Quality of life and patient satisfaction after endodontic treatment performed in three hospitals in Jeddah, kingdom of Saudi Arabia

Abstract

Aims: To evaluate the quality of life of patients after endodontic treatment, and their satisfaction toward the endodontic treatment in Jeddah, Saudi Arabia.

Methodology: A cross sectional study, was conducted on 300 patients who underwent endodontic treatment from 6 months to a week ago. The study was performed using a self-administered questionnaire. The collected data were analyzed using statistical analysis software SPSS v.26.

Results: In the OHRQoL items, the total degree of the oral health-related quality of life assessment was medium with (M = 2.72 out of 5, RII = 54.4%, SD = 0.67), the most affected was "Feeling an excruciating pain in the mouth" with (M = 3.37 out of 5, RII = 67.4%, SD = 0.77), while the least was " Feeling irritable with others because of the teeth or mouth" with (M = 2.32 out of 5, RII = 46.4%, SD = 1.35). The total degree of the personal satisfaction assessment was high with (M = 3.78 out of 5, RII = 75.6%, SD = 0.67). "Postoperative Pleasantness" was the most satisfied part with (M = 3.86 out of 5, RII = 77.3%, SD = 0.87).

Conclusion: This study showed a moderate level of OHRQoL among patients after the endodontic treatment, and a high level of satisfaction among patients toward the endodontic treatment.

Keywords : Oral health, Quality of life, Satisfaction, Endodontic treatment.

1. Introduction

Endodontic problems are key and common reasons causing patients seek for dental care [1]. Endodontic treatment or root canal treatment (RCT) is basically aimed to prevent or eradicate an infection of the root canal space to avoid tooth extraction [2]. Because, it is recognized that tooth loss is associated with impairment of quality of life, because nothing functions, looks, or feels like a natural tooth, so natural dentition should be preserved whenever possible [1,3]. Thus, when the pulp and periapical tissues are affected, this typically requires endodontic treatment [1].

Endodontic treatment is a procedure carried out by removing inflamed, infected or damaged dental pulp of a tooth, then filling the cleaned, root canal with sterile and antibacterial material [4,5]. This procedure participates in restoring the overall function of the teeth and improving the external looking of the teeth [5].

The depending on clinical parameters alone provide a limited knowledge of oral health outcomes [1,3]. Hence, there has been a paradigm shift in health care, including oral health care, to patient-reported outcomes of treatment and services [1,3]. Success of endodontic treatment also is not determined depending on the the existence of symptoms and signs only, but also by patients' experience, perception of the treatment rendered, and how these signs and symptoms affecting patients' quality of life (QoL) [1,6].

Quality of life (QoL) was defined by World Health Organization as 'the individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectation, standards, and concerns' [8]. The efforts have been exerted to assess the relationship between health and QOL, resulting in the widely spread term health-related quality of life [2]. To determine the consequences of treatment, QOL can be divided into the following parameters; physically, psychologically, and socially [5]. Regarding oral health, indices of Oral health-related quality of life (OHRQoL) are

complement of clinical measures, as the presence of physical, social, and psychological well-being are necessary together with the absence of disease [3]. Within endodontic treatment, postoperative pain may impact patients' overall QoL which influence patients' subjective evaluation of treatment alternatives [7]. Therefore, patient satisfaction is an important determinant in the providing of dental care [7].

Qol instruments are worthy because they measure the perception of population of the impact of oral disorders on well-being [8]. Patients' satisfaction and their OHQoL after dental treatment can be evaluated using self-assessing questionnaires [7]. In the OHQoL evaluation, there are seven conceptual dimensions of oral health: physical pain, functional limitation, physical disability, psychological discomfort, social disability, psychological disability, handicap [8]. There are many factors that might impact patient satisfaction with endodontic treatment such as cost, duration, painful, esthetics etc. Thus, the present study was carried out to evaluate the quality of life of patients after endodontic treatment, and their satisfaction toward the endodontic treatment in Jeddah, Saudi Arabia. Based on our knowledge, there is no similar study has been conducted in Saudi Arabia yet.

2. Material and methods

This study is a cross sectional study, was conducted on 300 patients in King Fahd Hospital, Al-Thaghr Hospital, and University Dental Hospital, to evaluate the quality of life of patients after endodontic treatment, and their satisfaction toward the endodontic treatment in Jeddah, Saudi Arabia.

The study included adult patients over the age of 18 who came to the mentioned Hospitals, and underwent endodontic treatment from 6 months to a week ago. Exclusion criteria applied were as patients with serious medical conditions, and patients with psychological problems or disabilities that prevent them from understanding the study instructions and purpose.

This study used self-administered research instrument (questionnaire) to assess the current level of OHRQoL and satisfaction among endodontic treatment patients. The study tool was developed purely based on the study objectives and after an extensive literature review. Before beginning to filling out the questionnaire, the purpose of the study and questions were clarified to patients, patients also were advised to answer questions based on their condition after endodontic treatment, and oral consent was obtained from patients. All information gathered was strictly confidential.

