



Knowledge, Awareness, and Practices about Traditional Orthodontic Braces Vs Invisalign Aligners among Dental Practitioners in Pakistan: A Cross-sectional Study

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Abstract

Background: Conventional fixed orthodontics are being replaced by the clear aligners and are becoming popular among the practitioners. However, it is unclear how Pakistani practitioners are recognizing its effectiveness. This study discusses and evaluates the use of traditional practices and clear aligners amongst the clinical practitioners.

Methods: To achieve our objective, we conducted a survey by questioning 328 dental practitioners in Pakistan to gauge the effectiveness of clear aligners amongst the patients. The results are recorded through the statistics of the responses and by developing a Chi-square tests indicating the practitioners age, experience (before and after the adopting aligners), and gender.

Results: The statistics illustrated that majority of the practitioners were female (68.3%) that aged between 20-30 years. In addition, 78.4% were the general practitioners and amongst them 47.6% had above five years of experience. The results indicated that 56.4% of the practitioners commended the use of aligners, however, 32.6% considered it less effective than braces. In addition, 91.8% mutually agreed that the aligners suite mild to moderate malocclusions. Statistics also showed that 51.2% of the adults recommended aligners and 58.5% adolescents recommended braces.

Conclusion: To conclude, there was a balanced approach of using aligners and braces amongst the practitioners. It is also determined that the aligners are useful for aesthetics, hygiene, and compliance, whereas, the braces were suggested for young patients with complex dental problems.

Key words: Orthodontic traditional braces, aligners, KAP, Pakistan, dentists

1. Introduction

Malocclusion is an irregularity of the teeth or a mal-relationship of dental arches beyond the range of what is accepted as normal (1). It can affect an individual's oral health, aesthetics, and overall quality

of life (2). Identifying the prevalence of malocclusion has been done globally, it is expected that the worldwide prevalence of malocclusion was 56% without differences in gender (3).

A survey conducted in 2024 in Karachi, Pakistan, showed that in young adolescents, the overall estimated prevalence of malocclusion was 57.4% (1). This showed the high need of orthodontic treatment modalities.

For ages, various orthodontic treatments have been recommended, and for instance, in 1770, conventional orthodontic treatment was used to treat a variety of malocclusions using wires, brackets, or ligatures. After that, Orthodontic materials were first developed in 1887 by Dr. Edward Angle, who used nickel alloy for its flexibility in cables (4). Different materials like copper, zinc, and 14-karat gold became more prominent and widely used for traditional orthodontic treatment. Stainless steel was introduced in 1929, and it gained popularity for its fracture-resistant properties under stress, and less costly than gold (4). The development of new research and technology in the late 20th and early 21st century brought CAD/CAM manufacturing, which has allowed the development of plastic orthodontics, including Invisalign. It is the procedure of straightening teeth utilizing clear, custom-made plastic aligners. ALIGN Technologies, the proprietary company of Invisalign, was co-founded by Pakistani-American, Zia Chishti in 1997, and the FDA approval for Invisalign was granted in 1999 (5). In 1999, the Align Technology company introduced Invisalign, the first commercially available clear aligner system. Clear aligners exert controlled, gentle forces on the teeth, facilitating their gradual movement into the intended position while minimizing discomfort (6). The origins of clear aligner therapy go back to the early twentieth century, when clinicians began experimenting with transparent plastic appliances for guiding tooth movement. Over time, they realized that using a series of slightly adjusted aligners—each one built on the changes created by the previous—could gradually shift the teeth into their desired positions. This innovation represented a major advancement compared with conventional fixed orthodontic appliances, which relied on metal brackets and wires to achieve similar outcomes (7). In Pakistan, research studies on increasing patient demand for aligners and awareness of professionals about braces versus aligners remains limited. Dental practitioners have an important role in modelling treatment choices, and thus the knowledge, awareness, and practices of dental practitioners' directly impact patient decisions and long-term compliance. Appreciating these aspects is crucial for evidence-based treatment planning instead of banking on personal preference (8-14). This study aimed to report this gap by inspecting how demographic and professional characteristics effect Pakistani practitioners' outlooks on traditional braces and clear aligners. It not only evaluated their knowledge, awareness, and practices regarding compliance shown by the patient, but also suitability of each modality towards its user. Therefore, it assisted in getting an updated prospective regarding current standards practiced in Pakistan.

