

Knowledge, Attitude, and Perception Towards Clear Aligner Therapy Among Patients Undergoing Fixed Orthodontic Appliance Treatment

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Abstract

Background: Clear aligner therapy (CAT) offers aesthetic and hygienic advantages over traditional fixed orthodontic appliances. However, its uptake is influenced by patients' knowledge, attitudes, perceptions (KAP) and acceptance of the treatment. This study aimed to evaluate the KAP towards CAT among patients undergoing fixed orthodontic treatment and to identify demographic and socioeconomic factors influencing these attitudes. **Methods:** A cross-sectional survey was conducted at a private hospital in Lagos, Nigeria, involving all consenting follow-up orthodontic patients undergoing fixed appliance orthodontic therapy. A validated self-administered questionnaire assessed demographic characteristics and KAP toward CAT. Data were analysed using SPSS v26 and R software, employing chi-square and logistic regression. **Results:** Among 232 participants, only 50% had heard of CAT, and just 27.6% demonstrated good knowledge. About 52.2% showed a positive attitude, and 50.9% had a favourable perception. Significant associations were found between attitude and age ($p = 0.022$), education ($p = 0.030$), ethnicity ($p = 0.035$), and income ($p = 0.013$). Income uncertainty was a negative predictor of a favourable attitude (OR = 0.42, $p = 0.025$). **Conclusion:** Knowledge of CAT among patients treated with fixed appliances is limited, despite moderate awareness and positive attitudes. Educational and economic factors significantly influence acceptance. Improved education and affordability could enhance uptake of aligner therapy.

Keywords: Clear aligner therapy, Orthodontics, Patient knowledge, Perception, Attitude, Socioeconomic factors, Nigeria.

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INTRODUCTION

Orthodontic treatment plays a crucial role in treating malocclusion and improving dental aesthetics [Oikonomou E *et al.*, 2021]. For managing complex malocclusion cases, fixed orthodontic equipment has historically been the recommended option [Oikonomou E *et al.*, 2021; Raj D *et al.*, 2024]. Clear aligner therapy (CAT), on the other hand, has become a popular substitute in recent years, providing benefits including better comfort and appearance for adult patients. [Oikonomou E *et al.*, 2021; Raj D *et al.*, 2024; Huang A., 2024; Pawar R *et al.*, 2024; Ne K., 2023] Since its introduction in the late 1990s, clear aligners have become very popular because of their convenience and discreet appearance. [Oikonomou E *et al.*, 2021; Huang A., 2024; Bhosale M *et al.*, 2023]. Because aligners can be removed for eating and brushing, they promote better oral hygiene compared to fixed appliances [Oikonomou E *et al.*, 2021]. Notwithstanding

these benefits, there are drawbacks to clear aligners, such as patient noncompliance, treatment restrictions, and higher expenses [Oikonomou E *et al.*, 2021].

One of the key factors influencing orthodontic treatment choices is patient awareness, attitude, and perception [Raj D *et al.*, 2024] While aggressive marketing by aligner companies has increased public awareness of aligners, patients often have limited knowledge about clear aligners [Raj D *et al.*, 2024]. Understanding how patients perceive clear aligners is essential to improving education and managing expectations in orthodontic care. The demand for aesthetically pleasing dental solutions has surged globally, leading to increased interest in clear aligners, [Oikonomou E *et al.*, 2021; Raj D *et al.*, 2024; Huang A., 2024; Pawar R *et al.*, 2024; Bhosale M *et al.*, 2023] On the other hand, while demand may be on the increase, knowledge gap may exist in the general population,

leading to misunderstandings and irrational expectations [Huang A., 2024; Pawar R *et al.*, 2024].

