gender	Response		P value
Have you ever visited a dentist/orthodontist?	Male (n=125)	Yes 86(68.8%)	No 39(31.2%)	.655
	Female (n=177)	126(71.1%)	51(28.8%)	
Have you undergone orthodontic treatment before?	Male (n= 125)	Yes 34(27.2%)	No 91(72.8%)	.181
	Female (n= 177)	61(34.46%)	116(65.53%)	

Table II: Comparing the responses when asked about the type of orthodontic treatment based on gender

Question	Gender	Response		P value
If yes, what kind of orthodontic treatment?	Male (n=125)	Fixed braces	25 (20%)	.206
		Removable braces	7 (5.6%)	
		Both	3 (2.4%)	
	Female (n=177)	None	90 (72%)	
		Fixed braces	38 (21.46%)	
		Removable braces	8 (4.5%)	
		14 (7.9%)		
		117 (66.10%)		

Table III: Comparing the responses when asked about confidence with a smile based on gender

Question	Gender	Response		P value
How confident are you while smiling with your teeth visible?	Male (n=125)	Completely confident	63 (50.4%)	.050
		Fairly confident	53 (42.4%)	
		Slightly confident	8 (6.4%)	
		Not confident	1 (0.8%)	
	Female (n=177)	Completely confident	84 (47.45%)	
		Fairly confident	62 (35.02%)	
		Slightly confident	23 (12.9%)	
		Not confident	8 (4.5%)	

Table IV: Comparing the responses when asked about wearing aligners in a day based on gender

Question	Gender	Response		P value
How long do you have to wear aligner in a day?	Male (n=125)	18 Hours	58 (46.4%)	.007
		22 Hours	39 (31.2%)	
		During day time	20 (16%)	
		Only at night	8 (6.4%)	
	Female (n=177)	18 Hours	50 (28.24%)	
		22 Hours	73 (41.24%)	
		During day time	45 (25.4%)	
		Only at night	9 (5.08%)	

Table V: Comparing the responses when asked about aesthetics and which is highly aesthetic in orthodontic therapy based on year of study

Question	Year of study	Response			P value
Do you think aesthetics is important in orthodontics?	3rd year (n= 49)	Yes 38 (77.55%)	No 2 (4.08%)	Maybe 9 (18.36%)	.073
	4th year (n= 96)	90 (93.75%)	1 (1.04%)	5 (5.2%)	
	CRI (n= 157)	138 (87.89%)	5 (3.18%)	14 (8.9%)	
Which among the following orthodontic treatment option do you think is highly aesthetic?	3rd year (n= 49)	Fixed metal braces 5(10.20%)	Ceramic braces 43 (87.75%)	Clear aligner 87(90.62%)	.211
	4th year (n= 96)	1(2.12%)	3(3.12%)	140 (89.17%)	
	CRI (n= 157)	4(2.54%)	13(8.2%)		

Table VI: Comparing the responses when asked about noticed irregular alignment of teeth while smiling based on gender and aligners in orthodontic treatment options based on year of study

Question	Gender	Response		P value
Have you noticed/has someone told you that you have irregular alignment of your teeth while smiling?	Male (n=125)	Yes 85(68%)	No 40 (32%)	.252
	Female (n=177)	109 (61.58%)	68(38.41%)	
Question	Year of study	Response	P value	
Do you have any knowledge about aligner as an option for orthodontic treatment?	3rd year (n= 49)	Yes 38(77.55%)	No 11(22.44%)	.000
	4th year (n= 96)	88(91.66%)	8(8.33%)	
	CRI (n= 157)	153(97.45%)	4(2.54%)	

Table VII: Comparing the responses when asked about whether aligners are removable and which orthodontic treatment option helps maintain better oral hygiene based on the year of study

Question	Year of study	Response		P value
Are you aware that aligners are removable ?	3rd year (n= 49)	Yes 45 (91.83%)	No 4(8.16%)	.029
	4th year (n= 96)	94(97.9%)	2(2.08%)	
	CRI (n= 157)	155(98.72 %)	2(1.27%)	
Which among the following treatment option do you think can help to maintain better oral hygiene?	3rd year (n= 49)	Fixed metal/ Ceramic braces	Clear aligners	.038
	4th year (n= 96)	10(20.4%)	88(91.66%)	
	CRI (n= 157)	8(8.33%) 13(8.28%)	144(91.71%)	

Table VIII: Comparing the responses when asked about the cost of clear aligners based on gender

Question	Gender	Response		P value
How much do you think clear aligners cost?	Male (n=125)	₹50,000-75,000	31(24.8%)	.001
		₹75,000-1,00,000	28(22.4%)	
		More than one lakh	35(28%)	
	Female (n=177)	Depending on the complexity of the case	38(21.46%)	
		₹50,000-75,000	50(28.24%)	
		₹75,000-1,00,000	21(11.8%)	
More than one lakh	68(38.4%)			
Depending on the complexity of the case				

Table IX: Comparing the responses when asked about the preference of aligners, metal braces, and ceramic braces based on gender

Question	Gender	Response			P value
If your alignment of teeth is irregular, which treatment would you opt for?	Male (n=125)	Fixed metal braces	Fixed ceramic braces	Removable clear aligner	.767
		30 (24%)	25 (20%)	70(56%)	
	Female (n=177)	37 (20.9%)	34(19.2 %)	106 (59.88)	

Table X: Comparing the responses when asked about the source to get knowledge of orthodontic aligners based on their year of study

Question	Year of study	Response			P value
If yes, how did you get to know about it?	Family Friends	3rd year (n= 49)	4th year (n= 96)	CRI (n= 157)	.000
		2 (4.08%)	2 (2.08%)	1 (0.6%)	
	Social media	8 (16.32%)	6 (6.25%)	23(14.64%)	
		Dentist (12(24.48%)	12 (12.5%)	25(15.92%)	
	Advertisement	17 (34.69%)	60 (62.5%)	103(65.6%)	
		None	1 (2.04%)	9 (9.3%)	
	9 (18.36%)	7 (7.29%)	1 (0.6%)		

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