When viewed thoroughly, the null hypothesis depicted no paramount difference in knowledge, awareness and practices between braces and aligners, whereas the alternative hypothesis presented a considerable variation. This discrepancy channeled the analytical approach and assisted to determine whether practitioner perceptions line up with surfacing orthodontic technologies.

2. Methodology

2.1. Study Design

This study embraced a cross-sectional design to assess KAP related to orthodontic treatment in dental professionals' constructing on insights described in previous literature (13). After brushing up pertinent published studies, our study structured a self-administered online questionnaire to collect data for the study (12-14). An online survey was published with Google Forms to gather data. The study duration was 5 months, May 2025 to September 2025.

2.2 Sample Size and Study Setting

A convenience sampling method was employed for this multicenter study, which was directed across several cities in Pakistan. In whole, 328 practitioners contributed. Using OpenEpi Version 3.01, the

least possible required sample size was estimated to be 318 at a 95% confidence level and a 5.5% margin of error. To reinforce the reliability and credibility of the outcomes, the final sample was amplified to 328 participants (12).

A 20-item questionnaire was formulated and primarily tested with 20 dental professionals, then minor refinements were done. Participants gave electronic informed consent prior to completing the survey. The questionnaire involved four sections: Demographics (Q1–5), Knowledge and Awareness (Q6–13), Clinical Practice Patterns (Q14–16), and Professional Development and Future Outlook (Q17–20). Items gathered information on age, gender, specialty, clinical experience, perceptions of treatment effectiveness, duration, patient compliance, clinical observations, training, and anticipated future trends. All questions were multiple-choice to enable quantitative analysis.

Ethical approval was granted by the Pakistan Research Institute of Dental Education (PRIDE/ERB/2025/022). The survey was reviewed by expert dental educators to warrant clarity and content validity after which it was to be distributed online through Google Forms via professional networks and social media. Participation was completely voluntary, and responses were collected anonymously and confidentiality was maintained throughout. The inclusion criteria required dentists to be actively practicing, with differing levels of clinical experience. Dentists who did not give consent and the undergraduate students were excluded.

Data were analyzed using IBM SPSS Statistics vs 26. Descriptive statistics summarized all of the characteristics and survey responses in the form of frequencies and percentages. Chi-square tests were applied to examine associations between clinician demographic characteristics and knowledge, awareness, and practice patterns for thorough understanding (12).

3. Results

Around 328 dentists from across Pakistan volunteered to participate in the study, with females being 68.3% (n=224) and males 31.7% (n=104) (Table 1). Most of the respondents were aged between 20 and 30 age (69.5%, n=228), trailed by those aged 31–40 years (25.9%, n=85). All dentists were licensed, with general dentists creating the largest group (78.4%, n=257) (Figure 1a). Concerning clinical experience, 47.6% (n=156) had 1–5 years, 32.3% (n=106) had less than 1 year, 12.5% (n=41) had 6–10 years, and 7.6% (n=25) had over 10 years of experience. Table 1 and Figure 1a offer an overview of the respondents' socio-demographic characteristics.

Table 1: Distribution of participants according to gender, age, and clinical experience

Variables		Frequency	Percent	Cumulative Percent
Gender	Female	224	68.3	68.3
	Male	104	31.7	100
Age	20–30	228	69.5	69.5
	30–40	85	25.9	95.4
	40–50	9	2.7	98.2
	Above 50	6	1.8	100.0
Clinical Experience	1–5 years	156	47.6	47.6
	6–10 years	41	12.5	60.1
	Less than 1 year	106	32.3	92.4
	More than 10 years	25	7.6	100.0