The questionnaire was consisted of three main parts. The first part included questions about demographic data such as sex, age etc. And the second part included questions about OHRQoL, this part like a previous study [8] was comprised of seven themes; physical pain, functional limitation, physical disability, psychological discomfort, social disability, psychological disability, handicap. While the third part include questions about patient satisfaction, such as cost, duration, painful, esthetics etc. The second and third parts of the study instrument were designed according to 5-Point Likert Scale. So that the paragraphs of the scale are presented to the study sample, and for each paragraph five answers determine their level of agreement with it. The answers are given numerical weights that represent the degree of answering the paragraph, which is used to express the level of low or high approval of the paragraphs and items of the scale.

The collected data were analyzed using statistical analysis software SPSS v.26 The following statistical methods were used; **Frequencies & Percentages**: which were used for describing personal data for the study sample, **Mean:** was used to identify to what extent the responses for sentences and the main dimensions of the study, **Standard Deviation**: showed how much variation or dispersion exists from the average (mean), or expected value, The more values came close to zero the more responses are centered and dispersion decreased, **Cronbach's Alpha**: was used to estimate the reliability of the questionnaire. **Pearson Correlation**

Coefficient: was used to measure the sincerity of internal consistency and the correlation coefficient, which is used to study the relationship between variables.

3. Results:

Reliability & Validity

3.1 Validity

a. Face validity

The face validity way was used to ensure the questionnaire validity and its suitability to the research goals, the questionnaire was evaluated by a group of experts, academics and specialists, and they were asked for their opinion about every paragraph in the questionnaire, and they were asked to add, delete or reformulate. The researcher followed the instructions and modified the questionnaire.

b. Internal Consistency

Internal consistent Means consistency of each paragraph of the questionnaire with the domain that belong to that specific paragraph, so correlation coefficients has been calculated between the degree of each paragraph, and the total score of domain, to verify the validity of the questionnaire, the results indicate validity consistency of internal data in the study where values of correlation coefficient ranged for all phrases between 0.346 to 0.807, and these values were significant at 1% level, and table (1) illustrate that.

Table 1: Internal consistency of each paragraph of the questionnaire.

oral health related quality of life						**personal satisfaction**		
No.	**r**	**Sig.**	**No.**	**r**	**Sig.**	**No.**	**r**	**Sig.**
1	.346**	.000	10	.664**	.000	1	.663**	.000
2	.557**	.000	11	.604**	.000	2	.679**	.000
3	.561**	.000	12	.697**	.000	3	.742**	.000

4	.604**	.000	13	.691**	.000	4	.761**	.000
5	.782**	.000	14	.785**	.000	5	.766**	.000
6	.768**	.000	15	.533**	.000	6	.700**	.000
7	.807**	.000	16	.801**	.000	7	.769**	.000
8	.746**	.000	17	.765**	.000			
9	.712**	.000						

Hint: r= Pearson Correlation Coefficient, **Significant at the 0.01 level.

3.2 Reliability

In general reliability means the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects, there are many methods in which it can be measured in order to ascertain the extent of the Reliability to measure what it was designed for, but in this study Cronbach's Alpha method have been used to calculate the reliability in the data collected through the study tool (questionnaire) and the results were shown in Table (2) below:

Table 2: The value of Cronbach's Alpha for every domain

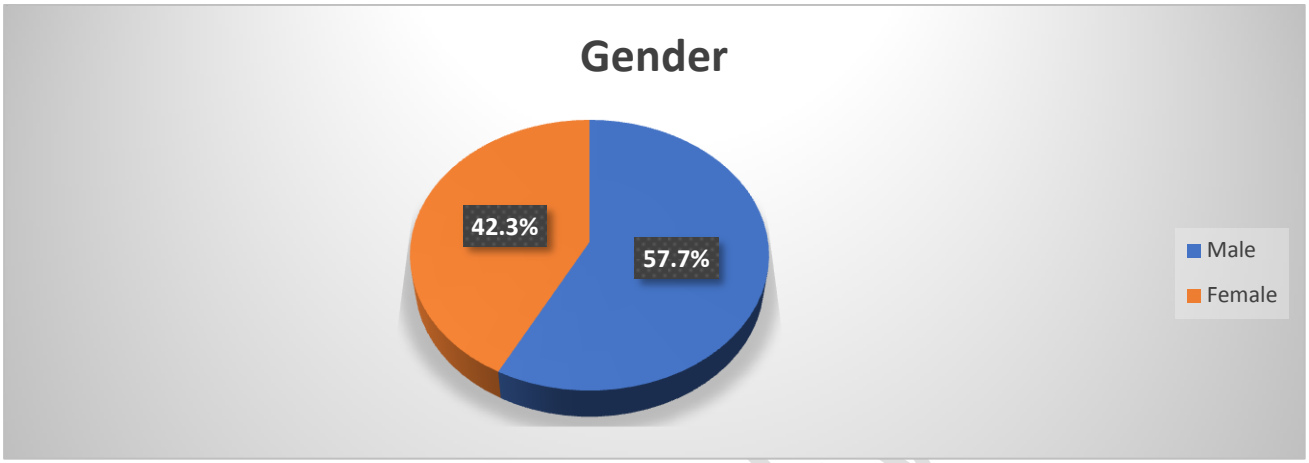
Domains	No. of Questions	Cronbach's Alpha
oral health related quality of life	17	0.899
personal satisfaction	7	0.847
All domains	**24**	**0.851**

