MEDICAL UNIVERSITY

„Prof. Dr. Paraskev Stoyanov“ - Varna“

FACULTY OF DENTAL MEDICINE

Department of „Conservative dental treatment and oral pathology“

"Assessment of changes in HDT in patients with bulimia"

ABSTRACT

Of PhD Thesis for awarding the educational and scientific degree „DOCTOR“

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The dissertation consists of 170 pages and is illustrated with 35 tables, 54 figures, and 6 appendices. The literature review includes 299 sources, of which 18 are in Cyrillic and 281 in Latin script.

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Scientific Jury:

Chair:

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The materials on the defense are available in the Scientific Department of MU - Varna and are published on the website of MU -Varna.

Note: The numbers of the figures and tables in the symmary do not correspond to the numbers in the dissertation.

CONTENT

ABBREVIATIONS USED

HDT - Hard Dental Tissues
BN - Bulimia Nervosa
AN - Anorexia Nervosa
MO - Microorganisms
OPG - Orthopantomography
DE - Dental Erosion
DH - Dentin Hypersensitivity
VAS - Visual Analogue Scale

I. INTRODUCTION

Bulimia nervosa is a psychosomatic disorder and one of the most common eating disorders of the 21st century, where appearance plays a leading role. It is an eating disorder associated with abnormal compensatory behavior, characterized by periods of excessive and uncontrollable consumption of large amounts of food, followed by various purging methods, the most common of which is self-induced vomiting.

Eating disorders not only have a negative impact on the overall physical condition of the body but also lead to significant consequences in the oral cavity. The most critical issue affecting oral health in patients suffering from bulimia nervosa (BN) is the recurrent episodes of self-induced vomiting, which dramatically lowers the measured pH level in the oral cavity. As a result of the demineralization of hard dental tissues (HDT), the most common damage observed is dental erosion, leading to irreversible loss of enamel and dentin.Some patients exhibit excessive oral hygiene maintenance, manifested in aggressive tooth brushing with abrasive toothpaste and a hard-bristled toothbrush, further contributing to the deterioration of dental tissues.

The increased frequency of carious lesions is also part of the clinical picture in patients with bulimia nervosa (BN). The number of carious lesions varies among individuals and is determined by several synergistically acting factors, including oral hygiene, the cariogenicity of the diet, malnutrition, fluoride exposure, genetic factors, and the use of various medications, such as antidepressants, which are known to reduce salivation, or appetite-suppressing agents.

Patients suffering from eating disorders, particularly BN, often experience changes in the quality and quantity of saliva, which compromises its protective functions and leads to negative consequences for oral health.

All these factors disrupt the balance in the oral cavity and result in irreversible consequences for hard dental tissues (HDT).

II. PURPOSE AND TASKS

PURPOSE:

The aim of the present study is to analyze the relationship between bulimia nervosa and deteriorating oral health, due to the role of self-induced vomiting as a leading risk factor, and to clinically examine the oral complications resulting from the disorder.

To achieve this objective, we have formulated the following tasks:

TASKS:

1. To analyze the properties of saliva in patients with bulimia nervosa by examining the following parameters: stimulated and unstimulated saliva, quantity, viscosity, pH, and buffering capacity, and to compare them with the parameters of a healthy control group.

2. To determine changes in the dental status of patients with bulimia nervosa.
   2.1. To examine the prevalence of primary and secondary carious lesions, filled teeth, and their localization.
   2.2. To assess the clinical presentation of erosive defects in hard dental tissues by evaluating their localization and size.

3. To investigate dentin hypersensitivity in patients with bulimia nervosa.

III. MATERAILS AND METHODS

Selection Criteria for Study Participants:

- Individuals over 18 years of age

- Individuals diagnosed with the eating disorder Bulimia Nervosa (BN) by a medical specialist

- Individuals who have signed informed consent

Exclusion Criteria:

- Individuals under 18 years of age

- Individuals who have not signed informed consent

- Individuals who do not suffer from Bulimia Nervosa

- Failure to comply with the given instructions before the study

Study Location:

- Clinical halls of "Conservative Dentistry and Oral Pathology" at the Faculty of Dental Medicine, Varna

- University Medical-Dental Center at the Faculty of Dental Medicine, Varna

The study was conducted during the period 2023-2024.

