



Patient satisfaction following root canal treatment by undergraduate and postgraduate dental students: A comparative questionnaire study

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Purpose: This study aimed to evaluate patient satisfaction following root canal treatment performed by undergraduate and postgraduate dental students.

Methods: A total of 120 patients were included (n=60 per group). A validated questionnaire was used, consisting of socio-demographic questions and eight satisfaction items scored on a 5-point Likert scale. Statistical analyses were performed using non-parametric tests, with significance set at $p < 0.05$.

Results: No significant differences were found between the groups regarding socio-demographic variables ($p > 0.05$). However, overall satisfaction scores were significantly higher among patients treated by postgraduate students ($p = 0.001$). In the undergraduate group, differences were observed according to age and marital status, with some results only marginally significant ($p \approx 0.04$). Patients with lower income reported greater satisfaction with treatment plan explanations ($p = 0.027$).

Conclusion: Both groups received generally favorable satisfaction ratings; however, postgraduate students obtained significantly higher scores. In the undergraduate group, socio-demographic factors, particularly age and marital status, appeared to influence satisfaction levels. Overall, these findings suggest potential areas for improvement in dental education and clinical supervision, including strategies to enhance patient-centered care.

Keywords: Dental education; patient satisfaction; root canal therapy; students.

Introduction

Globally, the increasing demand for healthcare services and the efforts of healthcare providers to meet these demands in a competitive environment are undeniable realities. In recent years, the rise in public and private healthcare institutions has focused on addressing patients' needs and expectations. Ensuring patient satisfaction is crucial for

the preference of healthcare institutions (1). Particularly in dentistry, patient satisfaction surveys are frequently used to evaluate service quality and suggest improvements. Data related to patient satisfaction are collected and evaluated using both quantitative and qualitative approaches (2).

In addition to satisfaction, factors such as ease of access to treatment and the proximity of dental clinics to patients' residences significantly influenced their choice of dentist.

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However, patients' primary concern has consistently been the skills and techniques of the dentist (3). One study reported that the technique/skill of the dentist had the most significant impact on patient satisfaction (4). Consequently, patients often seek treatment from centers or universities with specialist dentists because of the perceived professional competence, skill, and status of the practitioners (5).

Academic dental institutions fulfill a dual mission—delivering patient care while training future professionals—where both undergraduate and postgraduate students perform procedures under supervision (3,6). This context raises an important question: Does the provider's level of training affect patient satisfaction, particularly in technically demanding procedures such as root canal treatment? Root canal treatment is one of the most common procedures in dental training, but it often provokes patient anxiety and discomfort due to procedural complexity and multiple visits (7,8). While advancements in endodontic instrumentation and anesthesia have improved the experience, patients still report concerns related to intraoperative pain, treatment duration, postoperative clarity, and communication (9,10). These psychosocial and clinical factors together shape satisfaction scores (11).

Patient satisfaction is an important indicator reflecting both the quality of clinical education and the effectiveness of treatment services (12). For this purpose, the Dental Satisfaction Questionnaire (DSQ) is frequently used, as it allows multidimensional evaluation of the patient experience. Luo et al. (2) summarized the DSQ into six domains: Attitude, quality, convenience, cost, pain management, and patients' perceived needs for oral disease. In the present study, three domains were excluded. The cost domain was not relevant because patients did not directly pay treatment fees, as these were covered by social insurance. The pain management domain was excluded since it can be influenced by individual and psychological differences, potentially biasing results (13). The domain of perceived needs for oral disease prevention was also excluded, as it is more closely related to preventive and community dentistry rather than endodontic treatment. Therefore, only the domains of attitude, quality, and convenience were assessed in this study.

This study aimed to evaluate the satisfaction of patients receiving healthcare services in the field of endodontics from undergraduate and postgraduate students. The null hypothesis of the study was that there would be no difference in patient satisfaction levels between treatments performed by undergraduate and postgraduate students.

Materials and Methods

Ethical Approval and Sample Size Calculation

The study protocol was approved by the Firat University Non-Interventional Research Ethics Board (Date: 18.07.2024, No: 2024/10-14), and conducted in compliance with the principles of the Helsinki Declaration. Sample size calculation was performed using the G-Power 3.1.9.7 program (Universitat Kiel, Kiel, Germany), with a significance level (α) of 0.05, power of 0.95, and effect size of 0.65. The minimum total sample size required was determined to be $n=104$. Consequently, in this study, the total sample size was set at $n=120$, with $n=60$ participants in each group (3,11).

Survey Form and Implementation

The survey was conducted between 29.07.2024 - 29.08.2024, coinciding with the duration of an endodontic internship for undergraduate students at the Department of Endodontics, Faculty of Dentistry, Firat University. Surveys were distributed in clinics where postgraduate students treated patients and in undergraduate clinics under the supervision of faculty members.

