PATIENT COMPLIANCE TO REMOVABLE RETAINERS POST FIXED ORTHODONTIC TREATMENT.

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ABSTRACT

BACKGROUND: This study aims to evaluate patient compliance with removable retainers during the post-retention phase of fixed orthodontic treatment at the Komfo Anokye Teaching Hospital in Ghana, focusing on understanding compliance levels and influencing factors to improve long-term orthodontic outcomes.

AIM: This study aimed to evaluate patient compliance with removable retainers during the post-retention phase of fixed orthodontic treatment at the Komfo Anokye Teaching Hospital in Ghana and to identify key factors influencing adherence.

MATERIALS AND METHODS: A cross-sectional study was conducted at KATH, analyzing patients who completed fixed orthodontic treatment within the past five years. Data was collected through a structured questionnaire, and variables analyzed included compliance levels, influencing factors, and barriers to adherence using SPSS 26.0 software.

RESULTS: Among 58 respondents, 44.8% reported wearing their retainers sometimes, 25.9% wore them always, 13.8% wore them often, 12.1% wore them rarely, and 3.4% never wore them. Key barriers to compliance included forgetfulness (34.5%) and discomfort (24.1%). Other factors, such as esthetic concerns (13.8%) and difficulties with oral hygiene (10.3%), also impacted adherence. Compliance did not significantly differ among retainer types ($p = 0.172$).

CONCLUSION: Patient compliance with removable retainers is suboptimal, with forgetfulness and discomfort being primary barriers. Strategies such as enhanced patient education, customized retention plans, and technological aids should be explored to improve adherence and ensure long-term orthodontic stability.

KEYWORDS: Patient compliance, removable retainers, orthodontic retention, relapse, fixed orthodontic treatment.

INTRODUCTION

Orthodontic treatment aims to improve dental function and aesthetics, but achieving long-term stability depends on an effective retention phase using fixed or removable retainers[1]. Non-compliance with retainers is a leading cause of orthodontic relapse, with global adherence rates ranging between 30–50%[2]. Factors influencing compliance include patient awareness, comfort, esthetics, and oral hygiene challenges. Studies show that long-term adherence is significantly lower than initial compliance, highlighting the need for sustained patient education[3]. Additionally, cultural differences influence retention compliance, with variations seen across different regions[4]. Recent advancements, such as digital monitoring tools, have shown promise in improving compliance rates[5], while patient-centered interventions have demonstrated a significant impact on long-term retainer adherence[6]. This study examines compliance patterns among patients at Komfo Anokye Teaching Hospital (KATH), identifying key factors influencing adherence and potential strategies for improvement.

Types of Removable Retainers

Removable retainers play a crucial role in orthodontic retention, offering greater flexibility than fixed retainers while allowing patients to control their wear time[7]. The three principal classes of removable retainers are Hawley retainers, vacuum-formed retainers (VFRs), and Begg retainers, each with unique properties that influence patient acceptance and compliance. Hawley retainers, introduced in the 1920s, consist of an acrylic base plate, metal hooks, and a labial wire. They provide excellent stability and minor tooth adjustments during retention9. However, their visibility and impact on speech may be drawbacks for some patients. VFRs, such as Essix retainers, emerged in the 1990s as a clear, thin, and thermoplastically molded alternative. They are preferred for their aesthetics and comfort[10] but may lack durability and the ability to correct minor tooth movements. Begg retainers, similar to Hawley retainers but without labial wire, use an acrylic base plate with clasps behind the posterior teeth. They offer better aesthetics than Hawley retainers but provide less control over anterior teeth positioning[11]. Recent innovations combine features of different retainers. For example, the Damon Splint retainer features a clear VFR-like section for the front teeth, paired with an acrylic-covered posterior segment, which balances aesthetics with durability.

Fig 1. Hawley retainers

Fig 2. Essix retainers/VFR retainers

Fig 3. Beggs retainers

Comparison of compliance rates among retainer types

Research on compliance rates among different retainer types is limited. Studies suggest that VFRs have higher short-term compliance than Hawley retainers, primarily due to aesthetics and comfort[12]. However, long-term adherence may vary, influenced by factors such as durability and the need for replacement[13]. Compliance data on Begg retainers is scarce, with no significant difference in patient satisfaction compared to other types[14]. Age and gender also play a role in compliance, with younger patients showing a preference for VFRs[15]. While Hawley retainers offer durability and allow for minor adjustments, they may be less preferred due to visibility and comfort concerns. In contrast, VFRs offer aesthetic advantages and initial comfort but require more frequent replacements and can be more challenging to clean. Enhancing patient involvement in the decision-making process and providing education on retainer options can significantly improve adherence rates[16,17].