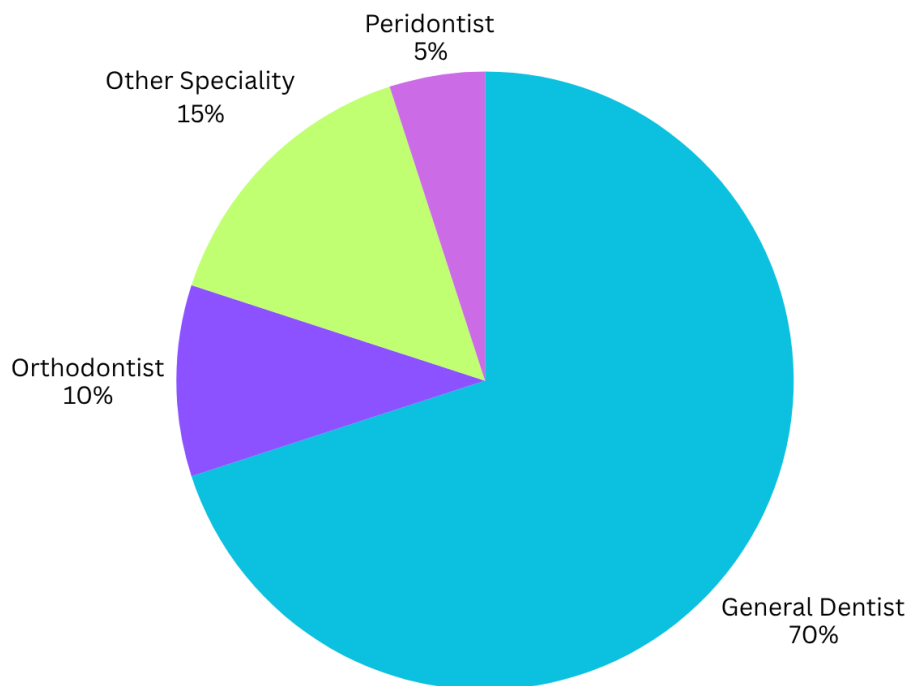


Figure 1a. Pie chart presenting study population

Data analysis revealed that 56.4% (n=185) of respondents had views that aligner treatment is less time consuming than braces, whereas 18.3% (n=60) assumed both take similar time (Table 2). Regarding treatment effectiveness, 32.6% (n=107) considered aligners slightly less effective than braces, and 22.6% (n=74) considered them slightly more effective (Figure 1b). Patient compliance was reported to influence aligner success by 38.1% (n=125) of respondents and braces by 24.1% (n=79), while 37.5% (n=123) considered compliance equally important for both (Table 2).

Figure 2a. Pie chart presenting study population.

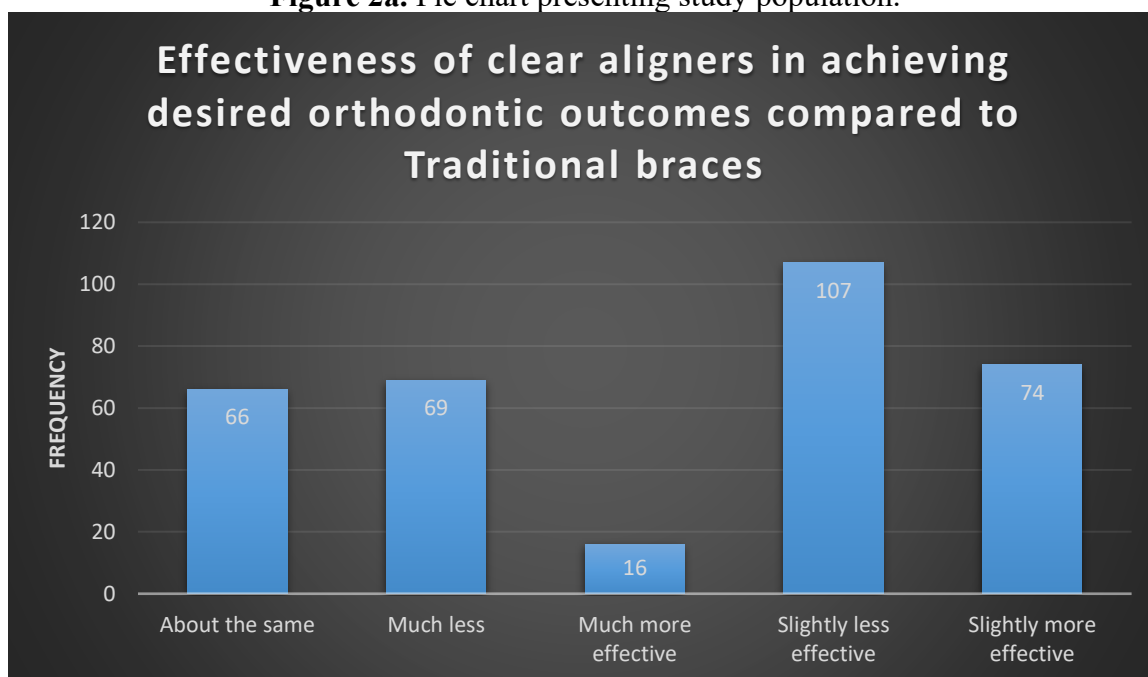


Figure 1b. Effectiveness of Clear Aligners in Achieving Desired Orthodontic Outcomes