The inclusion criteria for the study were patients aged 18 and older who provided informed consent and were capable of understanding and answering the survey questions. The exclusion criteria were as follows: Patients who did not undergo root canal treatment during their appointment, emergency cases (e.g., trauma), patients who completed the survey incorrectly or incompletely, and patients with illiteracy. These criteria were determined in accordance with previous study evaluating patient satisfaction in endodontic clinics (11).

The survey used to evaluate patient satisfaction was adapted from a previous study in the literature (11). It consisted of two sections: "Socio-demographic" questions and "satisfaction" questions. The second section, which assessed patient satisfaction, included eight questions. Patients were asked to answer based on their experiences during treatment. In the original study, the questionnaire consisted of three sections (socio-demographic, importance, and satisfaction). In the present study, the 'importance' section was excluded, and only two sections were used: Socio-demographic information and satisfaction items. During the adaptation process, the content validity of the questions was reviewed by two endodontic specialists. Responses were scored on a Likert scale, with possible scores ranging from 1 to 5, and higher scores indicating more positive outcomes (1=very poor, 2=poor, 3=fair, 4=good, 5=very good). The internal consistency of the questionnaire was analyzed using Cronbach's alpha and found to be reliable ($\alpha=0.889$).

Furthermore, when each item was deleted in turn, the alpha coefficient showed no substantial increase (ranging between 0.863 and 0.882), confirming the robustness of the scale. No separate pilot testing or pre-validation of the questionnaire was performed prior to the study.

For study design, informed consent was obtained from patients to participate in the survey after their root canal treatment. The survey was explained in detail, and patients were given the form to complete in the waiting room. To ensure objectivity and comfort, no identifying information was requested, and patients were left alone while completing the survey. The questionnaire was administered only once, immediately after treatment completion. Pre-treatment expectations were not assessed to minimize potential response bias, as patients might have perceived that their answers could affect the care to be provided. Physicians were not informed whether their patients participated in the survey.

Survey Form:

Section 1: Socio-Demographic Information

Gender? Female () Male ()

Date of Birth?/...../.....

Marital Status? Married () Single ()

Education Level? Literate () Primary School () Middle School ()

High School () University and Above ()

Household Income? Minimum Wage or Below () Above Minimum Wage ()

Have you previously completed this survey? Yes () No ()

Section 2: Satisfaction Form

(For the following items, please select the option that best represents your experience)

1. Satisfaction with the technical competence of the dentist

Very Poor/ Poor/ Fair/ Good/ Very Good

2. Satisfaction with the attitude of the dentist

Very Poor/ Poor/ Fair/ Good/ Very Good

3. Satisfaction with the continuity of care by the same dentist

Very Poor/ Poor/ Fair/ Good/ Very Good

4. Satisfaction with the length of waiting time

Very Poor/ Poor/ Fair/ Good/ Very Good

5. Satisfaction with the duration of the treatment

Very Poor/ Poor/ Fair/ Good/ Very Good

6. Satisfaction with the suitability of clinic hours

Very Poor/ Poor/ Fair/ Good/ Very Good

7. Satisfaction with the scheduling of the next appointment

Very Poor/ Poor/ Fair/ Good/ Very Good

8. Satisfaction with the detailed explanation of the treatment plan

Very Poor/ Poor/ Fair/ Good/ Very Good

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics 22 software. The normal distribution of parameters was evaluated using the Kolmogorov-Smirnov test, which revealed that the parameters did not follow a normal distribution. While evaluating the study data, descriptive statistical methods (minimum, maximum, mean, standard deviation, median, frequency) were used, along with the Kruskal-Wallis test to compare quantitative data across different levels of education. The Mann-Whitney U test was used for two-group comparisons. For qualitative data comparisons, Chi-square and Continuity (Yates) Correction tests were applied. A significance level of $p < 0.05$ was considered statistically significant.

Results

A total of 120 patients were included in the study, with 60 treated by undergraduate students and 60 by postgraduate students. The mean age of participants was 34.77 ± 14.04 years, and the sample consisted of 62 males (51.7%) and 58 females (48.3%). There were no statistically significant differences between the two groups in terms of baseline socio-demographic variables, including age, gender, marital status, education level, and income ($p > 0.05$).

Comparison of Overall Satisfaction Between Groups

Patients treated by postgraduate students reported significantly higher overall satisfaction scores compared to those treated by undergraduate students ($p = 0.001$, $r = 0.38$, large effect). The median scores across all eight satisfaction items were consistently higher in the postgraduate group, particularly for aspects related to technical competence, continuity of care, and clarity of communication (Table 1).

Gender-Based Subgroup Analysis

In the undergraduate group, male patients reported significantly higher satisfaction than females in two domains: Treatment duration ($p = 0.019$) and suitability of clinic hours ($p = 0.029$). However, no statistically significant gender-based differences were observed in the postgraduate group ($p > 0.05$) (Table 2).