Table (4) shows that the reliability variables were 0.899 to the first domain, and 0.847 to the second, these results indicate the presence of high reliability in the data of study domains, in addition, the total reliability coefficient reached 0.851, which is considered the very high value of the Cronbach's Alpha.

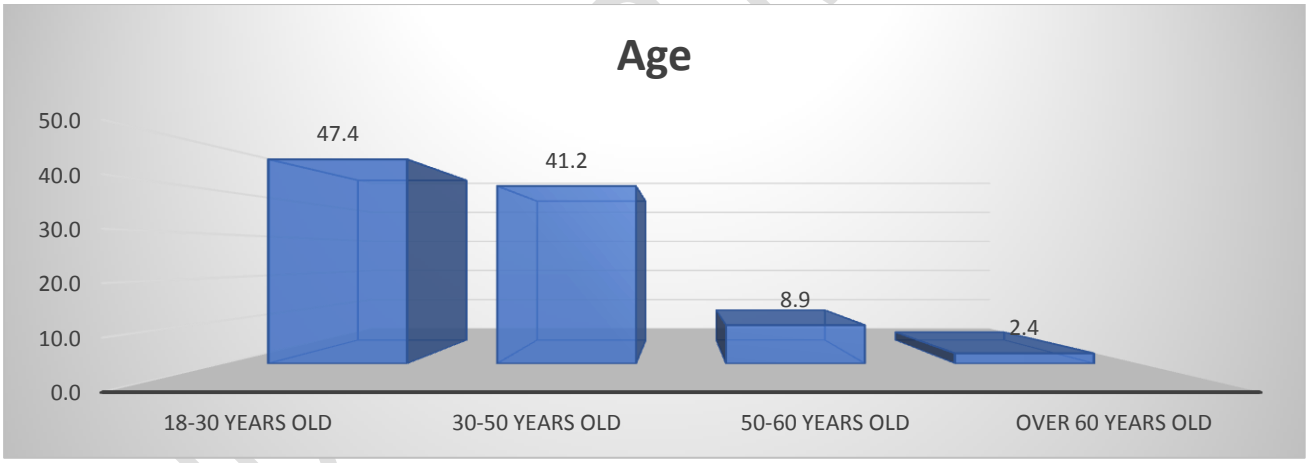
Through the above tests of the validity and reliability of data in the study, results indicated a high presence of validity and reliability of data in the study and, accordingly, the data

collected from the study sample is good and suitable for the analysis. The results of the analysis are dependable to be disseminated in the study population.