For age-specific treatment, 58.5% (n=192) preferred braces for teenagers and 22% (n=72) for adults. Aligners were more frequently considered for adults (51.2%, n=168) than teenagers (44.2%, n=145). Most respondents (91.8%, n=301) agreed that aligners are effective for mild to moderate malocclusion. Confidence in treatment planning was reported as 37.8% (n=124) for aligners, 46.3% (n=152) for braces, and 15.9% (n=52) for both (Figure 1c).

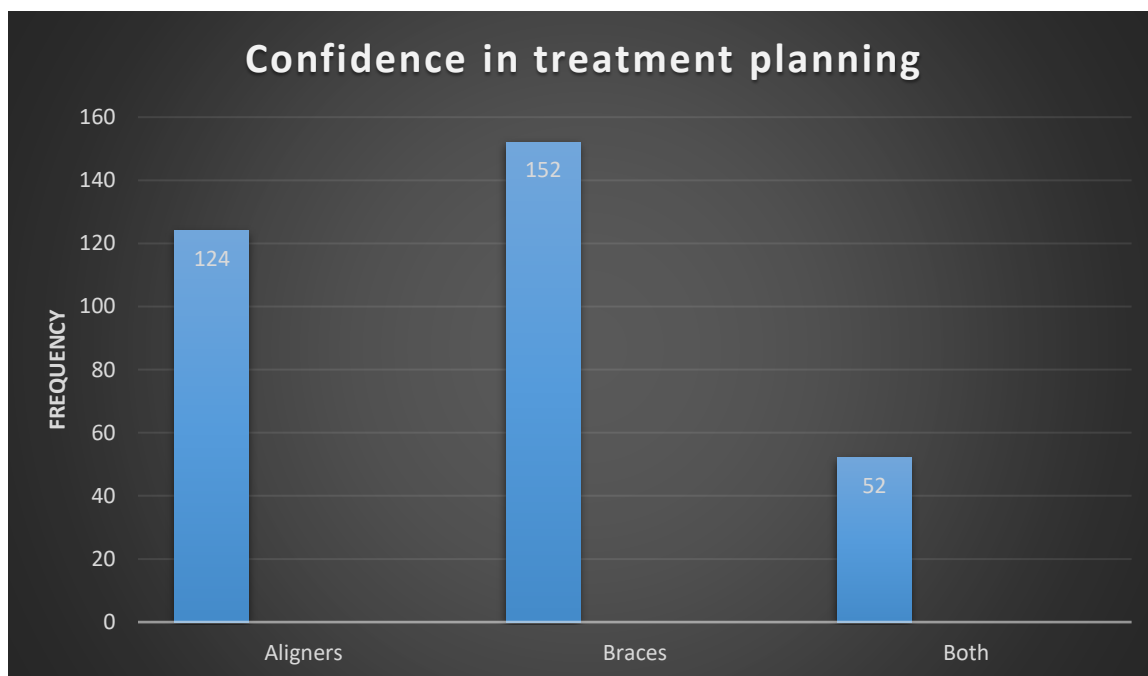


Figure 1c. Bar graph showing confidence in treatment planning with braces and aligners

.Oral hygiene was reported better with aligners by 81.7% (n=268), and 40.9% (n=134) observed better patient adherence with aligners compared to 31.7% (n=104) with braces (Figure 1d).

