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ORIGINAL ARTICLE

Demand for Endodontic Treatment and its Impact on Quality of Life

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ABSTRACT

Objective: To analyze the impact on quality of life-related to the need for endodontic treatment and possible association with sociodemographic variables. **Material and Methods:** It was carried out through the application of a sociodemographic script and the Oral Health Impact Profile (OHIP-14). The association between variables was verified using Fisher's exact test and the strength of the association between the independent variables and the impact on quality of life was calculated using the odds ratio (OR). **Results:** The impact on quality of life was declared by 87.8% of the participants, with physical pain (67.3%) and psychological discomfort (76%) being the most impacted domains. In terms of education level, participants who completed high school or more reported an 88.4% impact on the disability dimension, with around 2.4 times greater chances of suffering impact on this dimension. Individuals living alone reported a greater impact on the psychological disability dimension (54.8%). Participants with limited or no access to dental services, especially through the Unified Health System (NHS), reported a greater impact on the psychological disability dimension (61%). **Conclusion:** The need for endodontic treatment has a significant impact on quality of life, as stated by 87.8% of the participants, especially in the psychological discomfort (76%) and physical pain (67.3%) domains. These findings were associated with the following sociodemographic variables: gender, race/color, marital status, schooling, socioeconomic status and type of access to oral health services.

Keywords: Oral Health; Quality of Life; Endodontics; Root Canal Therapy.

Introduction

Pain is defined as an unpleasant emotional and sensory experience associated with potential or actual tissue damage. It is a subjective, emotional experience that can lead to disability [1]. Toothache is a nuisance for the patient and is very common, a fact evidenced in a study in which around 84% of the participants reported having had a toothache at least once in their lives, and of these, 56.4% had experienced it in the last twelve months [2].

According to the World Health Organization (WHO), quality of life is based on individuals' self-perceptions of their context in life in relation to their values, goals and expectations [3]. Good oral health has an impact on the quality of life of individuals and their basic daily activities, providing well-being and quality of life [4]. Endodontic therapy refers to the diagnosis, prevention and treatment of diseases and lesions of the pulp and associated periradicular conditions [5]. The areas of intervention in endodontics are vast and include vital pulp therapy, regenerative endodontic procedures, conventional endodontic treatment, endodontic retreatment and paraendodontic surgery. Their main objective is the preservation of functional natural dentition [6]. The success of endodontic treatment is often based on the absence or reduction of previous periapical lesions, the absence of symptoms and patient discomfort [3].

Although quality of life assessment has been widely used in dentistry in general, it has only recently been used in the field of endodontics [7]. However, endodontic treatment has had a positive impact on the quality of life of individuals, especially in terms of physical pain, psychological discomfort and psychological incapacity [8], as well as having a valuable conservative character, promoting the preservation of the dentition due to the high rate of tooth retention, which reaches 86.25% up to twenty years after endodontic treatment [9].

Given this scenario, it is essential to understand the factors that affect perceptions of oral health and quality of life and which can contribute to the development of strategies to help overcome obstacles to accessing dental services. This study, therefore, represents a further advance in the relationship between quality of life and oral health, also associating endodontic therapy with a better understanding of its impact on the lives of the population, with a view to achieving the ultimate goal of improving the public oral health system.

Currently, one of the most widely used international instruments for assessing oral health-related quality of life is the Oral Health Impact Profile (OHIP), which has at least seven linguistic and cultural versions [9]. In the OHIP, the data obtained is the result of input from patients and not just researchers, increasing the likelihood of being able to explore the consequences considered important by patients [10]. It has also recently been proven to be sensitive for assessing quality of life after endodontic therapy [7].

Many variables can influence the quality of life, and considering that exploration of this field is still necessary, this study aimed to analyze the impact on quality of life related to the need for endodontic treatment in patients who sought care at the endodontic clinic of the Brazilian Dental Association, Espírito Santo Section (BDA-ES) by applying the OHIP-14 questionnaire and possible relationships with associated sociodemographic variables.

