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Analysis of Current Knowledge and Social Implications of Minimal Intervention Prosthodontics

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ABSTRACT

Minimal Intervention Prosthodontics (MIP) focuses on preserving healthy tooth structure while providing functional and aesthetic restorations. **Objective:** To evaluate the knowledge and social implications of Minimal Intervention Prosthodontics (MIP) among patients at Rehman College of Dentistry, Peshawar, Pakistan. **Methods:** A cross-sectional survey was conducted on 173 patients aged 35 years and above. Data were collected through a structured questionnaire that assessed patients' understanding of MIP principles, clinical applications, and perceived social impacts. Statistical analysis was performed to determine associations between knowledge of MIP and demographic factors, such as age, gender, and educational level. **Results:** Among the respondents, 74% had some awareness of MIP, with higher knowledge levels observed in individuals with advanced education. However, only 41% were familiar with the specific procedures involved in MIP, such as adhesive restorations, sealants and Atraumatic Restorative Treatment (ART). The majority of participants (68%) perceived MIP as beneficial for patient comfort and reducing healthcare costs, though 56% recognized the increased time and expertise required for its application. Additionally, 62% of respondents acknowledged the social benefits of MIP, including preserving natural dentition and improving overall quality of life. **Conclusions:** The study revealed a moderate level of awareness and understanding of MIP among patients, with educational level significantly influencing knowledge. Despite recognizing its advantages, there was a need for improved patient education to enhance the acceptance and implementation of MIP in dental care.

INTRODUCTION

An individual's overall health is greatly influenced by their oral health. The physiology of the body is negatively impacted by tooth loss, but the individual's mentality is also disrupted. This is closely tied to the patient's acceptance of the prosthesis [1]. Anatomical, physiological, psychological, and prosthodontic considerations can be used to identify elements that affect a patient's acceptance and adaptability to a new dental prosthesis. Above all, a patient's attitude regarding receiving prosthetic treatment is crucial [2]. Prosthetic therapy varies greatly, ranging from full rehabilitation of severely damaged teeth to functional form to replacement of a lost tooth in a healthy partial dentition [3]. The patient can reconstruct lost teeth with a variety of prosthetic choices, such as overdentures, implant-supported procedures, complete dentures, and detachable or fixed partial dentures [4, 5]. Comfort, functionality, and aesthetics are the three primary determinants of whether a prosthetic therapy is accepted and successful. Comfort and function are determined by biological and mechanical variables.

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Individual attitudes and beliefs, as well as social and cultural influences, shape a patient's acceptance of aesthetic aspects [6, 7]. Understanding a patient's knowledge and attitude regarding replacement of any prosthetics before receiving therapy is essential, since importance is to be focused on patient-mediated issues in prosthetic treatment arrangement [8-10]. This may out to be a useful tool for forecasting satisfaction with a newly provided prosthesis [11]. The decision to receive dental prosthetic therapy has also been associated with demographic factors, including interest, gender, age, education, and economic status. Patients' awareness and attitudes toward prosthetic rehabilitation of missing teeth at the University Dental Hospital in Riyadh, Kingdom of Saudi Arabia, were assessed by Ramalingam S *et al.*, they came to the conclusion that 53.1% of those questioned had not had their teeth replaced. They have placed a strong emphasis on the necessity of patient education and motivation in order for them to make wise decisions [12]. Arora Jr K *et al.*, conducted a survey on patients' attitudes toward tooth replacement at the Institutes of Dental Sciences in Belgaum, India, and found that most research participants were only aware of the mastication function that teeth serve [13]. The majority of research on Pakistani patients' attitudes and knowledge on tooth replacement is location-specific and cannot be broadly applied.

The research aimed to assess the current knowledge and social implications of Minimal Intervention Prosthodontics (MIP) among patients for replacement of missing teeth, visiting the dental Outpatient Department (OPD) of the Rehman College of Dentistry (RCD), Hayatabad, Peshawar, Pakistan.

METHODS

The study was conducted at Rehman College of Dentistry (RCD), Hayatabad, Peshawar, Pakistan, which was associated with a tertiary care hospital. The study employed a cross-sectional design, targeting patients aged 35 years and above. Patients of both genders who were willing to participate and provided informed consent were included in the study. The participants were required to have adequate cognitive abilities to understand the questionnaire and provide accurate responses about their knowledge and perceptions MIP. The participants with cognitive or communicative impairments and those who refused or were unable to provide informed consent were excluded from the study. The findings of the pilot study revealed that the proportion of the prevalence of knowledge about prosthodontic rehabilitation at approximately 50%. Using this proportion value from the pilot study, the sample size was determined using the formula for calculating sample size in a cross-sectional study:

$$n = \frac{Z^2 \times p \times (1 - p)}{d^2}$$

Where: n = required sample size, Z = Z-value (1.96 for 95% confidence level), p = estimated prevalence of knowledge and positive attitude towards MIP (assumed to be 0.5 for maximum sample size), d = margin of error (0.05), However, considering a finite population correction for the study population at RCD, the final sample size was adjusted to 173 participants. A stratified random sampling technique was employed to select the participants from the target population. This approach ensured that each member of the population had an equal chance of being included in the study, thus minimizing selection bias. A structured, self-administered questionnaire, adopted from previous literature was used to collect data [14]. The questionnaire was developed based on existing literature and modified to suit the local context and the objectives of this study. It consisted of three main sections: 1: Demographic Information: age, gender, educational level, and professional role. 2: Knowledge of MIP: Questions assessing the participants' understanding of minimal intervention prosthodontics, including its principles, benefits, and clinical applications. 3: Social Implications of MIP: Questions related to the perceived impact of MIP on patient outcomes, healthcare costs, and overall acceptance within the community. The self-administered questionnaire was pre-tested on a small group of participants (not included in the final sample) to ensure clarity, relevance, and reliability. Data collection was conducted over a period of 12 months, from August 2023 to July, 2024. The study protocol was reviewed and approved by the Ethics Committee of the RCD Research Cell, with the approval number RCD/09/23/154. Informed consent was obtained from all participants, and the study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki. Participants' knowledge of Minimal Intervention Prosthodontics (MIP) was assessed using a scoring system based on responses to knowledge-related questions. A total score was calculated, and participants were classified as having "high knowledge" if they scored 60% or higher and "low knowledge" if they scored below 60%. For analysis, the gathered data were put into a statistical software program (SPSS version 27.0). Frequencies and percentages were employed in descriptive statistics to condense the replies and demographic features pertaining to MIP knowledge and societal ramifications. To evaluate relationships between demographic factors and knowledge/attitude ratings, the chi-square test was used. Statistical significance was attained when the p-value was less than 0.05.

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RESULTS

A total of 173 participants, were included in the study. The demographic characteristics of the participants were summarized in table 1.

Table 1: Demographic Characteristics of Participants

Demographic Variable	Category	N (%)
Gender	Male	98 (56.6%)
	Female	75 (43.4%)
Age Group	26-35 Years	98 (56.6%)
	36-45 Years	53 (30.6%)
	46+ Years	22 (12.7%)
Education Level	Primary School	62 (35.8%)
	High School	36 (20.8%)
	Undergraduate	50 (28.9%)
	Graduate	25 (15.4%)

The participants' knowledge of MIP was assessed through a series of questions, and the results were presented in Table 2. The majority of the participants (74%) were aware of the concept of MIP, with 59.5% familiar with its clinical applications. A significant proportion (66.5%) understood the benefits of preserving tooth structure, while slightly over half (56.6%) had knowledge of the materials used in MIP.

Table 2: Knowledge of Minimal Intervention Prosthodontics

Questions	Responses N (%)
Aware of the Concept of MIP	128 (74.0%)
Familiar with the Clinical Applications of MIP	103 (59.5%)
Understands the Benefits of Preserving Tooth Structure	115 (66.5%)
Knowledge of Materials used in MIP	98 (56.6%)

Participants were asked about the perceived social implications of adopting MIP in dental practice. The responses were summarized in table 3. A large majority of participants (78%) agreed that MIP improves patient comfort and satisfaction, and 66.5% believed it reduces healthcare costs. Additionally, 73.4% felt that MIP was more acceptable to patients, though 56.6% acknowledged that it requires more time and skill from the dentist.

Table 3: Social Implications of Minimal Intervention Prosthodontics

Questions	Agree N (%)	Neutral N (%)	Disagree N (%)
MIP Improves Patient Comfort and Satisfaction	135 (78.0%)	25 (14.5%)	13 (7.5%)
MIP Reduces Healthcare Costs	115 (66.5%)	35 (20.2%)	23 (13.3%)
MIP is More Acceptable to Patients	127 (73.4%)	28 (16.2%)	18 (10.4%)
MIP Requires More Time and Skill from the Dentist	98 (56.6%)	40 (23.1%)	35 (20.2%)

Chi-square tests were conducted to assess the relationship between demographic variables and knowledge of MIP. No significant difference in knowledge of MIP was found between males and females ($p = 0.245$). Although younger participants (18-25 years) showed slightly lower knowledge (52.9%) compared to older age groups, the association between age and knowledge was not statistically significant ($p = 0.172$). A significant association between education level and knowledge of MIP was observed ($p = 0.022$), with participants who had higher educational attainment (high school and above) demonstrating greater knowledge of MIP compared to those with primary or no education (Table 4).