Materials and Methods for Task 1

To analyze the properties of saliva in patients with bulimia nervosa by examining the following parameters: stimulated and unstimulated saliva, quantity, viscosity, pH, and buffering capacity, and to compare them with the parameters of a healthy control group.

Study Subjects: A total of 60 patients

- 30 patients diagnosed with Bulimia Nervosa, without other severe systemic diseases, requiring dental treatment.

- 30 patients without the eating disorder Bulimia Nervosa, without other severe systemic diseases, requiring dental treatment – control group.

To analyze the properties of saliva in patients diagnosed with Bulimia Nervosa**,** the Saliva Check Buffer Kit (GC America) clinical test was used (Fig. 1). The assessment of saliva properties served not only for diagnostic purposes but also as a means of communication with patients and their motivation.

The Saliva Check Buffer Kit provides information on the level, viscosity, and consistency of unstimulated saliva, as well as the pH, quantity, and buffering capacity of stimulated saliva.

Fig. 1 *Saliva Check Buffer Test for tabletop assessment of saliva properties*

Each patient was instructed in advance not to smoke, consume food or beverages, brush their teeth, or use mouthwash for at least one hour before the visit.

The clinical test consists of five sequential steps, with the first three assessing the properties of unstimulated saliva, while the fourth and fifth steps evaluate stimulated saliva. The first test involves a visual inspection to determine the level of hydration, the second evaluates the consistency of resting saliva, and the third test measures the pH of unstimulated saliva. The fourth test is used to measure the quantity of stimulated saliva, while the fifth step determines the buffering capacity of stimulated saliva.

Materials and Methods for Task 2

To determine changes in the dental status of patients with bulimia.

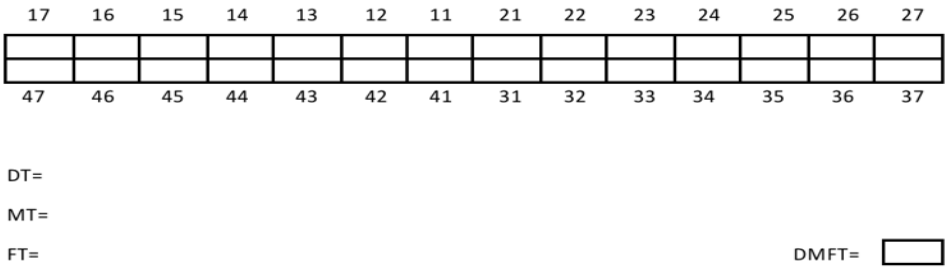
Materials and Methods for Task 2.1

To examine the prevalence of primary and secondary carious lesions, filled teeth, and their localization.

Study Subjects**:** 30 patients diagnosed with Bulimia Nervosa, without other severe systemic diseases, requiring dental treatment.

Each patient included in the study underwent a visual-tactile examination using a mirror and probe under proper lighting conditions.

The dental status of each patient was recorded in a specially designed ambulatory chart**.** The number and distribution of carious lesions were then assessed. The DMFT index (Decayed, Missing, and Filled Teeth) was used as the primary index for evaluating caries and determining the prevalence of carious lesions. The number of affected teeth was recorded, with carious, missing, and filled teeth recorded for each of the specified groups, with the final score representing the total sum.