Material and Methods

Study Design and Sample

This is a cross-sectional study that analyzed a sample of 312 individuals aged 18 or over who sought endodontic treatment at the endodontic clinic of the BDA-ES, located at the municipality of Serra, Brazil. In order to calculate the sample, the approximate target population of 994 people who sought care between January

and December 2021 was considered. The prevalence of the impact of oral problems of 35%, a 95% confidence level and a 5% margin of error were used as parameters for the sample calculation. A minimum sample of 260 participants was obtained. The expected prevalence of 35% was used based on a previous study carried out in the state of Espírito Santo [11]. Considering a loss rate of 20%, 52 participants were added, resulting in a final sample of 312 people.

Data Collection

Data collection took place between January 19 and December 2, 2021, through an interview carried out by the researcher before the endodontic treatment, where two questionnaires were administered to the participants: A script for sociodemographic characterization and the Oral Health Impact Profile (OHIP-14) to measure quality of life.

The following independent study variables were collected in the sociodemographic characterization script: gender, age, race/color, marital status, municipality of residence, schooling, socioeconomic status and type of access to oral health services in the last twelve months prior to the survey. The socioeconomic status of the participants was categorized according to the ownership of consumer goods and the education level of the head of household into classes A, B, C, D/E, using the Brazilian Economic Classification Criterion, BECC 2019 version [12].

The OHIP-14 assessed the subjects' perception of the impact on quality of life related to the need for endodontic treatment. The original OHIP instrument has 49 questions and includes seven dimensions of the impact to be measured: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and disability [10]. In this study, we used a shortened version of the questionnaire, with 14 questions (OHIP-14), because it is a brief instrument that is quick to administer and quote, and has the same psychometric properties for analyzing the seven domains of the impact to be measured that are present in the original instrument (OHIP-49). Participants answered the questions on a five-choice Lickert scale, coded as: 0 = never, 1 = rarely, 2 = sometimes, 3 = often and 4 = always. The higher the value assigned, the more negative the self-perception of the impact on quality of life [9]. In this study, we chose to use the method of expressing the results as a categorical variable in two groups: with impact for the answers "always" and "often" and without impact for "sometimes, rarely and never".

Data Analysis

Fischer's exact test was used to verify the associations between the independent variables and the dimensions assessed by the OHIP instrument. To assess the strength of the association between the independent variables and the OHIP dimensions, the odds ratio (OR) was calculated. The Mantel-Haenszel test was used to analyze the effect of the OHIP dimensions combined. The IBM SPSS 20 statistical package (IBM Corp., Armonk, NY, USA) was used for this analysis and the significance level adopted was 5% ($p<0.05$).

Ethical Clearance

This study was approved by the Research Ethics Committee of the Health Sciences Center of the Federal University of Espírito Santo (Opinion no. 4454344).

Results

The demographic profile of the study population was predominantly female (63.1%), aged up to 43 years (51.6%), brown (45.5%), married or living with a partner (53.2%), and living in the municipality of Serra (51.3%). In terms of socioeconomic characterization, the majority reported having studied for 13 years or more (78.9%), belonging to classes C/D/E (66%), and having used or not used the National Health System (NHS) to access oral health services in the last 12 months (53.2%).

The impact on quality of life due to the need for endodontic treatment was reported by 274 people (87.8%), and the areas with the greatest impact were physical pain (67.3%) and psychological discomfort (76%). In the analysis according to the gender of the participants, 69.2% of the women reported an impact on the psychological discomfort dimension, so it was observed that women were 2.8 times more likely to suffer an impact on this dimension than men (p<0.001; OR=2.859; 95% CI = 1.678; 4.872). There was no statistically significant association between the domains analyzed in relation to age group.

Non-white people (Black, Brown, Yellow and Indigenous) were most likely to report an impact on the social incapacity (57%) and disability (55%) dimensions and were 1. 7 times more likely to experience an impact on the social functioning dimension (p=0.022; OR=1.755; 95% CI = 1.051; 2.930) and 1.8 times more likely to experience an impact on the disability dimension (p=0.019; OR=1.863; 95% CI = 1.078; 3.221) than whites (Table 1).