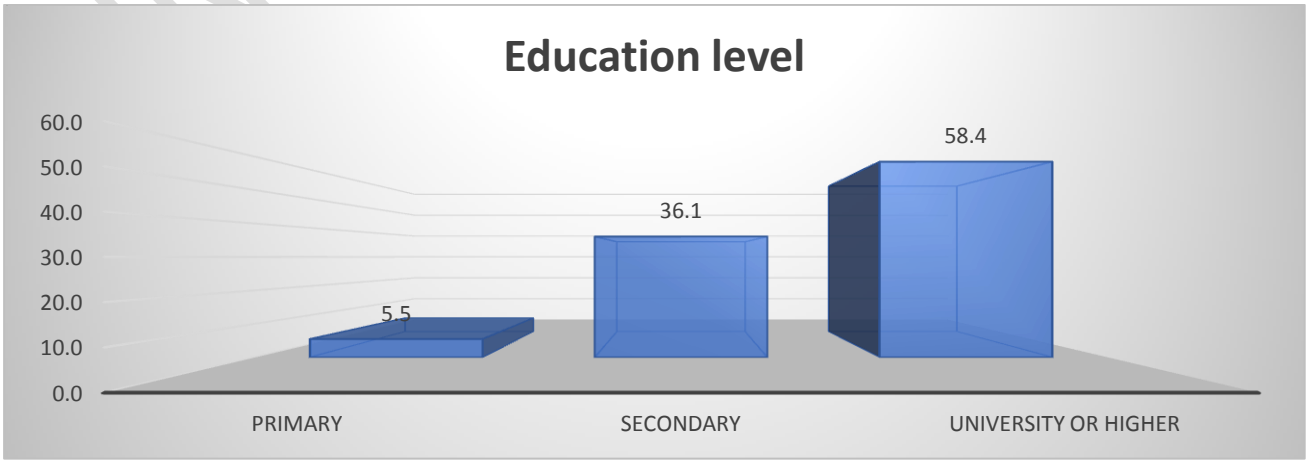
3.3 Descriptive Analysis of Data



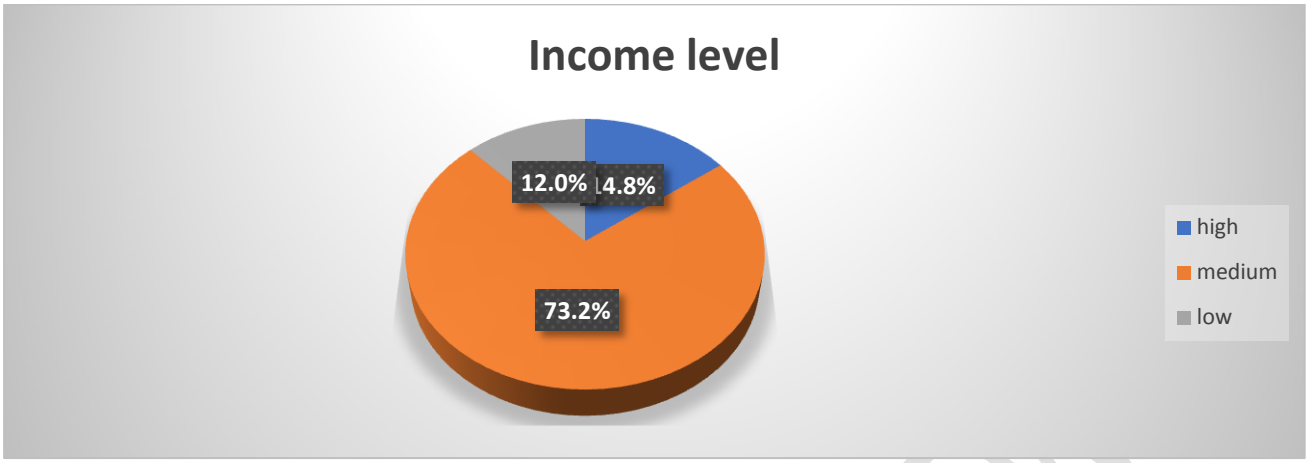
Graph 1: shows the participants distribution according to gender.



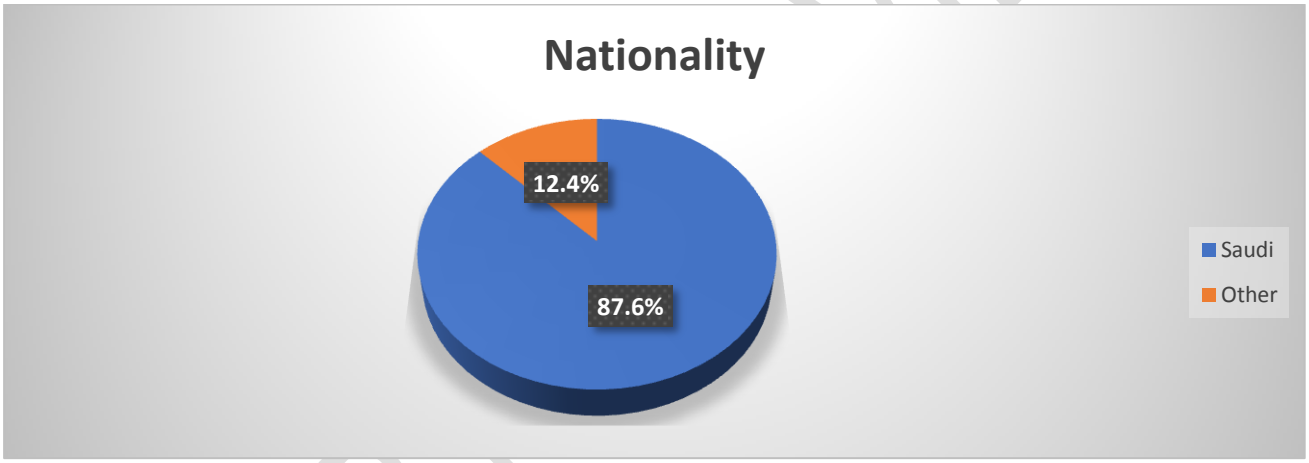
Graph 2: shows the participants distribution according to age.



Graph 3: shows the participants distribution according to Education level.



Graph 4: shows the participants distribution according to Income level.



Graph 5: shows the participants distribution according to Nationality.