Age-Based Subgroup Analysis

Among patients treated by undergraduate students, those aged ≤ 35 years reported higher satisfaction levels than

Table 1. Satisfaction scores of undergraduate and postgraduate groups

	Undergraduate Students (n=60)	Postgraduate Students (n=60)	Total (n=120)	p	Mean diff (95% CI)	Effect size (r)
	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)			
Satisfaction with the technical competence of the dentist	4.38±0.72 (4.5) (2-5)	4.78±0.49 (5) (3-5)	4.58±0.64 (5) (2-5)	0.001*	0.40 (0.18-0.62)	0.275
Satisfaction with the attitude of the dentist	4.55±0.65 (5) (3-5)	4.85±0.36 (5) (4-5)	4.7±0.54 (5) (3-5)	0.005*	0.30 (0.12-0.50)	0.198
Satisfaction with the continuity of care by the same dentist	4.58±0.7 (5) (2-5)	4.8±0.48 (5) (3-5)	4.69±0.61 (5) (2-5)	0.048*	0.22 (0.00-0.43)	0.133
Satisfaction with the length of waiting time	3.78±1.08 (4) (1-5)	4.43±0.83 (5) (2-5)	4.11±1.01 (4) (1-5)	0.001*	0.65 (0.30-0.98)	0.309
Satisfaction with the duration of the treatment	3.77±0.98 (4) (1-5)	4.65±0.61 (5) (2-5)	4.21±0.92 (4) (1-5)	0.001*	0.88 (0.60-1.17)	0.463
Satisfaction with the suitability of clinic hours	4.17±1.03 (4) (1-5)	4.62±0.61 (5) (3-5)	4.39±0.87 (5) (1-5)	0.012*	0.45 (0.13-0.75)	0.203
Satisfaction with the scheduling of the next appointment	4.22±0.8 (4) (2-5)	4.58±0.65 (5) (3-5)	4.4±0.75 (5) (2-5)	0.006*	0.37 (0.10-0.63)	0.224
Satisfaction with the explanation of the detailed treatment plan	4.25±0.97 (5) (1-5)	4.63±0.71 (5) (2-5)	4.44±0.87 (5) (1-5)	0.010*	0.38 (0.08-0.70)	0.202
Total score	33.7±5.25 (34) (22-40)	37.35±3.57 (39) (24-40)	35.53±4.84 (37) (22-40)	0.001*	3.65 (2.05-5.23)	0.381

Mann Whitney U Test *p<0.05.

those aged ≥ 36 years, with statistically significant differences in treatment duration ($p = 0.024$, $r=0.28$, small-to-medium effect), clinic hours ($p=0.042$, $r=0.24$, small effect), and appointment scheduling ($p=0.002$, $r=0.38$, medium effect) and total satisfaction scores, with some of these differences reaching only marginal significance ($p=0.019$, $r=0.30$, medium effect). In contrast, age did not significantly influence satisfaction in the postgraduate group (Table 3).

Effect of Marital Status

In the undergraduate group, single patients expressed higher satisfaction than married patients regarding treatment duration ($p=0.045$, $r=0.25$, small effect) and clinic hours ($p=0.002$, $r=0.36$, medium effect), with total satisfaction scores, although the differences in treatment duration and overall satisfaction were only marginally significant ($p=0.044$, $r=0.26$, small effect). Interestingly, in the postgraduate group, married patients reported higher satisfaction in the continuity of care by the same dentist ($p=0.030$) (Table 4).

Education and Income Levels

No statistically significant associations were observed between education level and satisfaction scores in either group ($p>0.05$) (Table 5). However, in the undergradu-

ate group, patients with income at or below the minimum wage reported higher satisfaction regarding explanation of the treatment plan compared to those with higher income levels ($p=0.027$, $r=0.26$, small effect). No such differences were observed in the postgraduate group (Table 6).

Discussion

With the rise in living standards, the demand for high-quality healthcare services has also increased. Medical centers and university hospitals have become focal points for improving healthcare providers' professional skills and training specialists. Patients seeking care in medical centers must accept that services will be provided not only by specialists but also by undergraduate and postgraduate students. Therefore, the quality of treatment provided by these students is of paramount importance (3). Therefore, this study evaluated the satisfaction of patients treated by undergraduate and postgraduate students, who play an important role in healthcare delivery. The hypothesis that satisfaction levels of patients treated by postgraduate students would be higher than those treated by undergraduate students was supported.

The findings revealed that satisfaction in the undergraduate group was mostly rated as "good"(4) and "very good"(5), although for certain questions like "Satisfaction