Table 1. Impact on quality of life related to the need for endodontic treatment according to race/color.

Dimension	White		Non-White		p-value	OR
	N	%	N	%		
Functional Limitation						
With impact	11	33.3	22	66.7	0.567	1.016 (0.473-2.184)
No impact	94	33.7	185	66.3		
Physical Pain						
With impact	70	33.3	140	66.7	0.480	1.045 (0.634-1.722)
No impact	35	34.3	67	65.7		
Psychological Discomfort						
With impact	84	35.4	153	64.6	0.147	1.142 (0.798-2.496)
No impact	21	28.0	54	72.0		
Physical Disability						
With impact	52	33.5	103	66.5	0.532	1.009 (0.631-1.615)
No impact	53	33.8	104	66.2		
Psychological Disability						
With impact	54	37.0	92	63.0	0.147	1.324 (0.827-2.119)
No impact	51	30.7	115	69.3		
Social Incapacity						
With impact	37	43.0	49	57.0	0.022	1.755 (1.051-2.930)
No impact	68	30.1	158	69.9		
Disability						
With impact	31	44.9	38	55.1	0.019	1.863 (1.078-3.221)
No impact	74	30.5	169	69.5		
Mantel-Haenszel					0.160	1.512 (0.757-3.020)

Regarding the marital status of the participants, 54.8% of those living alone (single, divorced or separated, and widowed) reported an effect on the psychological disability dimension and were 1.8 times more likely to have an effect (p=0.005; OR=1.837; 95% CI = 1.171; 2.881) than those who were married or living with a partner (Table 2). There was also significance in the psychological discomfort dimension (p=0.045), but as the confidence interval passed through 1, we can consider it non-significant.

Table 2. Impact on quality of life related to the need for endodontic treatment according to marital status.

Dimension	Married/Living		Others		p-value	OR
	N	%	N	%		
Functional Limitation						
With impact	16	48.5	17	51.5	0.347	1.235 (0.600-2.544)
No impact	150	53.8	129	46.2		
Physical Pain						
With impact	113	53.8	97	46.2	0.426	1.077 (0.671-1.730)
No impact	53	52.0	49	48.0		
Psychological Discomfort						
With impact	133	56.1	104	43.9	0.045	1.628 (0.965-2.746)
No impact	33	44.0	42	56.0		
Physical Disability						
With impact	83	53.5	72	46.5	0.497	1.028 (0.659-1.603)
No impact	83	52.9	74	47.1		
Psychological Disability						
With impact	66	45.2	80	54.8	0.005	1.837 (1.171-2.881)
No impact	100	60.2	66	39.8		
Social Incapacity						
With impact	52	60.5	34	39.5	0.072	1.503 (0.907-2.489)
No impact	114	50.4	112	49.6		
Disability						
With impact	31	44.9	38	55.1	0.077	1.532 (0.895-2.623)
No impact	135	55.6	108	44.4		
Mantel-Haenszel					0.173	1.472 (0.744-2.913)

Regarding the participants' education, it was observed that individuals who had completed high school or more (13 years of study or more) reported 88.4% of impacts on the disability dimension, and were thus approximately 2.4 times more likely to be impacted in this dimension (p=0.017; OR=2.391; 95% CI = 1.081; 5.287) than individuals who had incomplete high school or less than 13 years of study (Table 3).

Table 3. Impact on quality of life related to the need for endodontic treatment according to education level.