Factors Influencing Compliance

Demographic factors significantly influence compliance with orthodontic retention. Age plays a key role, with younger patients often exhibiting lower adherence due to forgetfulness and peer pressure[18]. Anderson et al. found that adolescents had a weaker understanding of retention techniques than adults, highlighting the need for age-appropriate interventions[19]. Gender differences also impact compliance; Aldegheishem et al. reported that female patients showed higher adherence due to agreater concern for aesthetics[20]. However, cultural and environmental factors may moderate these gender-based differences, suggesting variability across populations.[20] Socioeconomic status (SES) is another critical factor, particularly in low-resource settings like Ghana. Patients from lower socioeconomic status (SES) backgrounds may struggle with attending follow-up appointments or replacing lost or broken retainers due to financial constraints. [21] Retention awareness and education play a crucial role in adherence. Kvarnström et al. found that comprehensive patient education on retention significantly improved compliance[22]. Additionally, psychosocial factors, such as motivation, perceived self-efficacy, and locus of control, influence a patient's willingness to maintain treatment outcomes. Educating patients and fostering intrinsic motivation are essential for long-term retention success. This study aimed to investigate the level of compliance with removable retainers among post-orthodontic patients at Komfo Anokye Teaching Hospital and to identify the key demographic, psychosocial, and clinical factors that influence adherence to this treatment.

MATERIALS AND METHODS

Study Design and Setting: This study was a descriptive cross-sectional investigation conducted at the Komfo Anokye Teaching Hospital (KATH) in Kumasi, Ghana. KATH is a tertiary referral hospital with an orthodontic department that provides specialized dental care. The study involved patients aged 18 years and above who had completed fixed orthodontic treatment within the past five years and were prescribed removable retainers. Patients with cognitive impairments affecting self-reporting and those with fixed retainers only were excluded.

A convenient sampling approach was employed. Patients' records from the Pediatric and Orthodontic Dentistry Department were used to contact eligible participants. A total of 65 patients had completed orthodontic treatment at the Orthodontic Clinic at KATH and were contacted, yielding a response rate of 89.2% (n/N = 58/65).

Data collection was conducted through the use of structured questionnaires sent via Google Forms. Data were analyzed using SPSS version 26.0 and Python's SciPy. Descriptive statistics were used to analyze compliance patterns, and chi-square tests were conducted to examine the associations between compliance and retainer type.

This study prioritized ethical considerations to protect participants' rights, ensure their well-being, and maintain the integrity of the research. It adheres to the guidelines of the Ghana Health Service Ethics Review Committee, obtaining ethical approval before commencing. Ethical approval was obtained from the Committee on Human Research and Publication Ethics at the Kwame Nkrumah University of Science and Technology, with reference number CHRPE/AP/784/24.

RESULTS

The study recruited a total of 65 participants; however, only 58 participants met the inclusion criteria. Table 1 shows the response rate of participants. The participants comprised of 58.6% females and 41.4% males. The age of participants ranged from 18 to 33 years, with a mean age of 24 years. Fig. 4 illustrates the frequency and distribution of participant ages.

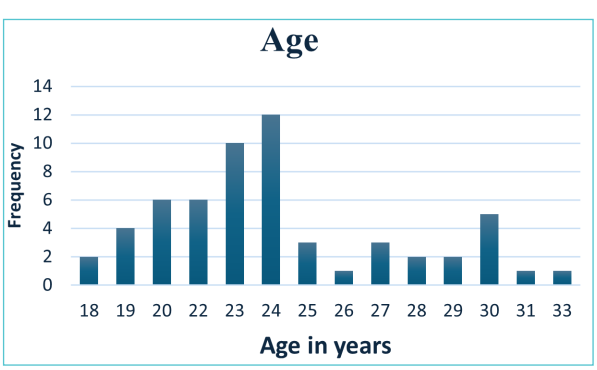

Figure 4: Graph of frequency of ages in years

Compliance Trends

Compliance patterns revealed that 44.8% of patients wear their retainers sometimes, while 25.9% wear them consistently. Smaller proportions wear them often (13.8%) or rarely (12.1%), with only 3.4% never using their retainers. Fig. 5 shows the compliance levels of participants in wearing their retainers.