Table 2. Satisfaction scores by gender in both groups

	Undergraduate Students				Postgraduate Students				Effect size (r)	
	Male (n=27)		Women (n=33)		Male (n=35)		Female (n=25)			
	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)		
Satisfaction with the technical competence of the dentist	4.26±0.86 (4) (2-5)	4.48±0.57 (5) (3-5)	0.423	0.23 (-0.12-0.60)	-0.09	4.83±0.38 (5) (4-5)	4.76±0.53 (5) (3-5)	0.783	-0.07 (-0.30-0.17)	0.02
Satisfaction with the attitude of the dentist	4.56±0.7 (5) (3-5)	4.55±0.62 (5) (3-5)		0.773 (-0.33-0.33)	-0.01	4.83±0.38 (5) (4-5)	4.86±0.35 (5) (4-5)	0.825	0.02 (-0.17-0.24)	-0.02
Satisfaction with the continuity of care by the same dentist	4.59±0.8 (5) (2-5)	4.58±0.61 (5) (3-5)		0.531 (-0.36-0.36)	-0.02	4.78±0.55 (5) (3-5)	4.81±0.45 (5) (3-5)	0.970	0.03 (-0.24-0.33)	-0.00
Satisfaction with the length of waiting time	4.07±0.96 (4) (2-5)	3.55±1.12 (4) (1-5)		0.062 (-1.04-0.02)	-0.53	4.33±0.84 (5) (2-5)	4.48±0.83 (5) (2-5)	0.377	0.14 (-0.26-0.62)	-0.10
Satisfaction with the duration of the treatment	4.11±0.8 (4) (3-5)	3.48±1.03 (4) (1-5)	0.019*	-0.63 (-1.11-0.16)	0.23	4.78±0.43 (5) (4-5)	4.60±0.66 (5) (2-5)	0.358	-0.18 (-0.46-0.10)	0.10
Satisfaction with the suitability of clinic hours	4.48±0.8 (5) (2-5)	3.91±1.13 (4) (1-5)	0.029*	-0.57 (-1.03-0.08)	0.260	4.50±0.71 (5) (3-5)	4.67±0.57 (5) (3-5)	0.390	0.17 (-0.18-0.56)	-0.09
Satisfaction with the scheduling of the next appointment	4.33±0.88 (5) (2-5)	4.12±0.74 (4) (2-5)		0.172 (-0.60-0.22)	-0.21	4.56±0.62 (5) (3-5)	4.60±0.66 (5) (3-5)	0.669	0.04 (-0.29-0.40)	-0.05
Satisfaction with the explanation of the detailed treatment plan	4.41±1.01 (5) (1-5)	4.12±0.93 (4) (1-5)		0.097 (-0.76-0.25)	-0.29	4.72±0.57 (5) (3-5)	4.60±0.77 (5) (2-5)	0.609	-0.13 (-0.45-0.23)	0.05
Total score	34.81±5.34 (37) (23-40)	32.79±5.08 (34) (22-40)	0.110 (-4.56-0.72)	-2.03	37.33±3.33 (39) (28-40)	37.36±3.71 (40) (24-40)	0.574		0.02 (-1.76-2.01)	-0.07

Mann Whitney U Test *p<0.05.

Table 3. Age-based (≤ 35 vs ≥ 36) satisfaction comparison in both groups

	Undergraduate Students				Postgraduate Students					
	35 and under (n=41)		36 and over (n=19)		35 and under (n=28)		36 and over (n=32)			
	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	p	Mean diff (95% CI)	Effect size (r)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	p	Mean diff (95% CI)	Effect size (r)
Satisfaction with the technical competence of the dentist	4.49±0.71 (5) (2-5)	4.16±0.69 (4) (3-5)	0.054	-0.33 (-0.69-0.03)	0.22	4.71±0.53 (5) (3-5)	4.84±0.45 (5) (3-5)	0.234	0.13 (-0.11-0.38)	-0.10
Satisfaction with the attitude of the dentist	4.59±0.63 (5) (3-5)	4.47±0.70 (5) (3-5)	0.544	-0.11 (-0.48-0.22)	0.07	4.79±0.42 (5) (4-5)	4.91±0.30 (5) (4-5)	0.200	0.12 (-0.05-0.29)	-0.10
Satisfaction with the continuity of care by the same dentist	4.61±0.70 (5) (2-5)	4.53±0.70 (5) (3-5)	0.566	-0.08 (-0.46-0.29)	0.06	4.68±0.61 (5) (3-5)	4.91±0.30 (5) (4-5)	0.097	0.23 (0.00-0.47)	-0.14
Satisfaction with the length of waiting time	3.88±1.05 (4) (1-5)	3.58±1.12 (3) (1-5)	0.282	-0.30 (-0.93-0.28)	0.13	4.25±0.89 (4) (2-5)	4.59±0.76 (5) (2-5)	0.081	0.34 (-0.05-0.76)	-0.20
Satisfaction with the duration of the treatment	3.95±0.95 (4) (1-5)	3.37±0.96 (3) (1-5)	0.024*	-0.58 (-1.11-0.11)	0.278	4.57±0.74 (5) (2-5)	4.72±0.46 (5) (4-5)	0.623	0.15 (-0.16-0.49)	0.10
Satisfaction with the suitability of clinic hours	4.34±0.94 (5) (2-5)	3.79±1.13 (4) (1-5)	0.042*	-0.55 (-1.17-0.01)	0.244	4.61±0.63 (5) (3-5)	4.62±0.61 (5) (3-5)	0.935	0.02 (-0.29-0.32)	-0.01
Satisfaction with the scheduling of the next appointment	4.46±0.60 (5) (3-5)	3.68±0.95 (4) (2-5)	0.002*	-0.78 (-1.24-0.31)	0.379	4.64±0.56 (5) (3-5)	4.53±0.72 (5) (3-5)	0.694	-0.11 (-0.44-0.21)	0.04
Satisfaction with the explanation of the detailed treatment plan	4.39±0.92 (5) (1-5)	3.95±1.03 (4) (1-5)	0.057	-0.44 (-1.00-0.08)	0.23	4.61±0.74 (5) (2-5)	4.66±0.70 (5) (2-5)	0.766	0.05 (-0.32-0.39)	-0.03
Total score	34.71±5.05 (35) (23-40)	31.53±5.15 (32) (22-39)	0.019*	-3.18 (-5.96-0.53)	0.303	36.86±4.17 (39) (24-40)	37.78±2.96 (40) (31-40)	0.277	0.92 (-0.83-2.77)	-0.13

