

### Influence of anxiety and vital signs before dental treatment

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#### ABSTRACT

**Background:** In the dental field, the anxiety that patients experience before attending a dental appointment is a factor that has increased the rates of oral diseases. This could be because patients visit the dentist less frequently and, in many cases, when they already require specialized treatment. **Purpose:** The purpose of this research was to determine the levels of anxiety and how they influence the vital signs of patients. **Methods:** The population consisted of 217 patients who received dental care at a health center and accepted the informed consent provided. The Modified Corah Dental Anxiety Scale (MDAS) was used to determine the level of anxiety. Statistical tests, such as the chi-square test, logistic regression, and odds ratio, were used to determine whether anxiety influences vital signs and dental treatment success. **Results:** All patients showed anxiety, which was distributed as mild (24.9%), moderate (26.7%), high (7.4%), and severe or phobic (41%). Regarding vital signs, 61.8% of patients presented some alteration in blood pressure, 56.7% had alterations in heart rate, 12.4% showed low oxygen saturation levels, and 24% presented alterations in respiratory rate. Despite these factors, 98.6% of the treatments the patients underwent were successful, and only 1.4% were affected by the influence of anxiety. **Conclusion:** It was found that the patients presented anxiety at different levels, which affected the typical values of vital signs. However, this situation did not affect the success of the dental treatment.

**Keywords:** dental anxiety; dental care; vital signs

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#### INTRODUCTION

The population's oral health is vital to dental professionals, who dedicate tireless efforts to reduce the levels of oral disease.<sup>1</sup> However, in recent times, it has been observed that several factors influence people's decisions not to visit the dentist for routine checkups or specific treatments.<sup>2,3</sup>

One of these factors, which sometimes goes unnoticed, is the emotional, behavioral, or cognitive state of individuals, which manifests as anxiety toward the dentist. This anxiety significantly affects the individual's decision to seek dental care and, importantly, hinders the dentist–patient relationship, which has a significant impact on patients' oral health.<sup>4,5</sup>

Dental anxiety is considered a powerful predictor of caries risk. For this reason, this problem must be adequately studied and analyzed because it constitutes a constant with

which dentists work daily. Furthermore, it is essential to recognize that it directly affects patients' vital signs, which often poses additional challenges for the dentist.<sup>6,7</sup>

Research indicates that, on average, individuals with dental phobia endure 17.3 days of pain before seeking dental care, presenting a significant concern for dentists as its prevalence continues to rise. It is estimated that between 5% and 20% of dental visits are prompted by patient anxiety stemming from negative experiences, either from their own past visits or those of their family members. This underscores the importance of effectively addressing and managing this issue.<sup>8,9</sup>

Dental anxiety is highly prevalent, with rates ranging from 4% to 23% in European countries, and it is widespread in the UK. Likewise, in Indonesia, around 20–30% of subjects felt fear and anxiety toward dental treatments. In the United States, between 10 and 12 million people have

severe dental phobia, which is considered the most severe form of dental anxiety. In addition, 35 million people suffer from dental anxiety in general. In South America, studies reveal a rate of 34.7% in preschool children, and parents of these children have also been found to have a high incidence of dental anxiety, reaching 41.1%.<sup>10,11</sup>

As illustrated, dental anxiety has a significant global impact. In Ecuador, numerous studies have indicated a prevalence of severe anxiety that reaches up to 39%.<sup>12</sup> This leads to a decline in oral health, increasing untreated cavities and affected teeth. It has been observed that dental anxiety is a crucial factor in predicting the risk of cavities, which explains the high rate of oral diseases in the country.<sup>13</sup>

Dental anxiety is characterized by subjective feelings of worry or distress or a negative outlook toward dental treatment. This situation triggers various signs and symptoms, including general malaise, nausea, restlessness, increased muscle tone, increased heart and respiratory rate, hyperventilation, and elevated blood pressure. These sensations interfere with dental care and affect people’s quality of life. Given this situation, dental professionals have developed various techniques and tools to reduce anxiety levels in patients, improve the relationship between the dentist and the patient, and, consequently, improve oral health.<sup>14,15</sup>

Considering that dental anxiety is a problem with a significant impact on society and has a direct influence on oral health, this research focused on determining the level of dental anxiety in patients and analyzing if there is any influence on vital signs and the success of dental treatment in those who come to a health center. For this purpose, the Modified Corah Dental Anxiety Scale (MDAS) was used to evaluate patients’ anxiety in the face of dental procedures, examining its relationship with vital signs and the success of dental treatment.