Dimension	≤12 Years of Study		≥13 Years of Study		p-value	OR
	N	%	N	%		
Functional Limitation						
With impact	5	15.2	28	84.8	0.259	1.567 (0.580-4.230)
No impact	61	21.9	218	78.1		
Physical Pain						
With impact	39	18.6	171	81.4	0.074	1.578 (0.901-2.765)
No impact	27	26.5	75	73.5		
Psychological Discomfort						
With impact	49	20.7	188	79.3	0.412	1.125 (0.602-2.102)
No impact	17	22.7	58	77.3		
Physical Disability						
With impact	28	18.1	127	81.9	0.117	1.448 (0.837-2.507)
No impact	38	24.2	119	75.8		
Psychological Disability						
With impact	30	20.5	116	79.5	0.458	1.071 (0.621-1.847)
No impact	36	21.7	130	78.3		
Social Incapacity						
With impact	17	19.8	69	80.2	0.420	1.124 (0.606-2.084)
No impact	49	21.7	177	78.3		
Disability						
With impact	8	11.6	61	88.4	0.017	2.391 (1.081-5.287)
No impact	58	23.9	185	76.1		
Mantel-Haenszel					0.589	1.007 (0.438-2.314)

In the analysis according to socioeconomic status, 57% of individuals in classes C/D/E reported an impact on the social incapacity dimension, making them 1.7 times more likely to have an impact on this dimension (p=0.027; OR=1.718; 95% CI = 1.029; 2.868) than individuals in classes A/B (Table 4).

Table 4. Impact on quality of life related to the need for endodontic treatment according to socioeconomic status.

Dimension	A/B		C/D/E		p-value	OR
	N	%	N	%		
Functional Limitation						
With impact	12	36.4	21	63.6	0.449	1.125 (0.530-2.384)
No impact	94	33.7	185	66.3		
Physical Pain						
With impact	76	36.2	134	63.8	0.145	1.361 (0.817-2.268)
No impact	30	29.4	72	70.6		
Psychological Discomfort						
With impact	79	33.3	158	66.7	0.385	1.125 (0.653-1.937)
No impact	27	36.0	48	64.0		
Physical Disability						
With impact	57	36.8	98	63.2	0.179	1.282 (0.802-2.050)
No impact	49	31.2	108	68.8		
Psychological Disability						
With impact	52	35.6	94	64.4	0.325	1.147 (0.718-1.834)
No impact	54	32.5	112	67.5		
Social Incapacity						
With impact	37	43.0	49	57.0	0.027	1.718 (1.029-2.868)
No impact	69	30.5	157	69.5		
Disability						
With impact	24	34.8	45	65.2	0.490	1.047 (0.597-1.837)
No impact	82	33.7	161	66.3		
Mantel-Haenszel					0.190	1.510 (0.704-3.240)

When analyzing the variable related to the use of dental services, it was found that 61% of individuals who had access to dental services through the NHS or who did not have access to any service reported suffering an impact on the psychological disability dimension, with 1.8 times more odds of suffering an impact on this dimension (p=0.007; OR=1.805; 95% CI = 1.149; 2.834) than users of private services or dental plans (Table 5).

Table 5. Impact on quality of life related to the need for endodontic treatment according to type of access to dental services.

Dimension	NHS/No Access		Private/Plan		p-value	OR
	N	%	N	%		
Functional Limitation						
With impact	19	57.6	14	42.4	0.365	1.219 (0.588-2.527)
No impact	147	52.7	132	47.3		
Physical Pain						
With impact	112	53.3	98	46.7	0.522	1.016 (0.632-1.632)
No impact	54	52.9	48	47.1		
Psychological Discomfort						
With impact	125	52.7	112	47.3	0.438	1.080 (0.642-1.820)
No impact	41	54.7	34	45.3		
Physical Disability						
With impact	88	56.8	67	43.2	0.127	1.330 (0.852-2.078)
No impact	78	49.7	79	50.3		
Psychological Disability						
With impact	89	61.0	57	39.0	0.007	1.805 (1.149-2.834)
No impact	77	46.4	89	53.6		

Social Incapacity						
With impact	53	61.6	33	38.4	0.043	1.606 (0.967-2.666)
No impact	113	50.0	113	50.0		
Disability						
With impact	42	60.9	27	39.1	0.095	1.493 (0.866-2.574)
No impact	124	51.0	119	49.0		
Mantel-Haenszel					0.538	1.027 (0.520-2.025)

The results of the Mantel-Haenszel combined tests showed no statistically significant relationships for any of the independent variables analyzed.