Mann Whitney U Test *p<0.05.

Table 4. Marital status-based satisfaction comparison in both groups

	Undergraduate Students				Postgraduate Students							
	Married (n=28)	Single (n=32)	Mean±SD (Median) (min-max)	p	Mean diff (95% CI)	Effect size (r)	Married (n=36)	Single (n=24)	Mean±SD (Median) (min-max)	p	Mean diff (95% CI)	Effect size (r)
Satisfaction with the technical competence of the dentist	4.32±0.67 (4) (3-5)	4.44±0.76 (5) (2-5)	4.63±0.61 (5) (3-5)	0.361	0.12 (-0.25-0.47)	-0.11	4.86±0.42 (5) (3-5)	4.67±0.56 (5) (3-5)	4.63±0.65 (5) (3-5)	0.086	-0.19 (-0.47-0.08)	0.15
Satisfaction with the attitude of the dentist	4.46±0.69 (5) (3-5)	4.63±0.61 (5) (3-5)	4.66±0.7 (5) (2-5)	0.338	0.16 (-0.17-0.50)	-0.11	4.92±0.28 (5) (4-5)	4.75±0.44 (5) (4-5)	4.63±0.65 (5) (3-5)	0.079	-0.17 (-0.36-0.03)	0.14
Satisfaction with the continuity of care by the same dentist	4.5±0.69 (5) (3-5)	4.66±0.7 (5) (2-5)	3.97±0.97 (4) (2-5)	0.250	0.16 (-0.19-0.49)	-0.12	4.92±0.28 (5) (4-5)	4.63±0.65 (5) (3-5)	4.63±0.65 (5) (3-5)	0.030*	-0.29 (-0.58-0.04)	0.18
Satisfaction with the length of waiting time	3.57±1.17 (4) (1-5)	3.97±0.97 (4) (2-5)	4.03±0.78 (4) (3-5)	0.187	0.40 (-0.10-0.92)	-0.16	4.5±0.81 (5) (2-5)	4.33±0.87 (5) (2-5)	4.46±0.78 (5) (2-5)	0.375	-0.17 (-0.61-0.25)	0.10
Satisfaction with the duration of the treatment	3.46±1.1 (3,5) (1-5)	4.03±0.78 (4) (3-5)	4.56±0.67 (5) (2-5)	0.045*	0.57 (0.11-1.04)	-0.25	4.78±0.42 (5) (4-5)	4.46±0.78 (5) (2-5)	4.5±0.66 (5) (3-5)	0.082	-0.32 (-0.68-0.01)	0.18
Satisfaction with the suitability of clinic hours	3.71±1.18 (4) (1-5)	4.56±0.67 (5) (2-5)	4.41±0.61 (4) (3-5)	0.002*	0.85 (0.37-1.32)	-0.36	4.69±0.58 (5) (3-5)	4.5±0.66 (5) (3-5)	4.63±0.58 (5) (3-5)	0.189	-0.19 (-0.54-0.11)	0.14
Satisfaction with the scheduling of the next appointment	4±0.94 (4) (2-5)	4.41±0.61 (4) (3-5)	4.38±0.94 (4) (1-5)	0.102	0.41 (0.02-0.82)	-0.20	4.56±0.69 (5) (3-5)	4.63±0.58 (5) (3-5)	4.58±0.78 (5) (2-5)	0.856	0.07 (-0.25-0.42)	-0.02
Satisfaction with the explanation of the detailed treatment plan	4.11±0.99 (4) (1-5)	4.38±0.94 (5) (1-5)	35.06±4.49 (35.5) (23-40)	0.203	0.27 (-0.20-0.75)	-0.15	4.67±0.68 (5) (2-5)	4.58±0.78 (5) (2-5)	36.54±4.32 (38.5) (24-40)	0.669	-0.08 (-0.47-0.29)	0.04
Total score	32.14±5.69 (32) (22-40)	35.06±4.49 (35.5) (23-40)		0.044*	2.92 (0.46-5.46)	-0.26	37.89±2.92 (40) (31-40)	36.54±4.32 (38.5) (24-40)		0.609	-1.35 (-3.40-0.62)	0.05

Mann Whitney U Test *p<0.05.