MATERIALS AND METHODS

The research was a descriptive observational study with a nonexperimental cross-sectional design. To determine the sample size of the population, the STATCALC EPI INFO statistical calculator (version 7.2.5.0) was used with a confidence level of 95%, a precision of 5%, and an expected frequency of 77.4%. The sample comprised 217 patients aged between 18 and 40 years who received dental care at the Morete Puyo Health Center from November to December 2022. The inclusion criteria were established as patients within that age range and who did not present clinical conditions that altered their vital signs, such as hypertension, anxiety, or pregnancy.

For data collection, a questionnaire was used that included sociodemographic questions, such as sex, age, socioeconomic level, and the type of treatment they were receiving at the dental care service. The MDAS was used to determine the level of dental anxiety. This scale

consists of five questions that assess situations related to dental treatment and trigger feelings of dental anxiety. The questionnaire consists of five response options on a Likert-type scale: always calm (1), almost always calm (2), sometimes calm (3), almost never calm (4), and uneasy (5). After quantifying the responses, they were categorized as follows: mild or no anxiety (fewer than 9 points), moderate anxiety (9-12 points), high anxiety (13-14 points), and severe anxiety or phobia (15 points or more).<sup>16</sup>

The survey was conducted in the waiting room while patients were waiting to be called by the dentist. During this time, the procedure was clearly explained, and they were asked if they had high blood pressure or previously diagnosed anxiety or if any woman was pregnant. The survey was only addressed to those who met the inclusion criteria and signed the informed consent form. Once the care was completed, the patient’s medical history was reviewed to record the type of treatment received and vital signs. Additionally, the dentist was asked whether they considered the treatment successful or not to establish a correlation between the anxiety and dental treatment. Furthermore, the protocol was evaluated and approved by the Human Research Ethics Committee of the Universidad Autónoma de los Andes (CEISH-UNIANDES) with registration number 2022-INT-RM-008.

After collecting the data, the responses from the participants were tabulated and then calculated to determine the level of anxiety. A similar analysis was also conducted with the vital signs data. Finally, with the results obtained, statistical analysis using SPSS Statistics (version 29) was performed. Statistical tests, such as the chi-square test, logistic regression, and odds ratio, were used to determine whether anxiety influences vital signs and dental treatment success.

RESULTS

A total of 217 patients with a mean age of 26.82 ± 7.33 years participated in the study. Of these, 63.6% were female and 36.4% male. The most representative age group was 18-25 years (50.2%) (Table 1).

The total average anxiety score obtained was 13.44 ± 5.92. When analyzing the results by gender, it was observed that the average total score for males was 13.43 ± 6.74, while for females, it was 13.28 ± 5.42. Although males had slightly higher scores, indicating a greater propensity to

Table 1. Characteristics of participants (n = 217)

		n (%)
Age; mean ± SD		Min = 18, Max = 40; 26.82 ± 7.33
Age groups	18-25 years old	109 (50.2)
	26-33 years old	59 (27.2)
	34-40 years old	49 (22.6)
Gender	Male	79 (36.4)
	Female	138 (63.6)

n: frequency

experience anxiety in the variables measured, this difference was not statistically significant ( $p = 0.292$ ) (Table 2).

It was observed that 61.8% of patients had some alteration in blood pressure, with 35.9% having high blood pressure and 25.8% having low blood pressure. The mean heart rate was  $79.06 \pm 10.51$  beats per minute. In addition, 56.7% of patients showed alterations in heart rate, with 46.6% having a high heart rate and 10.1% having a low heart rate. As for oxygen saturation, the mean was  $97.76 \pm 1.53\%$ . Oxygen saturation levels were found to be low in 12.4% of patients. Finally, the mean respiratory rate was  $19.18 \pm 2.18$  breaths per minute. It was observed that 24% of the patients had alterations in respiratory rate, with 14.7%

showing a high respiratory rate and 9.2% a low respiratory rate (Table 3).

Patients received a variety of treatments, with the most common being surgery (35%), restoration (48.4%), periodontal treatment (14.7%), endodontics (1.4%), and stitch removal (0.5%). Restorative treatment was the most frequently performed. It was observed that 50.2% of patients showed signs of anxiety or fear before the treatment. However, only 1.4% of the patients experienced some difficulty during treatment, while most (98.6%) had successful treatment. This indicates that the dentist effectively managed episodes of anxiety, which are common in dental clinics (Table 4).