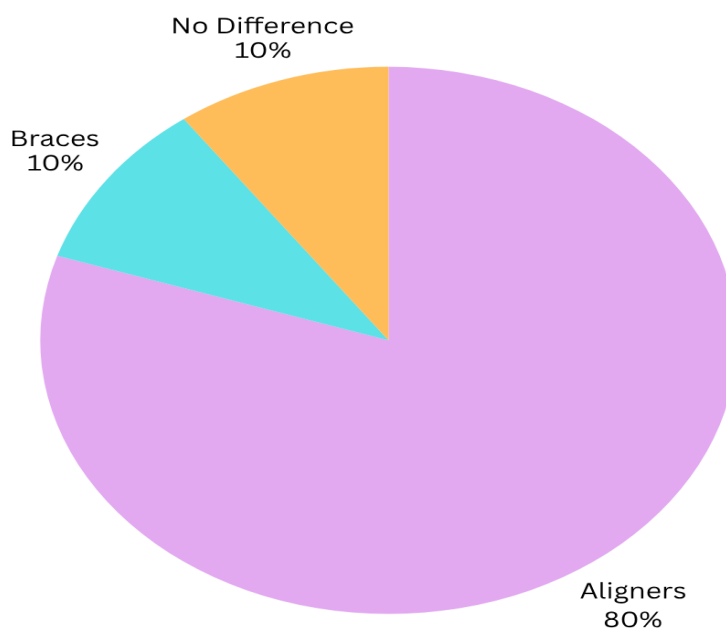


Figure 1d. Oral hygiene maintainance with orthdodontic braces and aligners as reported by participants.

Approximately 46.3% (n=152) of respondents expressed interest in further aligner training. Patients reportedly prioritize comfort and aesthetics, with 51.5% (n=169) “always” and 37.2% (n=122) “often” choosing aligners for these reasons. Finally, 73.5% (n=241) of respondents anticipated that aligners would become a more popular treatment modality in the future (Figure 1e).

Table 2: Comparison of treatment duration and effect of patient compliance on the success of orthodontic treatments

Orthodontic treatment modalities	Frequency	Percent	Cumulative Percent
Aligners	185	56.4	56.4
Braces	83	25.3	81.7
Same	60	18.3	100.0
Affected success with patient's compliance	Frequency	Percent	Cumulative Percent
Aligners	126	38.4	38.7
Both Equally	123	37.5	75.9
Braces	79	24.1	100.0