Table 5. Education level–based satisfaction comparison in both groups

	Undergraduate Students			p	Postgraduate Students			p
	Primary School (n=15)	High School (n=32)	University and above (n=13)		Primary School (n=14)	High School (n=27)	University and above (n=19)	
	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)		Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	
Satisfaction with the technical competence of the dentist	4.27±0.70 (4) (3-5)	4.44±0.76 (5) (2-5)	4.46±0.52 (4) (4-5)	0.492	4.86±0.36 (5) (4-5)	4.70±0.61 (5) (3-5)	4.84±0.37 (5) (4-5)	0.718
Satisfaction with the attitude of the dentist	4.53±0.64 (5) (3-5)	4.56±0.67 (5) (3-5)	4.62±0.51 (5) (4-5)	0.907	4.86±0.36 (5) (4-5)	4.85±0.36 (5) (4-5)	4.84±0.37 (5) (4-5)	0.992
Satisfaction with the continuity of care by the same dentist	4.47±0.83 (5) (2-5)	4.62±0.61 (5) (3-5)	4.69±0.63 (5) (3-5)	0.603	4.86±0.36 (5) (4-5)	4.74±0.59 (5) (3-5)	4.84±0.37 (5) (4-5)	0.895
Satisfaction with the length of waiting time	4.00±0.76 (4) (3-5)	3.72±0.92 (4) (2-5)	4.08±1.32 (5) (1-5)	0.299	4.29±0.73 (4) (3-5)	4.33±1.04 (5) (2-5)	4.68±0.48 (5) (4-5)	0.323
Satisfaction with the duration of the treatment	3.73±0.70 (4) (3-5)	3.69±0.97 (4) (1-5)	4.08±1.19 (4) (1-5)	0.241	4.71±0.47 (5) (4-5)	4.52±0.75 (5) (2-5)	4.79±0.42 (5) (4-5)	0.436
Satisfaction with the suitability of clinic hours	4.40±0.74 (5) (3-5)	4.12±1.10 (4) (1-5)	4.38±0.87 (5) (2-5)	0.715	4.57±0.65 (5) (3-5)	4.56±0.64 (5) (3-5)	4.74±0.56 (5) (3-5)	0.515
Satisfaction with the scheduling of the next appointment	4.20±0.77 (4) (3-5)	4.25±0.76 (4) (2-5)	4.46±0.66 (5) (3-5)	0.277	4.36±0.63 (4) (3-5)	4.59±0.69 (5) (3-5)	4.74±0.56 (5) (3-5)	0.131
Satisfaction with the explanation of the detailed treatment plan	4.20±0.77 (4) (3-5)	4.34±0.94 (5) (1-5)	4.54±0.66 (5) (3-5)	0.404	4.57±0.51 (5) (4-5)	4.48±0.94 (5) (2-5)	4.89±0.32 (5) (4-5)	0.122
Total score	33.80±4.35 (34) (26-40)	33.75±4.94 (34) (23-40)	35.31±4.56 (36) (25-40)	0.374	37.07±3.1 (37.5) (31-40)	36.78±4.26 (39) (24-40)	38.37±2.65 (40) (32-40)	0.436

Kruskal Wallis Test *p<0.05

with the length of waiting time” and “Satisfaction with the duration of the treatment,” responses were rated as “fair”(3) and “good” (4). In contrast, patient satisfaction scores for postgraduate students were consistently higher across all survey questions, ranging from “good”(4) and “very good” (5). These findings are consistent with those of Aydın et al.(11), who reported that patient satisfaction in postgraduate clinics was higher than that in undergraduate clinics in various endodontic departments. Specifically, satisfaction scores in postgraduate clinics were generally at the “good”(4) and “very good”(5) levels, and a similar trend was observed in our study. In clinics operated by undergraduate students, patients’ satisfaction regarding “long waiting times” and “long treatment durations” aligns with the findings in the literature. The literature identifies waiting and treatment times as significant factors leading to patient dissatisfaction (14,15). However, the higher satisfaction scores observed among patients treated in postgraduate clinics suggest that the service provided was perceived as “very good”(5) by most patients. This could be attributed to postgraduate students’ greater clinical experience and expertise, as well as the relatively more structured and organized clinical environment in which

they work (16).

Alshali et al.(17) evaluated patient satisfaction with treatments performed by undergraduate dental students and reported that overall satisfaction was high, with respectful attitudes rated most positively, while pain management and treatment access were relatively lower. These findings highlight that satisfaction depends not only on technical skills but also on interpersonal and organizational factors. Similarly, our results showed that while undergraduate students achieved favorable scores in technical competence and continuity of care, their patients reported lower overall satisfaction than those treated by postgraduates, mainly due to longer treatment and waiting times (p=0.001).