This knowledge gap applies to patients and dental professionals likewise; with the limited knowledge among dental professionals translating to their inability to educate their patients appropriately [6,7]. A study by Ne *et al.*, 2023, revealed that 76% of patients are aware that clear aligners exist, but only 42% are fully informed about their prices, effectiveness, and necessary course of treatment. Even though patients frequently choose aligners primarily for aesthetic reasons, patients and orthodontists continue to have serious concerns about treatment efficacy and compliance [Patil & Chaitra, 2023; Sheikh A *et al.*, 2016]. Some previously reported limitations/misconceptions to the use of aligners among orthodontic patients in other climes include limited knowledge to its efficacy when compared to fixed orthodontic appliance and duration of wear [Oikonomou E *et al.*, 2021; Bhosale M *et al.*, 2023]. Issues with compliance, such as the need to wear aligners for 20 to 22 hours every day, can result in less-than-ideal treatment results [Timm L *et al.*, 2021; Zhao J *et al.*, 2024]. Some patients may not be able to afford aligners because they are typically 1.5 to 2 times more expensive than traditional braces [Zhao J *et al.*, 2024; Alansari R *et al.*, 2019].

Despite these considerations, there are few studies that explicitly examine how patients who are receiving treatment with fixed appliances feel about transparent aligners [Oikonomou E *et al.*, 2021; Raj D *et al.*, 2024; Huang A., 2024]. Addressing these gaps requires evaluating their attitudes, knowledge, and readiness to change treatment approaches. This study aimed to evaluate the knowledge, attitude, and perception (KAP) of patients undergoing fixed orthodontic appliance treatment regarding clear aligner therapy (CAT). Specifically, the objectives are to assess knowledge levels about clear aligners among these patients, evaluate their attitudes toward CAT, and explore their perceptions regarding the therapy. Additionally, the study seeks to identify key factors that influence patient knowledge, attitudes, and perceptions toward clear aligner treatment.

MATERIAL AND METHODS

This cross-sectional study was conducted over three-months at a private hospital in Lagos, Nigeria, targeting all consenting follow-up orthodontic patients being treated with fixed orthodontic appliances. The study population comprised individuals returning for orthodontic follow-up care during the study period and who provided informed consent. Patients who declined consent or were unable to complete the questionnaire were excluded.

Data were collected using a structured, pre-tested, self-administered questionnaire designed to assess knowledge, perception, and attitude toward aligner therapy. Microsoft Excel 2019 was used for data entry and secure storage, with all entries reviewed for errors, duplication, and inconsistencies. Statistical analyses were performed using SPSS v26 and R Statistics, employing both descriptive (frequencies, means, percentages) and inferential (chi-square, ANOVA, Fisher's exact, Mann-Whitney U, and Kruskal-Wallis tests) methods depending on data type and distribution.

Ethical Considerations:

Ethical approval for the study was obtained from the Research and Ethics Committee of the Lagos University Teaching Hospital (ADM/DCST/HREC/APP/6239). All participants or their guardians provided informed consent prior to participation in the study.

RESULTS AND DISCUSSION

A total of 232 respondents were recruited into the study. The demographic characteristics of the study population showed the majority age group being those below 19 years of age. Most respondents were female (68.5%) and possessed tertiary or postgraduate education (70.7%). Employment status was evenly split between employed individuals (48.3%) and students (47.4%), with a notable proportion unsure about their household income (41.8%). (Table 1).

Table 1: Sociodemographic distribution of respondents

Variable	N = 232 ¹
Age Group	
≤19	87.0 (37.5%)
20–29	80.0 (34.5%)
30–39	41.0 (17.7%)
40–49	21.0 (9.1%)
50+	3.0 (1.3%)
Gender	
Female	159.0 (68.5%)
Male	73.0 (31.5%)
Level of Education	
Primary	3.0 (1.3%)

Variable	N = 232 ¹
Secondary	65.0 (28.0%)
Tertiary	110.0 (47.4%)
Postgraduate	54.0 (23.3%)
Occupation	
Employed	112.0 (48.3%)
Student	110.0 (47.4%)
Unemployed	10.0 (4.3%)
Ethnicity	
Yoruba	62.0 (26.7%)
Igbo	143.0 (61.6%)
Others	27.0 (11.6%)
Estimated Annual Household Income	
<10m	64.0 (27.6%)
10 - 20m	33.0 (14.2%)
20 – 30m	7.0 (3.0%)
30 – 40m	11.0 (4.7%)
40 – 50m	6.0 (2.6%)
>50m	14.0 (6.0%)
I don't know	97.0 (41.8%)
¹ n (%)	

An assessment of the knowledge of aligners among respondents showed that most of them knew aligners were removable (94%) and made of plastic (83%). There were significant gaps existed regarding treatment effectiveness, wear time, and malocclusion suitability. Most of them believed that treatment with aligners will require less hospital visits and was more

effective when compared to conventional fixed appliances. More than 50% of respondents believed that duration of aligner wear was all day except when eating; with a majority unsure of its efficacy to correct all malocclusions and treatment time when compared to fixed appliance therapy (Table 2).