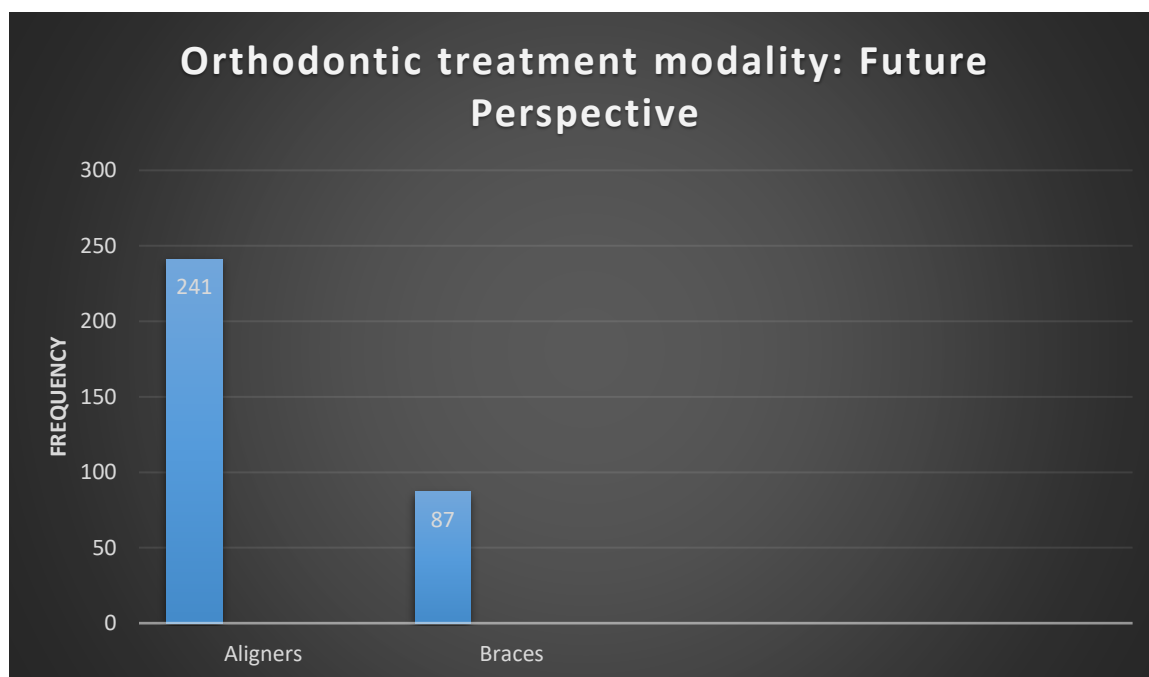


Figure 1e Orthodontic treatment modality likely be more popular in future

Additionally, Chi-square analyses were conducted to examine associations between clinician characteristics, training, and perceptions of orthodontic treatments as presented in Table 3. Dental specialty was significantly associated with perceived effectiveness of clear aligners relative to traditional braces ($Q6 \times Q4$) ($\chi^2(12) = 38.72$, $p < .001$, $\Phi = .344$), suggesting that orthodontists and general dentists hold differing views on aligner efficacy. Attendance at aligner workshops or certifications ($Q17$) was positively associated with confidence in treatment planning ($Q12$) ($\chi^2(2) = 6.10$, $p = .047$, $\Phi = .136$), demonstrating the influence of formal training on clinician confidence.

Patient prioritization of comfort and aesthetics over function (Q19) was significantly associated with the types of services offered (Q16) ($\chi^2(24) = 37.44$, $p = .040$, $\Phi = .338$). Clinics that provided both aligners and traditional braces reported a greater perceived preference of patients with comfort and appearance; interpretation is difficult because of the low numbers within particular cells. Similarly, there is an important relationship between better oral hygiene results (Q15) and the variety of services that patients receive (Q16) ($24=44.84$, $p=.006$, $\Phi=.370$), which indicated that there was an increase in oral hygiene among patients based on the type of services that they receive.

All in all, the results suggest that the specialty of a clinician and his/her formal training determines perceptions and confidence, whereas the diversity of the services promotes patient preferences and clinical results. Table 4 provides the summary of the associations between the characteristics of the clinicians, training, services offered and perceived outcomes and gives a clear picture of the relationship between the professional background and the scope of practice and clinical observations and patient responses

Table 3: Associations between clinician characteristics, formal training, services offered, and perceptions/outcomes regarding patient preferences and clinical observations.

Variables	Chi-square (X^2)	df	p-value	Effect size (Φ)	Interpretation
Q6: Perceived effectiveness of clear aligners $\times$ Q4: Dental specialty	38.72	12	<0.001	0.344	Significant. Specialty influences perceived aligner effectiveness.
Q12: Confidence in treatment planning $\times$ Q17: Attended aligner workshops	6.10	2	0.047	0.136	Significant. Workshop attendance increases confidence.
Q19: Patient preference (comfort/aesthetics) $\times$ Q16: Services provided	37.44	24	0.040	0.338	Significant, but interpret cautiously due to many low expected counts. Clinicians offering more services perceive patient preference for comfort/aesthetics more strongly
Q15: Better oral hygiene $\times$ Q16: Services provided	44.84	24	0.006	0.370	Significant. Practices offering multiple services observe better oral hygiene with aligners.

Discussion:

Although conventional braces and Clear aligners are both effective in achieving the desired orthodontic outcome, however, clear aligners are preferable these days (8). There are various reasons

for the shift of trend towards aesthetic orthodontic appliances, some of which are aesthetics and acceptability (8, 9), increased patients' satisfaction, and quality of life, lower pain, and less anxiety as compared to those receiving fixed appliances (10, 11). A positive outlook on using clear aligners has been written among orthodontists rather than general dentists in Pakistan (12). The technological advancement and research in the field of orthodontics are gaining pace in Pakistan, but it is under-explored and less data is available.

A cross-sectional study showed that orthodontists mostly prefer aligners, compared to general dentists who favor conventional modalities (12). The observed differences highlight several underlying influences, including the clinician's level of education, their exposure to hands-on training, and the number of years they have spent in practice. Such trends have been reported in the literature internationally. Selvaraj et al. (13) observed that dentists and postgraduate trainees of other specialities mostly showed limit-bounded understanding and irregular use of aligners in planning treatment. Alsultan et al. (14) also showed clear gaps in knowledge between general practitioners and orthodontists about Invisalign, reinforcing the requirement to strengthen development professionally and education related to aligners. Altogether, these studies propose that the effective integration of advance orthodontic technologies be contingent not only on patient importance but also on the practitioner's readiness and expertise with digital tools, which should preferably be integrated into dental syllabuses and continuing training programs.