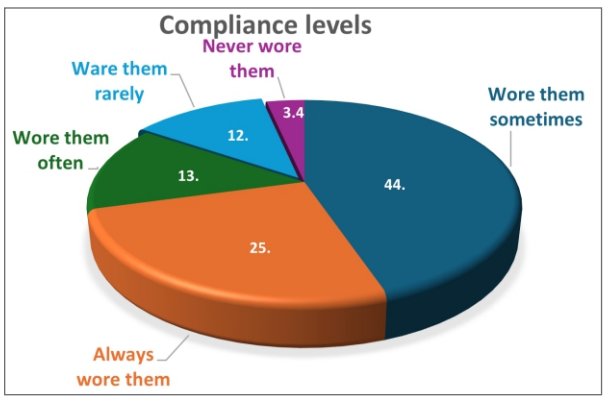

Fig. 5: Compliance levels of participants

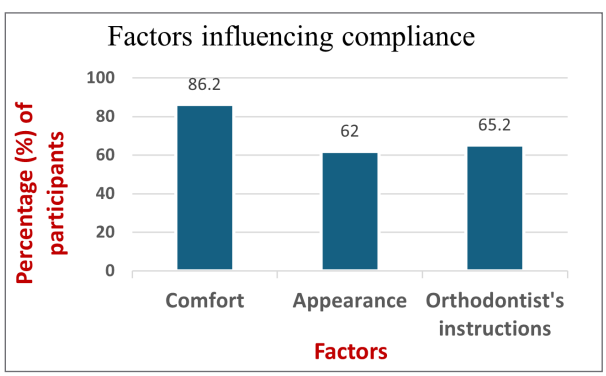

Fig. 6: Factors influencing compliance to wearing retainers

Comfort was a significant factor in retainer compliance, with 86.2% of the participants stating that it influenced their compliance. In terms of appearance, 62% agreed that it affected their compliance, suggesting that while aesthetics play a role, comfort has a greater impact on compliance. Additionally, instructions and support from orthodontists were crucial, with 65.2% of participants acknowledging their influence on retainer use (Fig. 6). This highlights the importance of clear communication and continuous support from orthodontists in promoting adherence.

Barriers to Compliance

Table 1 shows the main challenges patients faced in wearing their retainers as recommended by their orthodontist.

Table 1: Barrier of Compliance of Participants at KATH

Barrier of compliance	Frequency	Percentage (%)
Discomfort	14	24.1
Appearance/Esthetics	8	13.8
Forgetfulness	20	34.5
Difficulty in maintaining oral hygiene	6	10.3
Lack of understanding of importance	7	12.1
Peer influence/social situations	3	5.2
Total	58	100.0

The results indicate that forgetfulness is the most prominent barrier, with 34.5% of patients identifying it as a significant challenge, highlighting the difficulty many face in maintaining consistent retainer use. The discomfort was the second most common issue, reported by 24.1% of patients, indicating that physical discomfort has a significant impact on adherence. In contrast, peer influence or social situations were less frequently reported as barriers, affecting only 5.2% of patients.

The primary barriers to compliance with removable retainers at Komfo Anokye Teaching Hospital are forgetfulness and discomfort. While esthetic concerns and difficulties with oral hygiene also impact adherence, they are less prevalent. This suggests that strategies to improve retainer use should focus on addressing memory issues and enhancing comfort, with additional efforts to educate patients on the importance of retainers and mitigate practical difficulties. The relatively low impact of peer influence suggests that social factors may be less critical in this context than personal and practical considerations.

Effectiveness of different types of retainers

Performing the chi-square test using Python's scipy.stats module, the results are as follows:

Chi-square statistic (χ^2): 16.445

p-value: 0.172

degree of freedom (df): 12

The p-value (0.172) is greater than the common alpha level of 0.05, indicating that we failed to reject the null hypothesis. Thus, there is no statistically significant difference in the frequency of wear among different types of retainers.

Table 2. Contingency table for hypothesis testing

Type of Removable Retainer	Always	Often	Sometimes	Rarely	Never	Total
Beggs Retainer	1	0	1	1	0	3
Essix Retainer	9	5	17	4	1	36
Hawley Retainer	5	3	7	2	0	17
I did not use retainers	0	0	0	0	2	2
Total	15	8	26	7	2	58

DISCUSSION

This study assessed compliance with the use of removable retainers following fixed orthodontic treatment at Komfo Anokye Teaching Hospital. The age distribution of the 58 participants ranges from 18 to 33 years, with most participants in their mid-twenties and a noticeable peak at age 24 (20.7%). This highlights the predominance of young adults seeking orthodontic care. Among the respondents, 34 females (58.6%) and 24 males (41.4%) were represented, indicating a higher proportion of females seeking orthodontic treatment at the hospital. These findings are consistent with those of Wilson et al. and Aldegheishem et al., who reported that females are more likely to seek orthodontic treatment due to greater aesthetic concerns and social motivations.[18,20] Understanding the demographic characteristics of patients who have received orthodontic treatment is essential to healthcare providers. This knowledge helps tailor techniques and treatment methods that are best suited to cater to the needs of the population.