Table 2: Knowledge of aligner therapy among respondents

Question	N = 232 ¹
Heard of Aligners	116 (50%)
Aligner Type (Fixed/Removable)	
Fixed	7 (6.0%)
Removable	109 (94%)
Aligner Material	
Ceramic	11 (9.6%)
Metal	9 (7.8%)
Plastic	95 (83%)
Clinic Visit Frequency Compared to Braces	
Less	53 (46%)
More	11 (9.5%)
Same	5 (4.3%)
I don't know	47 (41%)
Effectiveness over Braces	
Yes	66 (57%)
No	9 (7.8%)
I don't know	41 (35%)
Can Correct All Malocclusions?	
Yes	17 (15%)
No	28 (24%)
I don't know	71 (61%)
Daily Wearing Duration	
6–10 hours	3 (2.6%)
12–16 hours	13 (11%)
20–22 hours	9 (7.8%)
I don't know	35 (30%)

Question	N = 232 ^l
Throughout the day, except when eating	55 (48%)
Treatment Duration Knowledge	
Shorter	31 (27%)
Longer	11 (9.5%)
The same	4 (3.4%)
I don't know	70 (60%)
Knowledge category	
Good	64 (56%)
Poor	50 (44%)
^l n (%)	

In terms of knowledge, half of the respondents had heard of aligners, with 27.6% demonstrating good overall knowledge (Figure 1).

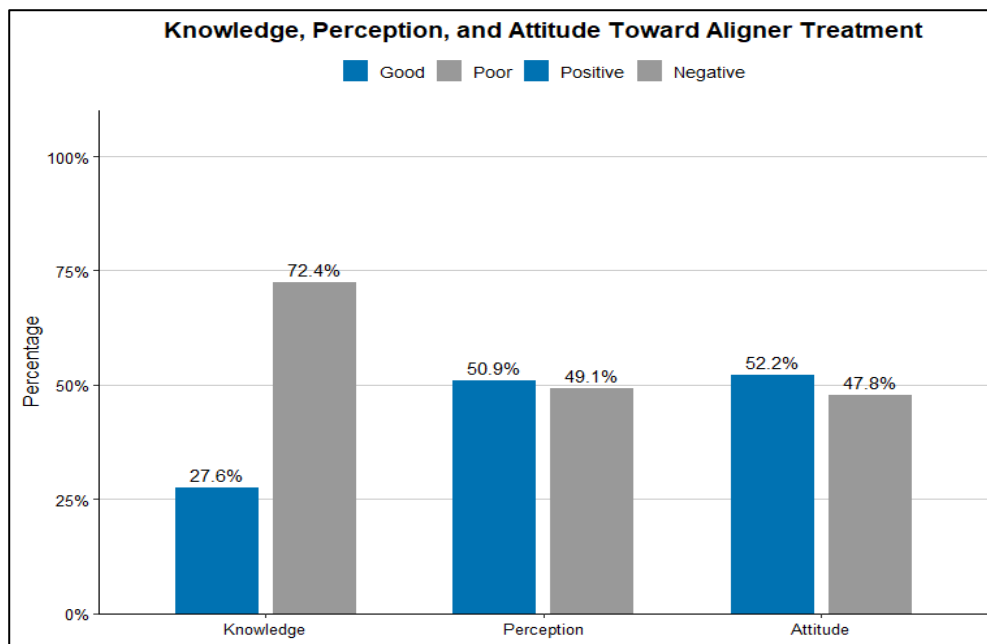


Figure 1

Perception scores were generally more favorable. A majority of respondents considered aligners to be modern orthodontic technology (60%) and hygienic (59%). Most respondents were neutral (39%) or agreed (33%) agreed that they were more aesthetic than fixed

braces. The respondents were also most neutral or agreed to perceived suitability for both adults and children, for managing their malocclusion and removability for social function as a significant advantage. (Table 3).