The study evaluated the knowledge, attitudes and practices of dental practitioners in Pakistan in relation to the use of both traditional orthodontic braces as well as clear aligners. Most of the respondents were young dentists with minimal clinical experience, which could be one of the reasons behind the high degree of acceptance and optimism of clear aligner therapy that we found. A large percentage of respondents thought that clear aligners took less time to treat than fixed appliances although there was a divided evidence on this point. Systematic reviews and umbrella analyses also regularly note that although aligners are useful in the management of mild to moderate malocclusions, traditional braces are more predictable to complex movements, like root torque, extrusion, and rotation (15,16). This gap between the practitioner perception and the literature indicates that there is a possible overestimation of the efficiency of aligner, which is probably due to a patient-based demand and marketing. In terms of treatment efficacy, more than 90 percent of the respondents stated that aligners should be used in mild to moderate cases of malocclusion, which aligns with the current reviews and meta-analysis (15,16). Notably, the overall awareness of the limitations of aligners was reflected by the fact that almost a third of participants still considered aligners to be inferior to braces. This is in line with the results of comparative studies which indicate that even though aligners are effective in improving patient-reported outcomes, the fixed appliances can achieve more extensive biomechanical corrections in some instances (17). Our respondents generally acknowledged that patient compliance was a factor in determining the success of treatment in the case of aligner therapy. This is consistent with the literature that highlights the fact that the removability of aligners means that high compliance is required to achieve predictable outcomes, unlike the fixed appliances, which do not depend on high patient compliance (18). Indicatively, over 80 percent of the respondents indicated that aligners were better at keeping their mouths clean, and both the international and local studies also indicated the same. There is evidence suggesting that aligner users have fewer signs of accumulated plaque and gingival inflammation than fixed appliance patients (19). The benefits of aligner therapy were also considered to be pain and comfort. Our respondents were of the opinion that patients tend to use aligners as they are more comfortable and attractive, which is in line with reports that aligner patients report lower levels of pain and higher levels of early oral health related quality of life than patients treated with fixed appliances (17, 19, 20). This is also corroborated by research that suggests that esthetics and discreetness have a great impact on patient preference, especially among adults (17, 19, 20, 21). Interestingly, despite the fact that most respondents replied they were more confident about planning treatments involving braces, almost half of them were interested in the idea of obtaining more training in aligner therapy. This reflects the existing gap in formal education and training opportunities in Pakistan. The emergence of local aligner providers and increasing patient

awareness as mentioned in the recent market and industry reports emphasize the urgency of the need to add aligner training to existing continuing professional development programs (22). The chi-square analysis also revealed significant correlations between clinical practice patterns and clinician perceptions. The perception of clinicians about the type of modality that produces better oral hygiene were highly correlated with the services they offer in their practice ($X^2 = 44.84$, $p = .006$), indicating that exposure to either aligners, braces or both on a regular basis might affect the way oral hygiene results are perceived. Similarly, the orthodontic services that providers offer in their clinical arrangement were also linked to their beliefs regarding what patients value to receive, like comfort and aesthetics ($X^2 = 37.44$, $p = .040$). These results show that the clinical settings of practitioners can influence their understanding of patient preferences. Training also had a significant impact: individuals who had participated in aligner workshops or certifications had a higher confidence in planning aligner cases ($X^2 = 6.10$, $p = .047$), which highlights the importance of structured educational exposure. Interestingly, there was no difference in confidence levels based on the years of clinical practice ($p = .226$) indicating that clinical seniority does not necessarily increase competence or comfort with aligner therapy. Altogether these associations highlight the fact that access to training and service offerings have a greater impact on practitioner perceptions as compared to experience duration. Lastly, a majority of the practitioners in this paper stated that aligners would be a more popular treatment option in the future. This hope is aligned with the current trends in the world and the region where the use of clear aligners is showing a rapid growth (22). The price of the aligner therapy, inaccessibility, as well as, the absence of higher levels of training, might remain obstacles in the Pakistani setting, though (23). The need to address these using structured training, evidence-based clinical guidelines and joint orthodontic education may help improve practitioners' preparedness to incorporate aligners into their orthodontic practice.

Abbreviations:

Knowledge, Awareness, and Practice KAP

Ethics approval and consent to participate: Ethical Approval has been taken from Pakistan Research Institute of Dental Education (P.R.I.D.E), reference number, PRIDE/ERB/2025/022. Consent to participate was provided to all the participants. This study adhered to the Declaration of Helenski to this effect.

Consent for Publication: Not applicable.

Availability of data and materials: The data will be available on request.

Competing interests: Authors declare no competing interest

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