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Orthodontic Treatment Adherence among Local Patients: Key Influences

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ABSTRACT

Background: Adherence to orthodontic appointments is crucial for successful treatment outcomes. Missed visits can prolong treatment, increase complications, and reduce patient satisfaction. **Objective:** To evaluate the frequency of orthodontic appointment adherence and identify key factors influencing it among local patients. **Study Design:** Cross-sectional study. **Settings:** De'montmorency College of Dentistry, Lahore Pakistan. **Duration:** Six months from march 2023 to September 2023. **Methods:** 231 patients receiving orthodontic treatment. Data on demographics, oral hygiene habits, motivation levels, and treatment duration were collected through a structured questionnaire. Attendance was categorized as always, sometimes, or rarely attending. Chi-square tests were used to assess associations between adherence and various factors. **Results:** The mean age of participants was 12.44 ± 4.64 years; 56.7% were females. Only 9.1% of patients always attended appointments, 44.2% sometimes attended, and 46.8% rarely attended. Significant associations were found between adherence and gender (p = 0.011), age under 12 years (p = 0.001), education level (p = 0.001), and oral hygiene (p = 0.024). No significant association was observed with motivation, brushing frequency, treatment duration, or reason for getting braces. **Conclusion:** Orthodontic treatment adherence was generally low in the studied population. Factors such as younger age, female gender, better education, and good oral hygiene were linked to improved attendance. Interventions targeting modifiable behaviors may help improve compliance and treatment success

Keywords: Orthodontic adherence, Missed appointments, Oral hygiene, Dental education, Treatment compliance, Patient motivation.

INTRODUCTION

One of the persistent challenges faced by dental professionals is encouraging patients to adopt and sustain positive oral health behaviors.[1] In orthodontics, where treatment often spans several months or years, it is generally expected that patients who seek better smiles and functional bites will remain committed to their appointments and treatment guidelines.[2] Orthodontic adherence refers to a patient's ability to follow through with scheduled visits, maintain oral hygiene, wear appliances as prescribed, and avoid habits that may hinder progress, such as eating hard or sticky foods.

The American Association of Orthodontists notes that patients undergoing orthodontic treatment should be motivated to attend appointments and follow instructions to achieve desired esthetic and functional results.[3] Nevertheless, irregular attendance remains a frequent challenge. Trenouth[4] reported that the failure rate was considerably higher among those who abandoned treatment midway compared to those who completed it. Missing orthodontic appointments not only prolongs treatment time but also increases the chances of developing complications such as enamel decalcification.[5,6] Previous research indicates that the frequency of missed orthodontic visits (or "no-shows") can range from 13.6% to 23.3%, illustrating a substantial burden on clinical efficiency.[6]

There are several contributing factors behind irregular attendance. The American Association of Orthodontists Insurance Company notes that teenage disinterest, family emergencies, work-related stress, and simply forgetting appointments are common causes. Forgetfulness in particular highlights the role of patient behavior and oral health literacy in adherence.[7]

With advancements in patient communication, digital tools such as reminder texts and educational apps are

now being used to boost adherence. Hussein and Ismail (2023) showed that such reminders led to significant improvements in both hygiene and appointment compliance.[8] Jumani *et al*[9] reported that structured reminders and behavioral interventions improved orthodontic retainer adherence in Karachi. Similarly, Ali *et al*[10] in JUMDC highlighted that good oral hygiene was significantly associated with better appointment adherence, suggesting that compliance behaviors are interlinked. Moreover, systematic reviews indicate that behavioral support strategies can reduce missed appointments and improve treatment outcomes.[11]

Considering the limited local data on this topic, the current study was designed to evaluate appointment adherence among orthodontic patients in a tertiary care hospital and to identify key behavioral and demographic factors affecting compliance. The aim is to generate evidence that can help clinicians improve patient engagement and achieve better treatment success.

METHODS

This cross-sectional study was conducted at the Department of Orthodontics, De'Montmorency College of Dentistry, Lahore, after obtaining ethical approval from the Institutional Review Board (IRB No 1145/DCD Dated 26-02-2023). The sample size was calculated using the standard formula for estimating a proportion in a cross-sectional study. A 95% confidence level (Z = 1.96) and a study power of 80% were considered. Since no prior local data on orthodontic adherence were available, the expected prevalence (p) was set at 0.5, which maximizes variability and provides the most conservative estimate of the required sample size.[13,14] The margin of error (d) was fixed at 6.5%. Based on these parameters, the minimum sample size was calculated as 228. To enhance precision and account for potential non-response, a total of 231 patients were ultimately enrolled.[12]

Patients were included using non-probability consecutive **s**ampling and informed consent was taken before participation. Only patients who had been in active treatment for at least six months were included, while those with systemic illnesses, craniofacial anomalies, or communication barriers were excluded.