**Table 2.** Results by gender of the anxiety survey (MDAS)

	Survey	Total n = 217	Men (n = 79)	Women (n = 138)	p
Anxiety: Visiting the dentist	Always calm	122 (56.2%)	42 (53.2%)	80 (58%)	0.363
	Almost always calm	50 (23%)	17 (21.5%)	33 (23.9%)	
	Sometimes calm	17 (7.8%)	8 (10.1%)	9 (6.5%)	
	Almost never calm	3 (1.4%)	0 (0%)	3 (2.2%)	
	Uneasy	25 (11.5%)	12 (15.2%)	13 (9.4%)	
	Mean $\pm$ SD	$1.89 \pm 1.31$	$2.03 \pm 1.42$	$1.81 \pm 1.24$	NS
Anxiety: In the waiting room	Always calm	118 (54.4%)	39 (49.4%)	79 (57.2%)	0.278
	Almost always calm	41 (18.9%)	17 (21.5%)	24 (17.4%)	
	Sometimes calm	24 (11.1%)	9 (11.4%)	15 (10.9%)	
	Almost never calm	8 (3.7%)	1 (1.3%)	7 (5.1%)	
	Uneasy	26 (12%)	13 (16.5%)	13 (9.4%)	
	Mean $\pm$ SD	$2 \pm 1.37$	$2.14 \pm 1.46$	$1.92 \pm 1.31$	NS
Anxiety: In the dental chair	Always calm	61 (28.1%)	26 (32.9%)	35 (25.4%)	0.801
	Almost always calm	37 (17.1%)	13 (16.5%)	24 (17.4%)	
	Sometimes calm	41 (18.9%)	13 (16.5%)	28 (20.3%)	
	Almost never calm	13 (6%)	4 (5.1%)	9 (6.5%)	
	Uneasy	65 (30%)	23 (29.1%)	42 (30.4%)	
	Mean $\pm$ SD	$2.93 \pm 1.60$	$2.81 \pm 1.64$	$2.99 \pm 1.57$	NS
Anxiety: Before sharp instruments	Always calm	45 (20.7%)	18 (22.8%)	27 (19.6%)	0.426
	Almost always calm	51 (23.5%)	18 (22.8%)	33 (23.9%)	
	Sometimes calm	34 (15.7%)	8 (10.1%)	26 (18.8%)	
	Almost never calm	13 (6%)	4 (5.1%)	9 (6.5%)	
	Uneasy	74 (34.1%)	31 (39.2%)	43 (31.2%)	
	Mean $\pm$ SD	$3.09 \pm 1.57$	$3.15 \pm 1.66$	$3.06 \pm 1.53$	NS
Anxiety: When injecting anesthesia	Always calm	42 (19.4%)	18 (22.8%)	24 (17.4%)	0.421
	Almost always calm	26 (12%)	11 (13.9%)	15 (10.9%)	
	Sometimes calm	39 (18%)	13 (16.5%)	26 (18.8%)	
	Almost never calm	17 (7.8%)	3 (3.8%)	14 (10.1%)	
	Uneasy	93 (42.9%)	34 (43%)	59 (42.8%)	
	Mean $\pm$ SD	$3.43 \pm 1.58$	$3.30 \pm 1.65$	$3.50 \pm 1.54$	NS
Total average anxiety	Slight or none	54 (24.9%)	25 (31.6%)	29 (21%)	0.292
	Moderate	58 (26.7%)	17 (21.5%)	41 (29.7%)	
	High	16 (7.4%)	5 (6.3%)	11 (8%)	
	Severe or phobic	89 (41%)	32 (40.5%)	57 (41.3%)	
	Mean $\pm$ SD	$13.34 \pm 5.92$	$13.43 \pm 6.74$	$13.28 \pm 5.42$	NS

Notes: SD: standard deviation; n: frequency; p: probability; NS: not significant

**Table 3.** Vital signs

Vital signs	n (%)
Blood pressure	Normal 83 (38.2)
	High 78 (35.9)
	Low 56 (25.8)
Heart rate	Normal 94 (43.3)
	High 101 (46.6)
	Low 22 (10.1)
Oxygen saturation (SaO <sub>2</sub> )	Normal 190 (87.6)
	Low 27 (12.4)
Respiratory rate	Normal 165 (76.0)
	High 32 (14.7)
	Low 20 (9.2)

n: frequency

**Table 4.** Treatment-related characteristics

Treatment	n (%)
Treatment undergone	Surgery 76 (35)
	Restoration 105 (48.4)
	Periodontal treatment 32 (14.7)
	Endodontics 3 (1.4)
	Other: removal of stitches 1 (0.5)
Request to the dentist	
Signs of anxiety or fear at the time of treatment	Yes 109 (50.2)
	No 108 (49.8)
Was the treatment successful?	Yes 214 (98.6)
	No 3 (1.4)