Compliance trends

The compliance trends revealed that 84.5% of participants reported wearing their retainers always, often, or sometimes, while 15.5% reported rarely or never wearing them. This pattern aligns with previous findings by Al-Moghrabi et al. and Fu et al., who observed that while initial post-treatment compliance is often high, adherence tends to decline with time.[11,25] Furthermore, 65.5% of participants stated that they followed their orthodontist's recommended guidelines on retainer wear duration and frequency, emphasizing the importance of effective clinician-patient communication, as highlighted by Pilgrim et al.[23]

Among factors influencing compliance, comfort emerged as the most significant, with 86.2% of respondents acknowledging its impact. This finding corroborates studies by Krämer et al. and Meade and Millett, who identified physical comfort as a crucial determinant of retainer use adherence.[24,32] Aesthetic concerns also influenced compliance, with 62% of participants reporting that the appearance of the retainer affected their willingness to wear it, consistent with findings by Latief et al.[12] Additionally, instructions and continuous support from orthodontists were reported as significant motivators by 65.2% of participants, emphasizing the critical role of provider reinforcement, as previously suggested by Pilgrim et al.[23]

Barriers to compliance and effectiveness of different types of retainers

The barriers to compliance noted in this study provide further insights. Forgetfulness was the most frequently cited obstacle (34.5%), followed by discomfort (24.1%), esthetic dissatisfaction (13.8%), and difficulty maintaining oral hygiene (10.3%). These results align with observations by Moda et al., who reported forgetfulness as a significant challenge to long-term compliance.[31] The physical discomfort associated with retainer wear, also highlighted by Krämer et al., underscores the need for retainer designs that prioritize patient comfort.[24] Interestingly, peer influence and social factors were the least reported barrier (5.2%), suggesting that personal factors outweigh social pressures, a trend similarly observed by Wilson et al.[18]

A key finding of this study was that compliance did not differ significantly among the various types of retainers (Essix, Hawley, and Begg), as indicated by a chi-square test with a p-value of 0.172. The p-value (0.172) was greater than the common alpha level of 0.05, indicating that we failed to reject the null hypothesis that there is no difference in the level of compliance among the different types of removable retainers. Thus, there is no statistically significant difference in the level of compliance among different types of retainers. This aligns with the conclusions of Bellini-Pereira et al. and Krämer et al., who indicated that while initial preference might vary based on esthetics or comfort, long-term compliance is driven more by behavioral factors than retainer type alone.[13,24]

To address compliance challenges, various strategies have been proposed. Technological aids such as microsensor-embedded retainers have shown promise in tracking wear time, as discussed by Schott and Göz.[33] Additionally, digital reminder systems, such as mobile applications, have been effective in enhancing compliance, as evidenced by Hussein and Ismail and Zotti et al.[34,35] Behavioral interventions, like motivational interviewing, suggested by Timm et al., can further improve adherence by strengthening patient commitment.[36]

Patient-centered education remains essential, with Kvarnström et al. emphasizing that awareness of the risks of non-compliance significantly improves retention outcomes.[24] Additionally, psychological factors such as self-efficacy and intrinsic motivation should be considered to support long-term adherence.

While this study did not directly assess socioeconomic status, previous research by Lemasney and Mathur highlighted that financial constraints may impede access to replacement retainers and follow-up visits, particularly in low-resource settings like Ghana.[21] While compliance with removable retainers among KATH patients is moderately high, challenges persist, particularly related to comfort, memory, and esthetic concerns. Targeted interventions focusing on comfort optimization, reinforcement through digital reminders, continuous orthodontist support, and personalized patient education are necessary to enhance long-term retention outcomes. Future research should explore these variables to design more inclusive retention strategies.

CONCLUSION

The findings reveal that although the majority of patients demonstrated moderate to high adherence, notable challenges such as forgetfulness, discomfort, and esthetic concerns persist. Comfort emerged as the most significant factor influencing compliance, followed closely by clear instructions from the orthodontist and patients' perceptions of their appearance. Forgetfulness and difficulty maintaining oral hygiene were identified as key barriers that compromise consistent retainer wear.

Importantly, compliance did not significantly differ among the various types of removable retainers prescribed, suggesting that behavioral and motivational factors, rather than retainer design alone, play a critical role in adherence. These findings underscore the need for a multifaceted approach to post-orthodontic retention. Targeted strategies, such as enhancing retainer comfort, utilizing technological aids like reminder systems, strengthening communication between orthodontists and patients, and fostering patient motivation and self-efficacy, are essential for sustaining long-term compliance. Future research should focus on developing individualized retention protocols, exploring the effectiveness of digital interventions, and addressing economic factors that may hinder access to orthodontic aftercare. By implementing comprehensive and patient-centered strategies, the stability of long-term orthodontic treatment can be significantly improved.

RECOMMENDATIONS

There is a need to conduct further research using focus groups; these will help provide economic predictors of retainer selection and utilization for future Ghanaian healthcare policies.

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