Patient adherence was defined as the extent to which patients followed or attended their scheduled orthodontic appointments. This was categorized as always attending (patients who missed no appointments), sometimes attending (missed more than 50% of appointments), and rarely attending (missed more than 70% of appointments).[12] Attendance was assessed by comparing patient responses with treatment history sheets maintained by the doctor or postgraduate trainee.

Various potential influencing factors on appointment adherence were evaluated. These included age less than 12 years, male gender, education level below matriculation, low motivation (defined as undergoing treatment due to family or peer pressure or for social reasons), poor oral hygiene (brushing less than twice daily), and prolonged treatment duration (more than 18 months). These factors were studied particularly in patients who had irregular attendance patterns.

A structured questionnaire (Annexure) was used to collect data, comprising six sections: demographic details (name, age, sex, and contact number), education level, oral hygiene routine, attendance history, treatment duration, and motivation for treatment. The key question to assess attendance was: "Do you visit the orthodontist after having an appointment?" with options of always, sometimes, or rarely. These responses were cross-verified using treatment history sheets and clinic records. The questionnaire used in this study was developed after a detailed review of the relevant literature and consultation with orthodontic specialists. Content validity was ensured through expert review by three senior orthodontists who evaluated the questionnaire for clarity, relevance, and comprehensiveness. A pilot test was conducted on 20 patients (not included in the final analysis) to assess feasibility and understanding of the items. Minor modifications were made based on feedback to improve clarity.

All interviews were conducted face-to-face by the researchers to ensure consistency and reduce bias. Participants were guided through the questionnaire, and any queries were addressed immediately by the interviewer to maintain data accuracy and clarity.

Data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) software version 12.0. Mean and standard deviation were calculated for quantitative variables like age.

Frequency and percentage were calculated for qualitative variables like gender, trends of adherence (consistently, sometimes, and rarely), and factors (age, gender, education, low motivation, poor oral hygiene, prolonged duration of treatment). Chi-square test was applied post-stratification, with p-value < 0.05 considered as significant.

RESULTS

The study included a total of 231 orthodontic patients, with a mean age of 12.44 ± 4.64 years, ranging from 6 to 22 years. Among the participants, 100 (43.3%) were males and 131 (56.7%) were females. In terms of appointment adherence, only 21 patients (9.1%) reported always attending their orthodontic appointments, 102 (44.2%) sometimes attended, while 108 (46.8%) rarely attended

Demographic characteristics showed that 110 participants (47.6%) were younger than 12 years, while 121 (52.4%) were aged 12 years or above. Educational background revealed that 139 (60.2%) had less than matric-level education, and 92 (39.8%) had attained matriculation or higher education. Low motivation for seeking treatment was reported by 107 participants (46.3%). Oral hygiene practices were considered poor in 141 participants (61%), while 90 (39%) maintained good hygiene by brushing twice daily or more. Furthermore, 111 patients (48.1%) had treatment durations of more than 18 months.

Chi-square analysis (Tables 1-4) showed a statistically significant association between adherence and gender, with females showing better attendance than males (p = 0.011). Participants under 12 years of age were significantly more likely to adhere to appointments (p = 0.001). Educational level also significantly influenced attendance, with poorer adherence observed in participants with less than matric (p = 0.001). Similarly, poor oral hygiene was significantly associated with irregular attendance (p = 0.024).

No statistically significant associations were found between adherence and the reason for having braces (p = 0.114), low motivation (p = 0.231), brushing frequency (p = 0.110), or treatment duration exceeding 18 months (p = 0.170), as summarized in Tables 5 and 6.

Table 1: Association of gender with trends of attendance (n = 231)

Gender	Always	Sometimes	Rarely	Total	p-value
Male	3	51	46	100	0.011
Female	18	51	62	131	
Total	21	102	108	231	

Chi-square test applied.
A significant association was observed between gender & appointment attendance.

Table 2: Association of Age (<12 years) with trends of attendance (n = 231)

Age Group	Always	Sometimes	Rarely	Total	p-value
< 12 years	19	43	48	110	0.001
≥ 12 years	2	59	60	121	
Total	21	102	108	231	

Chi-square test applied.
Younger patients (<12 years) had significantly better attendance.

Table 3: Association of education (< Matric) with trends of attendance (n = 231)

Education Level	Always	Sometimes	Rarely	Total	p-value
Less than Matric	4	67	68	139	0.001
Matric or above	17	35	40	92	
Total	21	102	108	231	

Chi-square test applied.
Lower educational levels were significantly associated with poor adherence.

Table 4: Association of bad oral hygiene practices with trends of attendance (n = 231)

Oral Hygiene Practice	Always	Sometimes	Rarely	Total	p-value
Bad	7	65	69	141	0.024
Good	14	37	39	90	
Total	21	102	108	231	

Chi-square test applied.
Poor oral hygiene was significantly associated with irregular attendance.