Table 3: Perception Toward Aligner Therapy

Perception Statement	Response Distribution				
	Strongly Disagree N = 61 ^l	Disagree N = 92 ^l	Neutral N = 306 ^l	Agree N = 225 ^l	Strongly Agree N = 150 ^l
Item					
Aligners are a Modern and Advanced Orthodontic Treatment	8 (5.8%)	4 (2.9%)	44 (32%)	40 (29%)	43 (31%)
Aligners are a more Aesthetic Option than Fixed Braces	11 (7.9%)	28 (20%)	54 (39%)	26 (19%)	20 (14%)
Aligners are Suitable for both Adults and Children	11 (7.9%)	21 (15%)	53 (38%)	33 (24%)	21 (15%)
Aligners can Maintain Oral Hygiene Better than Fixed Braces	8 (5.8%)	10 (7.2%)	38 (27%)	56 (40%)	27 (19%)
I Feel Confident Managing My Own Orthodontic Treatment with Aligners	11 (7.9%)	23 (17%)	64 (46%)	29 (21%)	12 (8.6%)

Perception Statement	Response Distribution				
	Strongly Disagree N = 61 ¹	Disagree N = 92 ¹	Neutral N = 306 ¹	Agree N = 225 ¹	Strongly Agree N = 150 ¹
The Ability to Remove Aligners for Special Occasions is Very Important to Me	12 (8.6%)	6 (4.3%)	53 (38%)	41 (29%)	27 (19%)

¹ n (%)

Attitude-related responses revealed a positive reception toward aligner therapy, particularly around lifestyle flexibility. Approximately 72% of participants said they would prefer aligners if they allowed them to eat freely, and the same proportion said they would prefer aligners if they could remove them for social occasions. However, cost remained a limiting factor: although 65.9% were willing to pay up to three times

more than fixed braces, 25% were not willing to pay more, and 5.6% were unsure. Concerns around food restrictions, removability, and appliance visibility also influenced attitudes, as demonstrated by 67% reporting concerns about dietary restrictions with fixed braces. Responses also showed many participants concerned about their compliance with wear (46%) (Table 4)

Table 4: Attitude towards Aligner Therapy

Attitude Statement	Response Distribution		
	Yes N = 1,211 ¹	No N = 586 ¹	I don't know N = 249 ¹
Item			
Do you Consider Fixed Metal Braces Affordable	118 (52%)	77 (34%)	33 (14%)
Do you Have Concerns About Food Restrictions with Fixed Metal Appliances	153 (67%)	65 (29%)	10 (4.4%)
Do you Have Concerns About the Inability to Remove Fixed Metal Appliances	107 (47%)	106 (46%)	15 (6.6%)
Do you Think you will Have the Discipline to Wear an Appliance that you can Remove at will Constantly	109 (48%)	92 (40%)	28 (12%)
Is the Appearance of the Orthodontic Appliance Important to you	171 (75%)	36 (16%)	21 (9.2%)
Would you be Willing to Pay more for an Appliance Treatment that will be less Visible Removable to Allow you Attend Special Occasions Eat Everything and to Brush	111 (48%)	77 (34%)	41 (18%)
Would you Have Preferred Aligners if They Allowed you to Eat Everything No Dietary Restrictions	160 (71%)	37 (16%)	29 (13%)
Would you Have Preferred Aligners if They Could be Removed for Social Occasions Eating and Brushing	162 (72%)	38 (17%)	24 (11%)
Would you Have Preferred Aligners to Metal Fixed Braces if They Offered less Visible Treatment	120 (53%)	58 (26%)	48 (21%)

¹ n (%)

Analysis of associations between sociodemographic characteristics and knowledge showed no statistically significant differences across age,

gender, or income groups, though higher educational attainment appeared to trend with better knowledge ($p = 0.066$) (Table 5).