- **Oral health-related quality of life assessment results**

Table (3) shows the descriptive measurements of items of Oral health-related quality of life assessment, whereas the table has (17) items, the item which comes first based on the relative importance index is "Feeling an excruciating pain in the mouth" with (M = 3.37 out of 5, RII = 67.4%, SD = 0.77), This result indicates medium degree of approval, the item which comes last based on the relative importance index " Feeling irritable with others because of the teeth

or mouth" with (M = 2.32 out of 5, RII = 46.4%, SD = 1.35) This result indicates a low degree of approval.

The total degree of the oral health-related quality of life assessment was medium with (M = 2.72 out of 5, RII = 54.4%, SD = 0.67).

Table 3: Oral health-related quality of life assessment results.

No.	Conceptual Dimension	Item	Never	Hardly ever	Occasionally	Fairly often	Very often	M	SD	RII	R
1.	Physical pain	Have you had painful aching in your mouth?	2.1%	6.2%	50.2 %	35.7 %	5.8 %	3.37	0.77	67.4 %	1
2.		Have you had to alter the temperature of the foods that you eat because of your teeth or mouth?	2.7%	16.8%	44.0 %	32.3 %	4.1 %	3.18	0.86	63.6 %	2
3.		Have you found it uncomfortable to eat any foods because of your teeth or mouth?	4.5%	26.1%	41.6 %	21.6 %	6.2 %	2.99	0.95	59.8 %	4
4.	Functional limitation	Have you felt that your sense of taste has worsened because of your teeth or mouth?	15.8 %	31.3%	27.1 %	19.6 %	6.2 %	2.69	1.14	53.8 %	9
5.		Have you had trouble pronouncing words because of your teeth and mouth?	36.1 %	20.3%	12.7 %	25.1 %	5.5 %	2.43	1.35	48.7 %	15
6.	Physical disability	Have you had to interrupt meals because of your teeth or mouth?	25.8 %	25.4%	23.0 %	18.6 %	6.9 %	2.55	1.25	51.0 %	11
7.		Has your diet been unsatisfactory because of your teeth or mouth?	27.5 %	25.8%	25.1 %	11.3 %	9.3 %	2.49	1.27	49.7 %	13
8.	Psychological disability	Have you been embarrassed because of your teeth or mouth?	26.5 %	23.4%	18.6 %	23.0 %	7.9 %	2.62	1.31	52.5 %	10
9.		Have you found it difficult to relax because of your teeth or mouth?	16.5 %	23.4%	38.5 %	16.2 %	5.5 %	2.71	1.09	54.2 %	7
10.		Have you found it difficult to fall asleep because of your teeth or mouth?	11.0 %	20.3%	37.5 %	24.7 %	6.5 %	2.96	1.07	59.1 %	5
11.		Have you ever been	10.7	18.6%	37.8	25.4	7.6	3.01	1.08	60.1	3

		awakened by problems with your teeth or mouth?	%		%	%	%			%	
12.	Psychological discomfort	Have you felt tense because of your teeth or mouth?	14.4 %	23.4%	30.9 %	25.8 %	5.5 %	2.85	1.13	56.9 %	6
13.		Have you been self-conscious because of your teeth or mouth?	25.1 %	18.9%	22.7 %	26.5 %	6.9 %	2.71	1.29	54.2 %	7
14.	Handicap	Have you been totally unable to function because of your teeth or mouth?	27.5 %	25.8%	22.3 %	19.6 %	4.5 %	2.48	1.21	49.5 %	14
15.		Have you felt that life in general was less satisfying because of your teeth or mouth?	35.1 %	20.6%	23.0 %	14.8 %	5.5 %	2.53	3.34	50.5 %	12
16.	Social disability	Have you had difficulty doing your usual jobs because of problems with your teeth or mouth	38.1 %	18.6%	19.6 %	16.2 %	7.2 %	2.36	1.33	47.1 %	16
17.		Have you been irritable with other people because of your teeth or mouth?	41.9 %	14.8%	19.2 %	16.5 %	7.2 %	2.32	1.35	46.4 %	17
		All items						**2.72**	**0.86**	**54.4 %**	

Hint: M=Mean of answers, RII=Relative Importance Index ((Mean/5) *100%), SD=Standard Deviation, R=Rank.

- **Personal satisfaction assessment results**

Table (4) shows the descriptive measurements of items of the personal satisfaction assessment, whereas the table has (7) items, the item which comes first based on the relative importance index is "Postoperative Pleasantness" with (M = 3.86 out of 5, RII = 77.3%, SD = 0.87), This result indicates a high degree of satisfaction, the item which comes last based on the relative importance index "Treatment duration" with (M = 3.6 out of 5, RII = 72.1%, SD = 0.91) This result indicates a high degree of satisfaction.

The total degree of the personal satisfaction assessment was high with (M = 3.78 out of 5, RII = 75.6%, SD = 0.67).