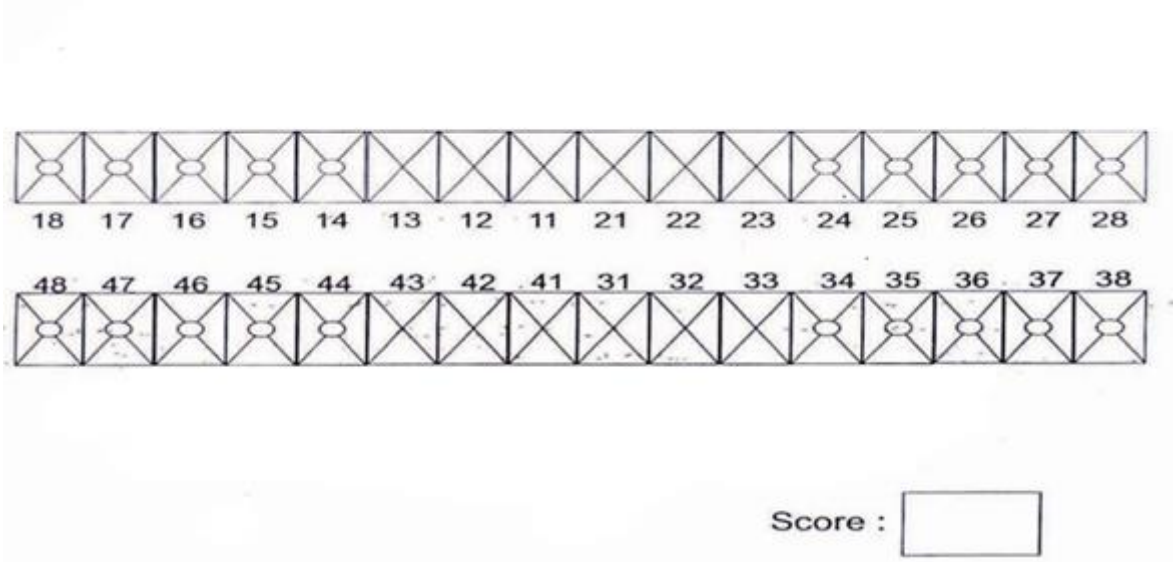
Appendix 1. *Ambulatory Chart for DMFT Index Calculation*

Due to the different progression rates of carious and non-carious processes in various tooth groups and surfaces, as well as the specific distribution of dental caries on certain surfaces in patients with bulimia nervosa, it was determined that the DMFS index is more appropriate for the purpose of this study.

The DMFS index is applied only to permanent teeth and provides more detailed information about the condition of hard dental tissues, as it divides the teeth into individual surfaces**.** Anterior teeth are divided into four surfaces: mesial, distal,

vestibular, and palatal/lingual, while posterior teeth are divided into five surfaces: mesial, distal, vestibular, palatal/lingual, and occlusal.

The total number of surfaces assessed is 128 or 148, depending on the presence of third molars and whether they are included in the study. The examined surfaces are recorded in a special ambulatory chart **(**Appendix 2).



Appendix 2. *Ambulatory Chart for Recording the Number and Distribution of Carious Lesions by Surface Using the DMFS Index.*

Materials and Methods for Task 2.2

To examine the clinical presentation of erosive defects in hard dental tissues, assessing their localization and size.

A prerequisite for conducting the study is good lighting and mandatory drying of the tooth surfaces to distinguish the early stages of dental erosion, which are difficult to detect.

For the diagnosis and assessment of erosive changes in hard dental tissues (HDT)**,** the BEWE index **(**Basic Erosive Wear Examination) is used. This is a four-point scale, ranging from 0 to 4, that measures the severity of dental erosion based on the extent of affected hard dental tissues.

The dentition is divided into six sextants. Each tooth is examined individually, but the highest score within each sextant is recorded. The final assessment is made by summing the individual scores, which are then recorded as a total score.