n: frequency

**Table 5.** Association between vital signs and anxiety levels

Variable		Presence of anxiety (Score $\geq 9$ )	P value (Sig)* < 0.05
Blood pressure	Normal	Reference	
	High	13.91 (5.71 – 33.88)	0.000**
	Low	11.42 (4.41 – 29.61)	0.000**
Heart rate	Normal	Reference	
	High	2.13 (1.13 – 4.00)	0.018*
	Low	2.66 (0.83 – 8.52)	0.089 <sup>ns</sup>
Respiratory rate	Normal	Reference	
	High	4.83 (1.41 – 16.5)	0.007**
	Low	2.83 (0.79 – 10.08)	0.095 <sup>ns</sup>
Oxygen saturation (SaO <sub>2</sub> )	Normal	Reference	
	Low	12 (1.59 – 90.51)	0.003**
Treatment	Success	Reference	
	Unsuccessful	1.28 (0.11 – 14.41)	0.839 <sup>ns</sup>

Notes: \* Sig 95%; \*\* Sig 99%; <sup>ns</sup> Not significant

It was possible to determine the probability of risk between blood pressure, heart rate, respiratory rate, and oxygen saturation with anxiety levels in the dental practice. From this, it could be determined that high blood pressure ( $p = 0.0001$ ), low blood pressure ( $p = 0.0001$ ), high heart rate ( $p = 0.018$ ), high respiratory rate ( $p = 0.007$ ), and low oxygen saturation ( $p = 0.003$ ) are risk factors for anxiety (Table 5).

## DISCUSSION

Dental anxiety is currently an essential topic of study, as high levels of anxiety negatively affect the success of dental treatment by distorting the relationship between dentist and patient.<sup>17,18</sup> In this context, this research aimed to analyze the influence of different anxiety levels on vital signs and the success of dental treatment for patients attending the health center. Thus, a survey based on the MDAS was administered to each patient before they were attended to by the dentist, pre-treatment vital signs were recorded, and three questions were asked of the treating dentist.

Using the MDAS made it possible to determine the level of anxiety in 217 patients before they visited the dentist. It was observed that, despite being a minority population, men were more likely to be anxious, which differs from other studies where higher levels of anxiety were found in women.<sup>9,19,20</sup> It is important to note that anxiety is a personal issue that can be influenced by past experiences and may affect a patient's behavior at the dentist's office.<sup>21</sup>

On the other hand, according to the MDAS used in this study, it was observed that all patients surveyed experienced some level of anxiety, either mild (24.9%), moderate (26.7%), high (7.4%) or severe (41%). However, previous studies, such as that of García et al.,<sup>22</sup> found that 91.43% of patients did not show anxiety, while 8.57% did experience anxiety. Similarly, Ríos-Erazo et al.<sup>23</sup> reported that 37.9% of participants showed anxiety, while 62.1% did not. Anzar et al.<sup>24</sup> showed that 92% of their study population did not present anxiety, while 8% did experience anxiety. These

results differ from those obtained in the present study, possibly due to factors that were not accounted for in the population, such as sociodemographic characteristics, age, socioeconomic level, and educational level. In addition, it is essential to mention that anxiety, having a diverse and multifactorial etiology, can be influenced by various aspects that the patient experiences before being seen by the dentist, such as the clinical environment, the type of dental treatment, the treatment received in the establishment, and, not least, the patient's personal emotional condition.<sup>25</sup>

Furthermore, when relating anxiety to vital signs, patients with altered blood pressure, high heart rate, high respiratory rate, and low oxygen saturation were found to be at increased risk for anxiety. These findings are consistent with other studies that have demonstrated the influence of anxiety on vital signs during dental procedures. For instance, García et al.<sup>22</sup> observed an elevation of average blood pressure values, oxygen saturation, heart rate, and temperature before and during the exodontic procedure.

Nevertheless, in this research, it was observed that the majority of dental treatments were successful, and there was no significant relationship between anxiety levels and treatment success. Almost all treatments were successful ( $p = 0.839$ ), with only three that were not. It should be noted that although few cases were unsuccessful, dental anxiety can be a significant obstacle to successful dental treatment, especially in older adult patients.<sup>26</sup> However, by being open and gentle, the dentist can establish a good relationship with the patient, avoiding difficulties affecting the treatment outcome.

It is important to note that this is the first study on patients treated in this region, particularly at this health center. Therefore, further research is necessary to establish a correlation between the sociodemographic factors of this population, anxiety, and the effectiveness of dental treatment over time through follow-up.

In conclusion, it was observed that most patients experienced some level of anxiety and changes in their vital signs. However, these factors did not affect the success of the patient's treatment.



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