Table 5: Association between sociodemographic variables and Knowledge about aligner therapy

Variable	Overall N = 114 ¹	Poor N = 50 ¹	Good N = 64 ¹	p-value ²
Age (Years)	23.5 (17.0, 30.0)	25.5 (18.0, 34.0)	23.0 (17.0, 30.0)	0.2
Gender				
Female	82 (72%)	33 (66%)	49 (77%)	0.2
Male	32 (28%)	17 (34%)	15 (23%)	
Level of Education				
Postgraduate	33 (29%)	20 (40%)	13 (20%)	0.066
Primary	0 (0%)	0 (0%)	0 (0%)	
Secondary	27 (24%)	9 (18%)	18 (28%)	
Tertiary	54 (47%)	21 (42%)	33 (52%)	
Occupation				
Employed	65 (57%)	30 (60%)	35 (55%)	0.9

Variable	Overall N = 114 ¹	Poor N = 50 ¹	Good N = 64 ¹	p-value ²
Student	44 (39%)	18 (36%)	26 (41%)	
Unemployed	5 (4.4%)	2 (4.0%)	3 (4.7%)	
Ethnicity				
Igbo	64 (56%)	26 (52%)	38 (59%)	0.7
Others	17 (15%)	8 (16%)	9 (14%)	
Yoruba	33 (29%)	16 (32%)	17 (27%)	
Estimated Household Income				
<10m	29 (25%)	14 (28%)	15 (23%)	0.2
>50m	8 (7.0%)	2 (4.0%)	6 (9.4%)	
10 - 20m	19 (17%)	12 (24%)	7 (11%)	
20 – 30m	3 (2.6%)	2 (4.0%)	1 (1.6%)	
30 – 40m	8 (7.0%)	4 (8.0%)	4 (6.3%)	
40 – 50m	3 (2.6%)	0 (0%)	3 (4.7%)	
I don't know	44 (39%)	16 (32%)	28 (44%)	
Perception				
Negative	15 (13%)	8 (16%)	7 (11%)	0.4
Positive	99 (87%)	42 (84%)	57 (89%)	
Attitude				
Negative	52 (46%)	25 (50%)	27 (42%)	0.4
Positive	62 (54%)	25 (50%)	37 (58%)	
¹ Median (Q1, Q3); n (%)				
² Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test				

Neither attitude nor perception was significantly associated with knowledge level ($p = 0.4$ and $p = 0.4$, respectively), indicating that improved understanding does not necessarily translate to a more favorable disposition (Table 5).

This study aimed to evaluate the knowledge, attitudes, and perceptions toward clear aligner therapy among patients who were currently undergoing fixed orthodontic appliance treatment in Lagos, Nigeria. Understanding patient perspectives on alternative treatment modalities is essential for informed decision-making and treatment planning.

Our findings revealed that half of the respondents had heard of aligner therapy, with only about a quarter demonstrating good overall knowledge. This indicates that although general awareness exists, detailed understanding of aligner treatment remains limited among the surveyed population. The knowledge gap observed in our study is consistent with other international studies [Oikonomou E *et al.*, 2021; Raj D *et al.*, 2024; Huang A., 2024]. A Saudi Arabian study by Alharbi I *et al.*, 2022, found that adults were largely unaware of Invisalign. Paim J *et al.*, 2024, reported that approximately half of Brazilian dental patients had heard of orthodontic aligners, with younger adults typically being more familiar with aligners than older participants. A comparable trend was observed in our study, although not statistically significant. This trend may be attributed to the marketing of aligner therapy towards image-conscious adults and teenagers via social media and dental clinics, which may not effectively reach all

population segments, particularly those with limited internet access or lower dental visitation rates.

Our study revealed that approximately half of the respondents demonstrated positive perception and positive attitude towards aligner therapy which previous studies had found that when people know about clear aligners, they tend to view them positively, chiefly due to their aesthetic and comfort advantages, [Paim T *et al.*, 2024; Vandrangi S *et al.*, 2023; Shivlani V *et al.*, 2023; Selveraj V *et al.*, 2023; Zakirulla M., 2022; Chong H *et al.*, 2025; Adobes M *et al.*, 2025; Wexler A *et al.*, 2020; Ziuchkovski J., 2008; Noll D *et al.*, 2017] However, in our study, positive perception and attitude did not translate to good knowledge, which remained poor overall. This discrepancy suggests that respondents may have formed impressions of aligners irrespective of factual understanding of the treatment modality.

