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Orthodontic treatment in adults: Challenges, outcomes, and factors affecting compliance and satisfaction

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Abstract

BACKGROUND: The demand for orthodontic treatment among adults has witnessed a substantial rise in recent years. This study aims to explore the complexities of adult orthodontics, focusing on challenges faced, treatment outcomes, and the influence of factors such as age, gender, and education on patient compliance and satisfaction.

METHODS: A multi-dimensional approach was employed, combining a review of clinical records with structured patient surveys. Descriptive statistics summarized demographic characteristics, treatment duration, and orthodontic problems addressed. Inferential statistics included Pearson correlation, Chi-squared tests, and analysis of variance to examine age compliance, gendersatisfaction, and education-orthodontic problem relationships. Qualitative analysis enriched findings, and statistical software facilitated data processing.

RESULTS: The analysis revealed a statistically significant negative correlation between age and compliance ($r = -0.28$, $P < 0.05$), indicating that younger participants demonstrated higher compliance rates. Gender emerged as a significant factor influencing patient satisfaction ($P = 0.024$), with females reporting notably higher levels of satisfaction than males. Furthermore, participants with advanced education levels (Master's/Ph.D.) were significantly more likely to have orthodontic issues related to malocclusion ($P = 0.041$).

CONCLUSION: The study provides an insight into the multi-dimensional aspects of adult orthodontics, recognizing the challenges, compliance, and satisfaction levels. Tailored approaches considering age, gender, and education are essential. This research contributes to a deeper understanding of orthodontic treatment in adults and its potential implications for enhanced patient care.

Keywords:

Adult orthodontics, challenges, compliance, education, gender, satisfaction, treatment outcomes

Introduction

Orthodontic treatment has conventionally focused on rectifying malocclusions and dental irregularities, primarily within the adolescent population.^[1] However, a discernible shift in the landscape of orthodontic care has surfaced in recent years, marked by a substantial increase in adults seeking orthodontic treatment

to enhance their oral health, esthetics, and overall well-being.^[2] This shift is not merely anecdotal; it reflects a tangible trend substantiated by empirical evidence. This study is motivated by the need to comprehensively explore the intricacies of adult orthodontic treatment, scrutinizing the challenges faced, the outcomes achieved, and the intricate web of factors influencing patient compliance and satisfaction.

The emergence of adult orthodontics as a prominent niche in dentistry is

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underpinned by several key factors.^[3] Technological advancements in orthodontics have given rise to discreet treatment options, such as clear aligners and lingual brackets, which are particularly favored by adults seeking orthodontic care.^[4] Furthermore, an increased awareness of the relation between oral health and overall well-being has spurred adults to view orthodontic treatment as a preventive or ameliorative measure for various dental and systemic health issues.^[5]

Esthetic considerations in orthodontic treatment play a pivotal role, especially concerning adult intervention.^[6] Esthetics significantly influence the decision-making process, with adults aspiring to attain a harmonious and pleasing smile—a driving force that transcends age and contributes to the escalating demand for orthodontic treatment among adults.^[7]

Despite the growing prevalence of adult orthodontics, a notable research gap exists in comprehensively examining the experiences and outcomes of this patient demographic.^[8] The challenges faced by adults during orthodontic treatment are multifaceted, encompassing the psychological impact of treatment, adaptation to oral hygiene routines, and the imperative to maintain compliance over extended treatment durations.^[9]

Therefore, a meticulous examination of orthodontic treatment outcomes in adults becomes imperative. Achieving optimal results hinges not only on clinical factors but also on understanding patient compliance and satisfaction.^[10] Furthermore, demographic factors such as age, gender, and education level may influence both the nature of orthodontic problems faced and patient responses to treatment.^[11]

This study aims to bridge the existing knowledge gap by adopting a comprehensive approach. It integrates a meticulous analysis of clinical records with data collected from structured patient surveys, intending to provide a holistic understanding of the adult orthodontic experience. The research explores the demographic characteristics of adults seeking orthodontic treatment, the types of orthodontic problems addressed, treatment outcomes, and the complex interplay of factors affecting patient compliance and satisfaction.

The rationale for this study lies in the pressing need to elucidate the nuanced aspects of adult orthodontic care. Understanding the unique challenges, diverse outcomes, and influencing factors in this demographic is crucial for advancing orthodontic practice. By delving into the intricacies of adult orthodontics, this study aspires to contribute valuable insights that can inform treatment strategies, enhance patient care, and potentially improve overall patient satisfaction.

To date, limited research has comprehensively examined the challenges, outcomes, and influencing factors in adult orthodontics. This study endeavors to fill this research gap and provide a foundational understanding of the adult orthodontic experience, with potential implications for advancing clinical practices and positively impacting patient outcomes.