Table 4: personal satisfaction assessment results.

No.	Item	Very unsatisfied	Unsatisfied	Neutral	satisfied	Very satisfied	M	SD	RII	R
1.	Treatment cost	3.8%	13.4%	22.0%	30.2%	30.2%	3.70	1.15	74.0%	6
2.	Treatment duration	1.4%	10.0%	30.6%	43.0%	15.1%	3.60	0.91	72.1%	7
3.	Treatment painfulness	0.0%	6.5%	28.2%	38.8%	26.5%	3.85	0.89	77.0%	2
4.	Postoperative esthetics	0.7%	8.2%	26.8%	42.3%	21.6%	3.76	0.91	75.2%	5
5.	Chewing ability	0.3%	7.6%	26.1%	38.8%	27.1%	3.85	0.92	77.0%	3
6.	Postoperative Pleasantness	0.7%	6.5%	21.6%	48.1%	23.0%	3.86	0.87	77.3%	1
7.	General satisfaction	0.0%	6.9%	28.2%	40.5%	24.1%	3.83	0.88	76.6%	4
All items							**3.78**	**0.67**	**75.6%**	

- **The relationship between demographic variables and oral health-related quality of life**

To test the differences in the oral health-related quality of life due to the variable (Age, Education level, Income level) we used the One-Way ANOVA test was used, and to test the differences in the oral health-related quality of life due to the variable (gender, Nationality) we used the independent samples T-test, as follows:

Table 5: The relationship between demographic variables and oral health-related quality of life

Variable	Category	N	Mean	Std. Deviation	Test-value	P-value
Gender	Male	168	3.00	.894	$7.225^{(t)}$	0.000**
	Female	123	2.34	.646		
Nationality	Saudi	255	2.76	.850	$2.291^{(t)}$	0.023*
	Other	36	2.42	.876		
Age	18-30 years old	138	3.00	.914	$10.811^{(F)}$	0.000**
	30-50 years old	120	2.52	.735		
	50-60 years old	26	2.33	.666		
	over 60 years old	7	2.13	.676		

Education level	primary	16	2.52	.644	2.207(F)	0.112
	secondary	105	2.61	.879		
	university or higher	170	2.81	.858		
Income level	high	43	2.88	.949	1.095(F)	0.336
	medium	213	2.71	.861		
	low	35	2.60	.726		

Hint: (T)= independent samples T-test, (F) One-Way ANOVA test, *Significant at the 0.05 level, **Significant at the 0.01 level.

It is clear from the previous table:

- There is a statistical difference (p-value< 0.05) in the oral health-related quality of life due to gender.
- There is a statistical difference (p-value< 0.05) in the oral health-related quality of life due to nationality.
- There is a statistical difference (p-value< 0.05) in the oral health-related quality of life due to age.
- There is no statistical difference (p-value> 0.05) in the oral health-related quality of life due to education level.
- There is no statistical difference (p-value> 0.05) in the oral health-related quality of life due to income level.
- **The relationship between demographic variables and personal satisfaction**

  To test the differences in the personal satisfaction due to the variable (Age, Education level, Income level) we used the One-Way ANOVA test was used, and to test the differences in the personal satisfaction due to the variable (gender, nationality) we used the independent samples T-test, as follows:

Table 6: The relationship between demographic variables and personal satisfaction

Variable	Category	N	Mean	Std. Deviation	Test-value	P-value
Gender	Male	168	3.75	.670	0.753(t)	0.452
	Female	123	3.81	.679		

Nationality	Saudi	255	3.78	.656	$0.182^{(t)}$	0.857
	Other	36	3.80	.799		
Age	18-30 years old	138	3.83	.685	$1.175^{(F)}$	0.320
	30-50 years old	120	3.77	.672		
	50-60 years old	26	3.57	.603		
	over 60 years old	7	3.76	.674		
Education level	primary	16	3.88	.930	$3.012^{(F)}$	0.051
	secondary	105	3.90	.708		
	university or higher	170	3.70	.614		
Income level	high	43	3.92	.669	$4.022^{(F)}$	0.019*
	medium	213	3.80	.654		
	low	35	3.50	.737		

Hint: (T)= independent samples T-test, (F) One-Way ANOVA test, *Significant at the 0.05 level, **Significant at the 0.01 level.

It is clear from the previous table:

- There is no statistical difference (p-value> 0.05) in the personal satisfaction due to gender.
- There is no statistical difference (p-value> 0.05) in the personal satisfaction due to nationality.
- There is no statistical difference (p-value> 0.05) in the personal satisfaction due to age.
- There is no statistical difference (p-value> 0.05) in the personal satisfaction due to education level.
- There is a statistical difference (p-value< 0.05) in the personal satisfaction due to income level.