Findings in this study showed associations between sociodemographic characteristics and knowledge showed no statistically significant differences across age, gender, occupation, ethnicity or income groups. However, higher educational attainment appeared to trend with better knowledge, approaching statistical significance. Neither attitude nor perception was significantly associated with knowledge level, indicating that improved understanding does not necessarily translate to a more favorable disposition. This finding is at variance with previous studies. [Oikonomou E *et al.*, 2021; Vandrangi S *et al.*, 2023; Shivlani V *et al.*, 2023; Selveraj V *et al.*, 2023; Zakirulla M., 2022]

Older respondents demonstrated more positive attitudes towards aligner therapy. This finding suggests that as individuals mature, they may develop a greater appreciation for aesthetic treatment options and lifestyle flexibility offered by aligners. This finding contrasts with previous studies that reported younger adults having more favourable perceptions of aligners [Huang A., 2024; Timm L *et al.*, 2021; Paim J *et al.*, 2024; Adobes M *et al.*, 2025, Noll D *et al.*, 2017; Lam J *et al.*, 2023]. The difference may be explained by the specific context of our study population—patients already undergoing fixed orthodontic treatment—who may have different considerations compared to treatment-naïve individuals. Additionally, the distinction between perception and attitude should be noted; while previous studies often assessed perception (how aligners are viewed), our significant finding pertained to attitude (willingness to adopt or preference for aligners) [Paim J *et al.*, 2024; Vandrangi S *et al.*, 2023; Shivlani V *et al.*, 2023]

Education level was significantly associated with attitude. This finding correlates with previous studies demonstrating that higher educational attainment is associated with greater health literacy, which in this context translates to understanding and acceptance of modern orthodontic techniques. [Selveraj V *et al.*, 2023; Chong H *et al.*, 2025; Sadhunavar T *et al.*, 2024; Shewale P *et al.*, 2024].

Household income demonstrated a significant association with attitude, with multivariate analysis confirming that income uncertainty was a significant negative predictor of positive attitude. This finding suggests that financial awareness and stability may influence openness to considering more expensive treatment alternatives. This finding corroborates a Saudi public survey by Alharbi I *et al.*, 2022, which revealed that average-income participants had greater belief in aligners' superiority than low-income participants. Etim & Umeh, 2025 also found that socioeconomic factors influence orthodontic treatment seeking behaviour in Lagos, Nigeria, with most orthodontic patients coming from middle to high socioeconomic classes. The relationship between income and attitude was further evidenced by respondents' willingness to pay more for aligners, with more willing to pay up to three times more than fixed braces, though a quarter were not willing to pay more. Less than a half of the respondents were reported to have the discipline to wear a removable appliance constantly, highlighting potential compliance concerns, which aligns with previous literature on aligner therapy challenges [Timm L *et al.*, 2021].

Strengths and Limitations

This study has several strengths. It specifically targeted patients currently undergoing fixed orthodontic treatment, providing insights from a population with direct experience of orthodontic care and relevant context for evaluating alternative treatment modalities. The use of validated questionnaire instruments and

appropriate statistical analyses, including multivariate regression, strengthened the methodological rigor.

However, some limitations should be acknowledged. The study was conducted at a single private hospital in Lagos, which may limit generalizability to other settings, including public hospitals or other regions of Nigeria. The cross-sectional design precludes establishing causal relationships between sociodemographic factors and KAP outcomes. Additionally, the high proportion of respondents (41.8%) who were unsure about their household income may have affected the analysis of income-related associations. However, this uncertainty itself emerged as a significant predictor in the multivariate analysis.

CONCLUSION

Knowledge of clear aligner therapy among patients treated with fixed appliances is limited. Income uncertainty could predict a positive attitude of patients towards aligners. Educational interventions and improved affordability strategies could enhance the uptake of aligner therapy among appropriate candidates.

Recommendation

For policymakers and public health professionals, aligner therapy should be made an accessible part of orthodontic care by spreading awareness and tackling cost barriers.

Conflict of Interest: None declared.

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