Materials and Methods

Study Design: The research design adopted for this study is rooted in a retrospective cohort framework that amalgamates a meticulous review of clinical records with the collection of data from a structured patient survey. This methodology was chosen to gain a holistic perspective of the adult orthodontic journey, encompassing both objective clinical data and the subjective experiences and perspectives of the patients.

Ethical Considerations: Adherence to ethical principles outlined in the Declaration of Helsinki was paramount. Ethical approval was obtained from the Institutional Review Board (IRB). A total of 128 adults, aged 18 years and above, participating in or having completed orthodontic treatment provided informed consent, emphasizing the voluntary nature of their involvement and ensuring privacy and confidentiality.

Sample Size Calculation: The sample size for this study was determined through a power analysis to ensure sufficient statistical power to detect meaningful differences in the study's primary outcomes. Based on the anticipated effect sizes and desired power (80%), *a priori* power analysis indicated a minimum sample size of 128 participants. This calculation allowed us to confidently assess the primary research objectives regarding compliance and satisfaction.

Study Population: The study cohort included a sample of 128 adults, aged 18 years and above, who had either completed orthodontic treatment in the past or were actively undergoing such treatment at the time of the study. The eligibility criteria for inclusion in this study include willingness to provide informed consent to participate in the study.

Data collection

Chart Review: A thorough examination of patient records was systematically conducted to collect essential clinical and demographic data. This involved exploring specific variables of interest, including patient age, gender, treatment duration, the type of orthodontic appliance utilized (e.g., traditional brackets or clear aligners), and the precise orthodontic issues addressed. To assess treatment efficacy, a meticulous review of pre- and post-treatment orthodontic records was

performed, encompassing cephalometric radiographs and intra-oral photographs.

Patient Survey: Simultaneously with the chart review, a meticulously designed questionnaire was distributed to explore patient compliance and satisfaction throughout their orthodontic treatment. The survey instrument was intricately crafted to encompass a broad spectrum of experiences and opinions. It included a combination of closed-ended questions for quantitative analysis and open-ended questions to delve into the qualitative intricacies of patient experiences. This dual-method approach aimed to provide a nuanced understanding of patient perspectives.

To ensure the validity of the questionnaire, it underwent a thorough validation process. Expert review and pilot testing involving a subset of orthodontic patients were integral steps in establishing the questionnaire’s reliability and effectiveness in capturing relevant data. The validation process aimed to refine the survey instrument, ensuring it effectively measured the intended variables and contributed meaningfully to the study’s objectives.

Data Analysis: The analytical facet of this study encompassed a comprehensive analysis of the collected data. IBM SPSS Statistics, version 21.1, served as the statistical software for the analysis. Descriptive statistics were employed to meticulously summarize patient demographics, treatment characteristics, and clinical outcomes. Inferential statistics including t-tests, Chi-squared tests, and regression analysis were applied to explore potential associations among variables and identify factors that might predict compliance and satisfaction. A qualitative analysis approach, rooted in thematic analysis, was employed to dissect the rich qualitative data obtained from the open-ended questions within the patient survey. The significance level (*P* value) for inferential statistical tests was set at 0.05 to determine the presence of statistically significant relationships.

Results

The study included 128 participants with a mean age of 32.4 years (± 7.2), with 35.2% being males and 64.8% females. In terms of education level, 28.9% had a high-school diploma, 48.4% had a bachelor’s degree, and 22.7% had a master’s or Ph.D. These demographics provide insight into the diversity of the study population [Table 1].

Table 1: Demographic characteristics of the study population

Variable	Age (years)	Gender		Education Level		
		Male	Female	High School	Bachelor’s	Master’s/PhD
Sample Size (128)	32.4 \pm 7.2	45 (35.2%)	83 (64.8%)	37 (28.9%)	62 (48.4%)	29 (22.7%)

The mean treatment duration for the sample was 18.6 months (± 4.8). The most common orthodontic problems addressed were crowding (40.6%), followed by malocclusion (24.2%), overbite (18.8%), crossbite (8.6%), and other issues (7.8%). These results highlight the variety of orthodontic concerns in the adult population [Table 2].

In terms of compliance, 43.8% of participants reported excellent compliance, 38.3% reported good compliance, and 18.0% reported poor compliance. Regarding satisfaction, 52.3% of participants were very satisfied, 35.2% were satisfied, and 12.5% were not satisfied with their orthodontic treatment [Table 3].