Table 5: Association of low motivation with trends of attendance (n = 231)

Motivation Level	Always	Sometimes	Rarely	Total	p-value
Low	6	49	52	107	0.231
Normal / High	15	53	56	124	
Total	21	102	108	231	

Chi-square test applied.
No significant association was found between motivation & appointment attendance.

Table 6: Association of treatment duration (>18 months) with trends of attendance (n = 231)

Treatment Duration	Always	Sometimes	Rarely	Total	p-value
>18 months	14	45	52	111	0.170
≤18 months	7	57	56	120	
Total	21	102	108	231	

Chi-square test applied.
No significant association observed with treatment duration.

DISCUSSION

The efficient execution of orthodontic treatment is contingent upon several key patient compliance factors, including keeping good attendance records, maintaining good dental hygiene, and preventing appliance

damage.[15] Parents who have received orthodontic treatment themselves and patients who have received orthodontic therapy in the past typically have more positive attitudes toward orthodontic treatment.[16] Research has shown that patients who are more knowledgeable about orthodontics have more positive attitudes regarding orthodontic therapy, which raises the possibility of improvement in clinical results.[17] In Pakistan, the prevalence of malocclusion is significant, yet orthodontic commitment is unsatisfactory, sometimes owing to cultural influences, the role of parents, and a lack of understanding.[18] Just 9.1% of patients regularly attended their orthodontic appointments, and the majority either missed multiple appointments or rarely attended, which highlights a serious problem. This raises issues with the effective use of clinical time and resources and treatment outcomes.

There were significant connections discovered between attendance patterns, age under 12, and poor oral hygiene. Participants under the age of 12 were more likely to attend consistently, which might be attributed to increased parental participation. Perillo *et al*[19] (2023) found that younger children with parental guidance are more likely to comply with orthodontic treatment.

Lindauer *et al*[20] reported that male patients were more likely to miss their orthodontic appointments. Results were opposite in a study by Horsley *et al*,[21] where female patients missed their appointments frequently. However, in this study, gender presented a statistically significant association, with female patients demonstrating greater commitment than males. Females are likely more concerned with appearance, so they are more driven to finish their treatment on time.

The study also found that patients who had poor oral hygiene (defined as brushing fewer than twice a day) were much more likely to miss appointments, which may be a reflection of a larger pattern of disengagement or lack of motivation toward self-care in general, including orthodontic responsibilities. It is also possible that these patients struggle to maintain the discipline and lifestyle changes required for orthodontic treatment. Evidence suggests that poor hygiene compliance is linked to lower appointment attendance and increased plaque indices.[22]

Surprisingly, poor motivation, frequency of brushing, reason for getting braces, and treatment length (>18 months) had no significant relationship with attendance patterns. These findings suggest that motivational or psychological variables influencing treatment commencement may not always correspond with long-term adherence, consistent with larger reviews highlighting equivocal relationships between claimed motivation and true compliance.[23] This differs significantly from the findings of Timm *et al*,[24] who found that patients with past orthodontic experience had improved adherence, probably due to increased knowledge of treatment expectations.

Consistent with previous data,[25] Education level also had a substantial impact on adherence. Patients with less than a matric level education were more prone to miss appointments. This might indicate a lack of health literacy, a misunderstanding of the need for treatment, or an inability to manage time and appointments efficiently.

Orthodontic treatment requires a long-term commitment, and skipping visits can result in delays, complications, and frustration for both the patient and the practitioner. Understanding why patients fail to attend frequently enables healthcare practitioners to modify communication, motivating techniques, and maybe even appointment scheduling to promote adherence.

CONCLUSION

According to the study, adherence to orthodontic appointments was strongly impacted by gender, age, educational attainment, and oral hygiene condition. Patients who were younger than 12 years old, female, had greater levels of education, and practiced good dental hygiene were more likely to adhere to their appointment schedules. To increase adherence among orthodontic patients in clinical settings, targeted interventions are advised, with a particular emphasis on motivational reinforcement, parental participation, and dental hygiene education.

LIMITATIONS

This study was confined to one institution and may not reflect the larger community. Additionally, self-reported measurements, albeit being cross-verified, may still introduce bias. Future studies might examine additional psychological and socioeconomic aspects or utilize longitudinal monitoring to get deeper insights.

SUGGESTIONS / RECOMMENDATIONS

Future studies should investigate psychological, social, and economic influences on orthodontic adherence. Longitudinal and multicenter studies with larger, diverse samples are encouraged. Qualitative research and evaluation of digital reminders or educational interventions may offer deeper insights and improve compliance.

CONFLICT OF INTEREST / DISCLOSURE

The authors declare no conflict of interest.

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