4. Discussion

Patient-centered outcome assessments are focus on how diseases and treatment modalities affect a person's physical, social, and emotional functioning, based on this perspective, it can help to define suitable treatment goals [9]. Improving OHRQoL and patients' satisfaction are the major outcomes of dental care provision [5]. Evaluation of OHRQoL and patients'

satisfaction after receiving endodontic treatment can help dental practitioners and patients to understand the impact of endodontic treatment better [5]. Therefore, this study evaluated the quality of life of patients after endodontic treatment, and their satisfaction toward the endodontic treatment. The main findings from this study were that the effect of endodontic treatment on patients' OHRQoL was generally moderate, while there was overall high level of satisfaction among patients towards endodontic treatment.

In the present study an endodontic specific QOL instrument was specially developed by choosing 17 items from the 49 items included in the Oral Health Impact Profile (OHIP) [10]. According to our results, it was found to have high validity and reliability of data in the study. Hence, our questionnaires can be used as a stable tool to investigate OHRQoL after endodontic treatment. This is consistent with what Bhaisare and colleagues found [8]. It is worth mentioning that previous studies that had used OHIP found that missing teeth, and of periodontal attachment , and untreated caries are associated with increasing levels of impact on quality of life and well-being [8].

It's well-known that most of patients enjoy pain relief and function restoration through endodontic treatment [11,12]. According to our results, physical pain was the most affected dimension of OHRQoL dimensions, as there was above moderate prevalence of pain or its related difficulties in eating after endodontic treatment. It was stated that postoperative pain following endodontic treatment still common, and affects about 3% to 58% of patients [13]. Zilinskaite-Petrauskiene & Haug reported that patients experiencing pain reported significantly poorer QOL in all domains, except functional limitation [14].

Postoperative pain following endodontic treatment can be attributed to microbiological, chemical or mechanical injuries in periradicular tissues, in addition to the psychological factors [13]. In a clinical investigation, it is not easy to determine if one factor or multiple

factors elicit pain. microbiological factors could be due to the improperly cleaning of root canal system, thus, residual infection may cause exacerbation through imbalances in the host-bacteria relationship, synergistic or additive microbial interactions, or the presence of decisively pathogenic bacteria before the initiation of treatment [15]. Chemical factors involve the extrusion of medications, irrigants, or filling materials. While the mechanical factors could be as overinstrumentation [16,17].

Predictive models showed that postoperative pain depended on tooth type, occlusal contacts, periapical radiolucency, preoperative pain prevalence and previous emergency root canal treatment; postoperative pain intensity was affected by tooth type and patient's age, while the duration of pain was affected by gender, age and pre-existing periapical radiolucency [18]. In a prospective cohort study Gotler and his colleagues found that incidence of post endodontic pain depends on the pulp condition, as root canal treatment of teeth with vital pulp was associated with a higher incidence and intensity of post endodontic pain (6 h after treatment) compared to retreated teeth or teeth with necrotic pulp [19].

Patients might experience physical problems after receiving endodontic treatment such as difficulty in eating, breathing or talking [5]. In our study there was a moderate level of physical disability in eating after undergoing the endodontic treatment. Endodontic treatment may also effect patients' mood, personality and confidence [5]. In our study there was moderate prevalence of psychological disability or discomfort. This could be because endodontic treatment effects patients' psychological theme as the as the appearance of the discolored tooth, which may causes reduction of confidence level or bad mood [20]. Regarding social disabilities, its prevalence in our study were lower than moderate.

Patients' satisfaction with treatment is a major purpose of health and dental care, it's also necessary for quality care and patients' compliance. High-quality results cannot be considered

in the case of patients who are unsatisfied with the treatment and dentist's attitude received and they still having some complaints from pain and lack of functional ability or aesthetics of the treated teeth [21]. Our results demonstrated a high level of satisfaction among our participants toward their endodontic treatment based on their high appreciation of the painless procedures, chewing ability of teeth and postoperative pleasantness. Our results are consistent with those of previous studies was performed by Emilia Karova et al. in Bulgaria [21], and by Dugas et al., study in Canada [22].

In our study patients' demographic variables such as gender, age and nationality showed the presence of a relationship with OHRQoL, as (p-value < 0.05). While education level and income level did not show any significance with OHRQoL, as (p-value > 0.05). But there was no relationship between the patients' demographic information except income level and patients' satisfaction toward their endodontic treatment. The relationship between age and OHRQoL could be justified by greater impact of systemic and oral diseases in elderly individuals [23]. While the relationship between gender and OHRQoL could be because women weigh their oral health more when they evaluate their quality of life [16]. Regarding the relationship between nationality and OHRQoL could be justified by cultural differences.

5. Conclusion

This study showed a moderate level of OHRQoL among patients after the endodontic treatment, physical pain was the most affected dimension of OHRQoL dimensions. There was relationship between OHRQoL and age, gender, and nationality. This study also demonstrated a high level of satisfaction among patients toward the endodontic treatment. There was a relationship between patients' satisfaction and the income level of patients.