The analysis of demographic variables (gender, age, marital status, educational level, and income level) showed that patient satisfaction regarding the clinician’s technical competence, attitude, and continuity of care by the same clinician was high in both types of clinics, independent of these factors (p>0.05).

Many studies evaluating patient satisfaction have reported varying results concerning age and satisfaction levels (11,18,19). For example, ArRejaie et al.(18) found that in satisfaction surveys conducted in undergraduate clinics,

Table 6. Income level-based satisfaction comparison in both groups

	Undergraduate Students					Postgraduate Students						
	Minimum Wage and Below (n=25)		Above Minimum Wage (n=35)		Effect size (r)	Minimum Wage and Below (n=18)		Above Minimum Wage (n=42)		p	Mean diff (95% CI)	Effect size (r)
	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)	Mean±SD (Median) (min-max)								
Satisfaction with the technical competence of the dentist	4.48±0.65 (5) (3-5)	4.31±0.76 (4) (2-5)	0.414	-0.17 (-0.53-0.21)	0.09	4.76±0.53 (5) (3-5)	4.83±0.38 (5) (4-5)	0.783	0.07 (-0.17-0.30)	-0.02		
Satisfaction with the attitude of the dentist	4.68±0.63 (5) (3-5)	4.46±0.66 (5) (3-5)	0.121	-0.22 (-0.54-0.13)	0.17	4.86±0.35 (5) (4-5)	4.83±0.38 (5) (4-5)	0.825	-0.02 (-0.24-0.16)	0.02		
Satisfaction with the continuity of care by the same dentist	4.6±0.82 (5) (2-5)	4.57±0.61 (5) (3-5)	0.430	-0.03 (-0.38-0.38)	0.08	4.81±0.45 (5) (3-5)	4.78±0.55 (5) (3-5)	0.970	-0.03 (-0.33-0.21)	0.00		
Satisfaction with the length of waiting time	4±1 (4) (2-5)	3.63±1.11 (4) (1-5)	0.211	-0.37 (-0.83-0.15)	0.15	4.48±0.83 (5) (2-5)	4.33±0.84 (4.5) (2-5)	0.377	-0.14 (-0.60-0.29)	0.10		
Satisfaction with the duration of the treatment	3.96±0.98 (4) (1-5)	3.63±0.97 (4) (1-5)	0.147	-0.33 (-0.83-0.15)	0.18	4.60±0.66 (5) (2-5)	4.78±0.43 (5) (4-5)	0.358	0.18 (-0.09-0.44)	-0.10		
Satisfaction with the suitability of clinic hours	4.36±1.08 (5) (1-5)	4.03±0.98 (4) (2-5)	0.081	-0.33 (-0.86-0.18)	0.21	4.67±0.57 (5) (3-5)	4.50±0.71 (5) (3-5)	0.390	-0.17 (-0.53-0.14)	0.09		
Satisfaction with the scheduling of the next appointment	4.32±0.75 (4) (3-5)	4.14±0.85 (4) (2-5)	0.450	-0.18 (-0.57-0.20)	0.09	4.60±0.66 (5) (3-5)	4.56±0.62 (5) (3-5)	0.669	-0.04 (-0.39-0.29)	0.05		
Satisfaction with the explanation of the detailed treatment plan	4.48±1 (5) (1-5)	4.09±0.92 (4) (1-5)	0.027*	-0.39 (-0.88-0.11)	0.26	4.60±0.77 (5) (2-5)	4.72±0.57 (5) (3-5)	0.609	0.13 (-0.21-0.46)	-0.05		
Total score	34.88±5.2 (36) (23-40)	32.86±5.2 (32) (22-40)	0.117	-2.02 (-4.61-0.64)	0.20	37.36±3.71 (40) (24-40)	37.33±3.33 (38.5) (28-40)	0.574	-0.02 (-1.95-1.79)	0.07		

Mann Whitney U Test *p<0.05.

younger patients aged ≤ 35 years had a more positive treatment experience. In their comprehensive study evaluating patient satisfaction at the dental clinic of Mulago Hospital in Kampala, Uganda, Mwebesa et al.(20) indicated that patients' marital status affected their satisfaction levels, with widowed patients reporting 1.34 times higher satisfaction than single patients. However, other studies have indicated no significant relationship between age and satisfaction " and "marital status and satisfaction" (11,19). This is notable as it underscores the need to consider a patient's age and marital status during treatment (3). These inconsistencies may be related to differences in study design, cultural context, and patient populations. For example, while some studies report higher satisfaction among younger or single patients, others found no association, possibly due to variations in expectations, communication preferences, and socioeconomic backgrounds. In the current study, the lower satisfaction observed among married and older patients may stem from extended treatment durations, waiting times, or the inconvenience of scheduling follow-up appointments, possibly causing disruptions in their parental or professional obligations.

Regarding education, it is generally accepted that patient satisfaction levels decrease as educational attainment increases (11,19,21). However, in the current study, as in the surveys by ArRejaie et al.(18) and Habib et al.(22) evaluating undergraduate clinics, no significant effect of education on satisfaction scores was observed ($p > 0.05$). Although there was no statistically significant difference in understanding, information, and response to treatment among patients with different educational levels, numerically higher satisfaction was observed with increasing education levels (12).