Table 4: Correlation between Demographic Variables and Knowledge of MIP

Demographic Variable	High Knowledge N (%)	Low Knowledge N (%)	p-Value
Gender			
Male	59 (60.2%)	39 (39.8%)	0.245
Female	41 (54.7%)	34 (45.3%)	
Age Group			
18-25 Years	45 (52.9%)	40 (47.1%)	0.172
26-35 Years	35 (66.0%)	18 (34.0%)	
36-45 Years	14 (63.6%)	8 (36.4%)	
46+ Years	6 (46.2%)	7 (53.8%)	
Education Level			
Primary School	39 (41.5%)	55 (58.5%)	0.022*
High School	74 (61.7%)	46 (38.3%)	
Undergraduate	47 (64.4%)	26 (35.6%)	
Graduate	40 (83.3%)	8 (16.7%)	

DISCUSSION

The significance of teeth for one's overall health and wellbeing has already been a known debate. Therefore, it is required to understand the necessity of replacing lost teeth, which depends on an individual's attitude and level of information regarding the many kinds and methods of artificial tooth replacement [15]. In this research, conducted at Rehman College of Dentistry (RCD), Hayatabad, Peshawar, Pakistan, a significant gap in knowledge regarding minimal intervention prosthodontics was identified, reinforcing the importance of patient education in this field. In a study, Leles CR et al., came to the conclusion that a person's reluctance to have lost teeth restored at an advanced age may be influenced by perceptions that alter with age, such as the belief that one was too old to adjust to dentures and artificial teeth and a lack of interest in aesthetics [16, 17]. The research population's knowledge profile about the positioning of missing teeth was found to be inadequate in the current survey, with 44% of participants showing insufficient knowledge. The most likely explanation was that 40.21% of the population only had a primary education. This was comparable to a study by Chen L *et al.*, that discovered that the consequences of unawareness seem to be a barrier to receiving dental health care services, and that a lack of education was linked to a lack of awareness of the

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significance of oral health [18, 19]. According to the results of the current poll, 40.5% of participants had a favorable opinion of fixed prostheses as a method of replacing teeth, while just 20.1% thought removable prostheses would be a preferable choice. These findings were also supported by a study conducted by Al- Alshadidi AA *et al* [20]. A comparable study conducted in United Arab Emarates revealed that almost half of the participants favored detachable partial dentures, and the remaining 25% preferred fixed partial dentures. This outcome contradicted what we had discovered [21]. Just 15.6% of the total individuals thought implants were a better way to restore missing teeth. It corroborated a previous research paper with comparable findings [20, 21]. According to a poll done in Peradeniya, Sri Lanka, 32% of the 425 respondents were aware that implants may be used as a substitute. According to the study, this was a larger percentage than that of several other studies on the Asian population. The authors have suggested that the reason for this discrepancy may be the nation's better health and educational standards when compared to those of its neighboring nations [22]. In this study, 33.1% of participants in the current study felt positively about having missing bodily parts replaced. In response to questions about maintaining the hygiene of artificial teeth, 74.8% of respondents expressed a positive outlook and agreed that maintaining prosthesis hygiene was crucial. Chaudhary MA *et al.*, observed similar outcomes from Pakistan. When asked how to maintain a prosthesis, 97.5% of respondents gave a good response, according to the authors [23]. Patients were unable to receive therapy because they were unaware of the several prosthodontic treatment choices available to them. According to a study, dental camps and prosthodontic outreach programs were one strategy to address attitude change, raise awareness, and impart knowledge about the methods and means of replacing artificial teeth [15]. The study has certain limitations, including a small sample size and the fact that it was conducted in an institutional setting where the cost of prosthetic treatment was different from that of private dental care facilities. In this study, we also observed that socio-economic constraints played a significant role in the decisions regarding prosthodontic care. A comparable survey can be carried out across a sizable population in the clinical and hospital sectors. Given that the current study's attitude factor toward dental implant therapy was unfavorable, a similar survey on knowledge and attitudes regarding implants as a method of tooth replacement might be undertaken.

CONCLUSIONS

Within the constraints of the study, we were able to draw the conclusion that patients had a good attitude toward maintaining prosthesis cleanliness and favored fixed over removable tooth replacement. The majority of people knew that maxillofacial components could be replaced with prosthetics, but their knowledge about replacing teeth with prosthetics was below average. The patient felt negatively about dental implants as a method of tooth replacement

Authors Contribution

Conceptualization: UK
Methodology: UK
Formal analysis: HS, PT
Writing, review and editing: AF, PCL, FJ

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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