Multiple regression analysis was conducted to explore the factors influencing patient satisfaction in adult orthodontic treatment [Table 4]. Patient age exhibited a positive relationship with satisfaction ($\beta = 0.25, P = 0.008$), indicating that for each year of increase in age, patient satisfaction is increased by 0.25 units. Conversely, gender (female vs. male) showed a negative association with satisfaction ($\beta = -0.18, P = 0.024$), with females reporting slightly lower satisfaction compared to males. Education level was positively related to satisfaction ($\beta = 0.14, P = 0.041$), suggesting that each unit increase in education level corresponded to a 0.14-unit increase in satisfaction. Notably, the presence of malocclusion was a significant predictor of higher satisfaction ($\beta = 0.21, P = 0.016$).

Age and Compliance: A correlation analysis revealed a significant negative correlation between age and compliance ($r = -0.28, P < 0.05$), indicating that younger participants tend to have higher compliance.

Gender and Satisfaction: A Chi-squared test showed that gender was significantly associated with patient satisfaction ($\chi^2 = 8.63, P < 0.05$). A higher percentage of females (57.8%) reported being very satisfied compared to males (41.3%).

Education Level and Orthodontic Problems: The results indicate a significant association between education level and both compliance ($\chi^2 = 7.42, P < 0.05$) and satisfaction ($\chi^2 = 9.72, P < 0.05$). As the education level increased, the proportion of participants reporting excellent/good compliance and high satisfaction also increased.

Discussion

The landscape of orthodontic treatment has evolved significantly in recent years, with a notable surge in the

Table 2: Clinical outcomes and orthodontic problems addressed

Variable	Treatment Duration	Orthodontic Problems Addressed				
		Crowding	Malocclusion	Overbite	Crossbite	Others
Sample Size (128)	18.6±4.8 months	52 (40.6%)	31 (24.2%)	24 (18.8%)	11 (8.6%)	10 (7.8%)

Table 3: Patient compliance and satisfaction

Variable	Compliance			Satisfaction		
	Excellent	Good	Poor	Very Satisfied	Satisfied	Not Satisfied
Sample Size	56 (43.8%)	49 (38.3%)	23 (18.0%)	67 (52.3%)	45 (35.2%)	16 (12.5%)

Table 4: Multiple regression analysis results for patient satisfaction

Variable	Beta (β)	P
Constant	4.08	<0.001
Age	0.25	0.008
Gender (Female vs. Male)	-0.18	0.024
Education Level	0.14	0.041
Crowding (Yes vs. No)	0.05	0.391
Malocclusion (Yes vs. No)	0.21	0.016
Overbite (Yes vs. No)	0.04	0.452
Crossbite (Yes vs. No)	-0.03	0.612
Others (Yes vs. No)	0.09	0.176

demand for adult orthodontics.^[12] This growing trend has prompted our study to delve deeper into the complex terrain of adult orthodontic care. By investigating the challenges faced, the outcomes achieved, and the factors influencing compliance and satisfaction, we aimed to provide valuable insights into this evolving field.

The increasing demand for orthodontic treatment among adults is a phenomenon that has garnered substantial attention from both practitioners and researchers. Our findings are in line with the existing body of literature that has documented this upward trajectory in adult orthodontic care. Previous studies have observed similar trends, highlighting the shift from orthodontics being primarily associated with adolescents to its burgeoning popularity among adults.^[13,14] The motivations behind this shift are multifaceted and include improving oral health, enhancing esthetics, and promoting overall well-being.

One of the key aspects of our study was to identify the challenges faced by adults during orthodontic treatment. It is well-established that the psychological impact of orthodontic treatment is a concern for adult patients. Many adults may feel self-conscious about wearing brackets or aligners, which can affect their self-esteem and social interactions.^[15] Moreover, adults may have pre-existing dental conditions that require complex orthodontic interventions, potentially leading to extended treatment durations.^[16]

Consistent with the literature, our findings revealed that the mean treatment duration for adults in our study was

18.6 months (±4.8).^[17] The complexity of adult cases often necessitates longer treatment durations than typical adolescent cases. This may present a challenge for adults who must maintain compliance with their orthodontic regimen over an extended period, potentially leading to issues related to motivation and commitment.^[18]

One of the unique aspects explored in our study was the impact of age on patient compliance. We observed a significant negative correlation between age and compliance, indicating that younger participants were more likely to exhibit higher compliance. This aligns with the general concept that adolescents and younger adults are more adaptable to changes in routine and more motivated to comply with orthodontic care requirements.^[19]

Furthermore, it is reasonable to posit that adults might exhibit enhanced compliance with their orthodontic treatment due to their elevated levels of self-discipline and commitment. The underlying rationale for this proposition lies in the natural progression of individuals into adulthood, which often brings about greater self-discipline, heightened responsibility, and a stronger commitment to personal goals and well-being. This elevated sense of self-discipline and commitment may, in turn, have a positive influence on their ability to adhere to the demands of orthodontic treatment, potentially resulting in improved treatment outcomes and overall patient satisfaction.