References

1. Liu P, McGrath, Cheung GSP. Improvement in oral health–related quality of life after endodontic treatment: a prospective longitudinal study. Journal of endodontics. 2014;40(6):805-810.

2. Wigsten E, Kvist T, Jonasson P, Bjørndal L, Dawson VS., Fransson H., et al. Comparing quality of life of patients undergoing root canal treatment or tooth extraction. Journal of endodontics. 2020;46(1):19-28.

3. Leong DJX, Yap AUJ. Quality of life of patients with endodontically treated teeth: a systematic review. Australian Endodontic Journal. 2020;46(1):130-139.

4. Alrahabi MK, Younes HB. A cross-sectional study of the quality of root canal treatment in Al-Madinah Al-Munawwarah. 2016.

5. Iqbal MZ, Rajan S, Iqbal, MS. Determinants of oral health-related quality of life among patients on root canal treatment. Journal of Pharmaceutical Research International. 2020:76-82.

6. Hegde N, Shetty A, Bhat R. Patient satisfaction and assessment of reason for seeking root canal treatment in a cost-free hospital setup. Dentistry and Medical Research. 2020;8(2):49.

7. Hamasha AA, Hatiwsh A. Quality of life and satisfaction of patients after nonsurgical primary root canal treatment provided by undergraduate students, graduate students and endodontic specialists. International endodontic journal. 2013;46(12):1131-1139.

8. Bhaisare A, Patil A, Warhadpande M, Kalbande A. Evaluation of Oral Health Related Quality of Life and Satisfaction Outcome of Endodontic Treatment in Central India–A Cross Sectional Study. IOSR-JDMS. 2017;16(6):43-50.

9. Christie MJ, French D, Sowden A, West A. Development of child-centered disease-specific questionnaires for living with asthma. Psychosomatic Medicine. 1993.

10. Chapko MK, Bergner M, Green K, Beach B, Milgrom P, Skalabrin, N. Development and validation of a measure of dental patient satisfaction. Medical Care. 1985:39-49.

11. Friedman S, Mor C. The success of endodontic therapy-healing and functionality. CDA J. 2004;32(6):493-503.

12. Pak JG, White, S. N. Pain prevalence and severity before, during, and after root canal treatment: a systematic review. Journal of endodontics. 2011;37(4):429-438.

13. Bourreau MLS, Soares ADJ, Souza-Filho FJD. Evaluation of postoperative pain after endodontic treatment with foraminal enlargement and obturation using two auxiliary chemical protocols. Revista de Odontologia da UNESP. 2015;44:157-162.

14. Zilinskaite-Petrauskiene I, Haug SRA. Comparison of Endodontic Treatment Factors, Operator Difficulties and perceived Oral Health-Related Quality of Life between Elderly and Young Patients. Journal of Endodontics. 2021.

15. Clark DS, ElDeeb, M. E. Apical sealing ability of metal versus plastic carrier Thermafil obturators. Journal of endodontics. 1993;19(1):4-9.

16. Cohen-Carneiro F, Souza-Santos R, Rebelo MAB. Quality of life related to oral health: contribution from social factors. Ciência & Saúde Coletiva. 2011;16:1007-1015.

17. Alonso-Ezpeleta LO, Gasco-Garcia, C, Castellanos-Cosano L, Martín-González J, López-Frías FJ, Segura-Egea JJ. Postoperative pain after one-visit root-canal treatment on teeth with vital pulps: comparison of three different obturation technique. Medicina oral, patologia oral y cirugia bucal. 2012;17(4):e721.

18. Arias A, de la Macorra JC, Hidalgo JJ, Azabal, M. Predictive models of pain following root canal treatment: a prospective clinical study. International endodontic journal. 2013;46(8): 784-793.

19. Gotler M, Bar-Gil B, Ashkenazi M. Postoperative pain after root canal treatment: a prospective cohort study. International journal of dentistry, 2012.

20. Ibiyemi O, Taiwo JO. Psychosocial aspect of anterior tooth discoloration among adolescents in igbo-ora, southwestern Nigeria. Annals of Ibadan postgraduate medicine. 2011;9(2):94-99.

21. Emilia Karova DMD, Viktoria Petrova DMD, Alexander Bonchev DMD, Violeta Dogandzhiyska DMD. Perceptions of Endodontic Treatment Outcomes Provided by Undergraduate Students and Endodontic Specialists. 2019.

22. Dugas NN, Lawrence HP, Teplitsky P, Friedman S. Quality of life and satisfaction outcomes of endodontic treatment. Journal of endodontics. 2002;28(12):819-827.

23. Zucoloto ML, Maroco J, Campos JADB. Impact of oral health on health-related quality of life: a cross-sectional study. BMC Oral Health. 2016;16(1):1-6.