Previous studies have highlighted that gender-satisfaction (11,18,19,22) and income level-satisfaction (11,18) relationships do not have significant effects. However, Hama-sha et al.(6) reported that patients with higher incomes were more satisfied with their treatment than those with lower incomes. In this study, although no statistical difference was observed in household income ($p > 0.05$), patients with higher income in the undergraduate group reported relatively lower satisfaction scores. Notably, the question regarding "satisfaction with the detailed explanation of the treatment plan" showed a statistical difference ($p = 0.027$). Lee et al.(3) noted in their study evaluating the quality and satisfaction of dental treatments performed by undergraduates that these students may be less adept at thoroughly explaining treatment plans. Additionally, it is possible that patients with higher socioeconomic status expected more detailed explanations, similar to those in private practice settings, which may partly explain the rela-

tively lower satisfaction in this subgroup (23).

The clinical education level of dental providers plays a pivotal role in shaping patient satisfaction outcomes. In this study, patients treated by postgraduate students reported significantly higher satisfaction, likely due to their greater clinical exposure, advanced theoretical training, and refined procedural skills. Postgraduate students may demonstrate greater competence in time management, communication, and patient education, which could contribute to more positive patient perceptions. Moreover, postgraduate clinics tend to operate within a more structured and systematic framework, ensuring smoother appointment scheduling and continuity of care—factors that are known to positively influence satisfaction (14). In contrast, undergraduate students, being in the earlier stages of clinical training, may experience difficulties managing longer procedures, providing detailed treatment explanations, or navigating unanticipated complications, all of which may prolong treatment duration and waiting times.

Patients at undergraduate clinics may expect a slower, learning-oriented pace and appreciate detailed care and consistent attention from a single student. In contrast, socioeconomically advantaged patients accustomed to private settings might prioritize efficiency and polished communication, which could explain lower satisfaction rates in such groups. Moreover, demographic factors such as age, marital status, and income appear to moderate patient perceptions of care. Personalized communication, trust-building, and attention to patient-specific preferences significantly improve satisfaction (24). Thus, enhancing undergraduate training should include not only technical proficiency but also patient-centered communication—through simulated interviews, real-time feedback, and time-management exercises. Tools such as virtual patient simulations and structured peer/expert feedback have shown promise in boosting communication skills .

An important limitation of this study is that only a partial version of the DSQ was used (2). The survey corresponded to only three themes (attitude, quality, and convenience) out of the six themes and 23 items in the updated DSQ, while other dimensions such as cost, pain management, and patients' perceived needs for prevention were excluded. Therefore, the findings provide only a partial reflection of overall patient satisfaction and should be interpreted with this limitation in mind. Another limitation of this study is that the type and number of teeth treated (e.g., anterior, premolar, or molar) were not stratified. Because molar treatments are generally more complex and time-consuming than anterior teeth, this variability may have influenced treatment duration and consequently affected patient satisfaction scores. Future studies should analyze

satisfaction outcomes by tooth type to provide more standardized comparisons. Another limitation is that sociodemographic factors were analyzed using univariate methods rather than multivariate analyses. More comprehensive multivariate approaches (e.g., logistic regression) could provide deeper insights into the combined effects of these variables on patient satisfaction. The absence of such analyses may limit the interpretability of our findings. Previous studies have conducted two separate surveys before and after treatment as part of continuous assessment (3,11). However, the possibility of biased responses, as patients might perceive their pre-treatment answers as potentially influencing their upcoming care, cannot be ignored. Conducting the survey post-treatment in this study eliminated such bias and can be considered a strength.

The experiences of patients receiving endodontic treatment reflect the quality of clinical practice and the students' level. In particular, comparisons of treatments performed by undergraduate and postgraduate students are critical for understanding the effects of different levels of clinical education on patient satisfaction. Based on these studies, adjusting endodontic treatment programs at universities to provide students with more hands-on experience may be an important step in improving patient satisfaction. Furthermore, the development of additional support and feedback mechanisms specific to postgraduate students in clinical education may further improve the quality of treatment outcomes.

Conclusion

Patients treated by postgraduate students reported higher satisfaction scores, which may be related to their greater clinical experience, advanced theoretical training, and relatively more structured clinical environment in which they work. These findings suggest that differences in satisfaction do not necessarily reflect superior care but may instead be associated with the stage of clinical education and organizational factors.

From a practical perspective, the results highlight the importance of strengthening undergraduate curricula with specific educational interventions. These may include structured communication training, modules on time management, and simulation-based exercises to enhance technical proficiency and patient-centered care. Incorporating such targeted strategies could help reduce dissatisfaction related to prolonged treatment times and waiting periods and foster more positive patient experiences. This study shows the effect of student levels on patient satisfaction, while also revealing that socio-demographic factors are also an important factor affecting the success of clinical practice.

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