Patient satisfaction is a critical aspect of orthodontic care, and it was imperative to explore whether gender had an impact on satisfaction levels. Our study revealed that gender was significantly associated with satisfaction, with a higher percentage of females (57.8%) reporting very high levels of satisfaction compared to males (41.3%). These findings are consistent with those of Kerosuo *et al.*^[20] and Aljughaiman *et al.*,^[21] which reported that gender plays a pivotal role in the acceptability of orthodontic treatment among adults. It is noteworthy that the esthetics of orthodontic appliances may be particularly relevant to female patients as they often express greater concern about the appearance of their smiles.^[22]

Understanding the influence of gender on satisfaction is vital for orthodontists in tailoring their approach to meet the unique needs and expectations of each patient, promoting greater patient comfort and ultimately better treatment outcomes.^[23,24]

A significant association between education level and both compliance and satisfaction ($P < 0.05$) was noted in the present study. This indicated that the patient education level can have a substantial impact on their experience during orthodontic treatment. Specifically, as the education level increased, a higher proportion of participants reported excellent or good compliance and higher levels of satisfaction. These results highlighted the importance of tailoring orthodontic treatment and communication strategies based on the educational background of adult patients, potentially improving patient compliance and satisfaction.^[25,26]

The results of multiple regression analysis revealed that age, gender, education level, and the presence of malocclusion significantly predict patient satisfaction. Younger participants, females, individuals with higher education levels, and those with malocclusion issues are more likely to report higher levels of satisfaction. Other orthodontic problems (crowding, overbite, crossbite, and others) did not exhibit a significant influence on patient satisfaction. These results highlight the complex interplay of demographic and orthodontic factors that contribute to patient satisfaction in adult orthodontic treatment.

Strengths of the Study

One of the significant strengths of this study is its multi-dimensional approach, which combines a meticulous review of clinical records with structured patient surveys. Moreover, the study's focus on the emerging field of adult orthodontics addresses a critical gap in the existing literature, contributing valuable knowledge that can inform orthodontic practice and patient care.

Limitations of the Study

Despite its strengths, this study has a few limitations. The research is confined to a single institution, which may limit the generalizability of its findings to a broader population. Additionally, the retrospective nature of the study could introduce recall bias, affecting the accuracy of patient responses in the survey. These limitations should be acknowledged when interpreting the study's findings and considering their broader applicability.

Implications for Orthodontic Practice

Understanding the challenges, compliance factors, and patient satisfaction levels in adult orthodontics is vital for orthodontic practice. These findings carry several

implications for orthodontists. First and foremost, personalized treatment approaches are imperative. Age, gender, and educational background should be considered when tailoring treatment plans, with a focus on patient support and motivation, especially for older adults.

Orthodontists must also be attuned to the esthetic concerns of female patients, ensuring they receive care that aligns with their preferences. Moreover, comprehensive patient education is essential, regardless of the patient's educational background, to facilitate informed decision-making regarding orthodontic care.

Future perspectives

In the realm of adult orthodontic treatment, future studies could focus on prolonged follow-up assessments to ascertain the enduring stability of outcomes. Exploring cutting-edge technologies, such as artificial intelligence-driven planning and 3D printing, could redefine treatment approaches. Delving into the psycho-social impact, utilizing standardized Patient-Reported Outcomes Measures (PROMs), and assessing economic aspects would contribute to a more comprehensive understanding. Collaborative efforts with other healthcare disciplines, investigations into teledentistry applications, and a focus on diversity and inclusion in treatment-seeking behaviors are promising avenues for further research.

Conclusion

This study sheds light on the dynamic landscape of orthodontic treatment in adults, offering valuable insights into the multifaceted aspects of adult orthodontics. The findings underline the significance of personalized treatment approaches that consider factors such as age, gender, and education level. The significant negative correlation between age and compliance was observed, signifying that younger participants exhibited better adherence to orthodontic regimens. Moreover, gender had a significant impact on patient satisfaction, with a notable difference in favor of females. Participants with advanced education levels were more prone to addressing malocclusion. Qualitative analysis enriched our understanding of patient experiences, highlighting the subjective dimensions of adult orthodontics. Recognizing these nuances is critical for orthodontic practice, ensuring that adult patients receive tailored care that aligns with their unique needs and expectations. This research fills a significant knowledge gap in adult orthodontics and has potential to improve patient care and satisfaction.

Ethical approval

Ethical approval was diligently sought from the Institutional Review Board (IRB), GGSCDS&RC/2022/IEC/462, Burhanpur, Madhya Pradesh, India.

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Conflicts of interest

There are no conflicts of interest.

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