Discussion

This study found that a high percentage of participants requiring endodontic treatment reported an impact on their quality of life (87.8%), a result higher than that found in a study assessing the impact of oral problems [13]. The high incidence of dental pain leading to the need for endodontic treatment may explain this finding. Previous studies have also shown that the quality of life and psychological well-being of patients requiring endodontic treatment are impaired [14,15]. Difficulties related to access to endodontic therapy and comprehensive care remain a challenge for the Unified Health System and ultimately affect the quality of life of those in need of treatment.

The areas most frequently reported by the participants were psychological discomfort (76%) and physical pain (67.3%), which is consistent with another finding [15]. Oral problems are usually associated with discomfort and painful symptoms, which can cause psychological distress to individuals and significantly affect their quality of life [16].

Given the psychosocial impact of the painful condition, the diagnosis and care of the patient should be carried out with an empathetic and welcoming approach [17]. Knowing the individual's perspective on their oral health condition and how it affects their daily activities can change the professional's technical stance on the health-disease process, add a humanistic approach to clinical practice, and thus contribute to the formation and strengthening of the bond between professionals and patients. When patients are listened to and their opinions are respected, bonds are created and users entrust their demands to the service, making integrality, a principle of the NHS, a reality [17].

There was a statistically significant association between the need for endodontic treatment and quality of life with the sociodemographic factors analyzed in four of the seven domains of the OHIP-14: psychological discomfort, psychological incapacity, social incapacity, and disability. This highlights the importance of analyzing subjective and psychometric parameters, using sociodental indicators to assess health, in order to understand how oral health problems affect the quality of life of the population.

This study included a greater number of women in the sample and there was a greater impact on QOL associated with women. This is a common finding that can be explained by taking into account the socio-cultural context, in which women are historically more associated with the act of caring (personal and family) and, therefore, seek more health services and report more morbidities [18].

It should also be considered that appointments at the BDA-ES endodontic clinic were made during working hours and on working days, which contributed to the lower demand for treatment among male workers. This result also confirms that other studies found the impact of oral health on quality of life predominantly for women [12,13,18,19].

In this study, no statistically significant association was found between age group and impact. This result is in agreement with another author who points to the relationship between advancing age and greater impact on QOL due to the accumulation of health problems with advancing age [11]. Approximately 28.2% of the population seek dental care only when they experience pain [20]. Considering that the majority of the sample in this study consisted of individuals up to 44 years of age, it is assumed that the lower demand for endodontic treatment in the older age groups is due to the fact that this population contingent consists of partially edentulous individuals.

The greater impact reported by individuals living alone (single, separated, divorced and widowed) compared to those who are married or living with a partner supports the evidence that a lonely marital situation can affect the quality of life [21].

There is evidence of greater survival and lower incidence of health problems among married individuals compared with unmarried individuals. Several hypotheses attempt to explain this protective effect of being married. The main explanatory model is related to social support and also that living together may lead to healthier lifestyle habits [21,22].

Non-white individuals reported greater effects than white individuals in the areas of social inability and disability. Studies have already highlighted racial disparities in oral health in Brazil, with the black population (black and brown) being more vulnerable than whites [23]. Despite progress, there is still a marked contrast between whites and blacks in terms of material rewards (salaries), lack of sanitation, and issues of violence that ultimately affect their lives, especially their health conditions [23].

Social indicators have shown that the black population has worse educational, health, income, and housing outcomes, more illnesses, including mental illness, lives in areas without basic infrastructure, and has less access to health services [23]. The disparities in access to health services for the black population are also reinforced by data showing that medical care, consultations, health insurance, and dental care are more accessible to the white population [24].

When the impact was analyzed according to the participant's level of education, it was found that individuals with 13 or more years of education reported a greater impact than individuals with less education. This finding differs from the literature, which indicates that less educated individuals have a greater impact on their daily activities [12,13,25,26]. It is assumed that higher levels of education would lead to more information and access to health services. However, it should be kept in mind that although the majority of the sample analyzed in this study consisted of more educated individuals, the majority also belonged to the C/D/E socioeconomic classes. Thus, schooling did not translate into income in this sample.

Individuals with less favorable socioeconomic conditions reported an impaired quality of life due to the need for endodontic treatment. These results are similar to those of other studies that have used subjective indicators to analyze the impact of oral health problems [11-13]. This fact reinforces the importance of social inequalities, especially income, as a factor influencing oral health-related quality of life, as individuals belonging to higher social classes who need treatment are likely to have easier access to this therapy through private dental services.

A greater negative impact on quality of life was associated with NHS users. In a study conducted in the State of São Paulo, 6.1% of adults who sought dental care in the public and private sectors required endodontic treatment. Among adults seeking dental care in the public sector, 53.3% required endodontic treatment, showing an association between the need for endodontic treatment and the use of public dental services by adults [15].

It should also be noted that individuals with a history of toothache were 1.6 times more likely to use public services than those without a history of toothache [27].

It should also be considered that this study was conducted during COVID-19 the pandemic, declared by the World Health Organization (WHO) on March 11, 2020, which affected the number and type of dental procedures performed worldwide [27,28]. Within the NHS, there was a reduction in the provision of dental care in all categories during the pandemic period. Emergency dental consultations and procedures in primary and specialty care services decreased by 42.5% and 44.1%, respectively, between 2020 and 2019. Non-emergency procedures decreased by 92.3%. A comparison of data from the Unified Health System's Outpatient Information System between April and June 2019 and 2020 showed an 88.4% decrease in the total productivity of services provided by primary and specialized care [28,29].

Given that the most vulnerable populations are the most dependent on the NHS, it is reasonable to assume that access to endodontic therapy during the pandemic has been impaired, especially among the less privileged, and that this has had a significant impact on the quality of life of this social segment. Given the reduction in the provision of all types of dental care over the past two years, in addition to the economic recession scenario that the pandemic has exacerbated, and the history of suppressed dental demand in the country, the post-pandemic period presents critical challenges for the NHS oral health network.

Although this study provides information on the impact of the need for endodontic treatment on quality of life and associations with sociodemographic variables, its limitations must be considered. Because of the cross-sectional design, the results obtained are hypothesis-generating regarding associated factors, but do not have the power to make causal inferences. Behavioral variables and measures of self-esteem were also not assessed. In addition, the results obtained should be interpreted with caution since the sample was obtained from a school clinic and therefore the findings may only be applicable to the population in question.

The solution to the high prevalence of impact on quality of life associated with the need for endodontic treatment is linked to access to comprehensive dental care, including expanding the supply of specialized treatment, especially for groups with unfavorable socioeconomic backgrounds. Given the impact that the lack of access to dental services imposes on a significant portion of the population, generating not only physical but also psychological, economic and social limitations, the importance of implementing actions aimed at strengthening dentistry in the NHS is highlighted.

Conclusion

The need for endodontic treatment has a significant impact on quality of life, as stated by 87.8% of the participants, especially in the psychological discomfort (76%) and physical pain (67.3%) domains. These findings were associated with the following sociodemographic variables: gender, race/color, marital status, schooling, socioeconomic status and type of access to oral health services. The predilection for impact was associated with individuals who were female, non-white, living without a partner, who had studied for 13 years or more, belonging to classes C/D/E and who had access to oral health services through the SUS or who did not have access.

Authors' Contributions

BSA	https://orcid.org/0000-0002-0507-3079	Conceptualization, Methodology, Investigation, Writing - Original Draft and Writing - Review and Editing.
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WGB	https://orcid.org/0000-0002-2242-9006	Methodology and Writing - Review and Editing.

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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