The BEWE index ranks the changes in hard dental tissues (HDT) and also provides an opportunity for managing the condition based on the severity of erosive changes**.**

Tabl.1 *BEWE Index - Criteria for Assessing the Loss of Hard Dental Tissues (HDT)*

Result	**Assessment Criteria**
0	**No erosive wear on tooth surfaces**
1	**Initial superficial loss of hard dental tissues (HDT), localized only in the enamel. Dentin is not affected**
2	**Clearly defined defect. Dentin is affected. Loss of HDT <50%**
3	**Dentin is affected. Loss of HDT ≥50%**

Tabl.2 *Risk Level and Condition Management*

Risk Level	**Cumulative Score from All Sextants**	**Management**
None	**≤2**	**Routine oral hygiene.** **Observation and index measurement every 3 years.**
Low	**3 - 8**	**Routine oral hygiene, dietary assessment, observation, index measurement every 2 years.**
Moderate	**9 - 13**	**Routine oral hygiene, dietary assessment.** **Identification of the primary etiological factor for HDT loss and development of a strategy for its elimination. Index measurement every 6-12 months.**
High	**≥14**	**Routine oral hygiene, dietary assessment.** **Identification of the primary etiological factor for HDT loss and development of a strategy for its elimination.** **Treatment through restorations.** **Index measurement every 6-12 months.**

Materials and Methods for Task 3

To investigate dentin hypersensitivity in patients with bulimia nervosa.

Study subjects: 30 patients diagnosed with bulimia nervosa, without other severe systemic diseases, requiring dental treatment. The selection and exclusion criteria for patients are the same as those described in the previous tasks. However, for this task, the following additional exclusion criteria were applied:

- Pregnant or breastfeeding patients;

- Patients who have undergone prior treatment for hypersensitivity in the last 3 months;

-Patients who have taken analgesics, antihistamines, anticonvulsants, sedative medications, or have undergone anti-inflammatory therapy in the last 72 hours;

- Carious, pulpitis-affected, devitalized, fractured teeth, as well as teeth with congenital defects or crowns, were excluded from the study.

Two methods were used in the study to provoke and assess dentin hypersensitivity: a tactile stimulus using a dental probe and a cold stimulus with an air jet from the dental unit.

The tactile stimulation was performed by gently moving the tip of a periodontal probe linearly from mesial to distal in the cervical region of the buccal surface of the tooth, applying moderate pressure to the surface. The probe was then moved in the same manner across the occlusal surfaces of posterior teeth and the palatal and lingual surfaces of both upper and lower teeth to ensure the assessment of all surfaces.

The cold stimulus was applied by directing an air jet from the dental unit perpendicularly from a distance of approximately 3-4 mm onto the cervical region of the tooth for a duration of three seconds. The air jet was then directed at 90 degrees to the occlusal/incisal surface of the tooth for another three seconds, followed by the assessment of the palatal and lingual surfaces.

After each stimulus, participants were instructed to report the intensity of pain using the visual analogue scale (VAS). The VAS consists of a line on which the patient moves a cursor from one end, representing "no pain," to the other end, representing "maximum pain." The scale is marked in millimeters, ranging from 0 to 100 mm, or in centimeters, from 0 to 10 cm.

The patient moves the slider according to their perception of pain, from "no pain" to "maximum pain." The intensity of pain, as determined by the patient, is then recorded. The interpretation of the scale is as follows:

- No pain: 0
- Mild pain: 1 to 3
- Moderate pain: 4 to 6
- Intense pain: 7 to 9
- Extremely intense pain: 10

4. Statistical Methods

The data was entered and analyzed using the advanced functions of the mathematical-statistical software package SPSS (SPSS Statistics v.22, developed by IBM Corp) and Microsoft Excel**,** utilizing the Data Analysis tool.

The applied statistical methods include a variety of techniques for data processing and interpretation, allowing for the extraction of significant and accurate results from the conducted studies. The methods used are an essential part of the analytical process to ensure the reliability of the conclusions, including:

- Analysis of Variance (ANOVA)
- Comparative Analysis
- Regression Analysis
- Variance Analysis of Quantitative Variables
- Correlation Analysis
- F-Test for Two Samples
- Graphical and Tabular Representation of the Obtained Results

In all conducted analyses, an acceptable significance level of $p<0.05$ was adopted, with a 95% confidence interval. This approach ensures a high degree of reliability and accuracy in the results, minimizing the probability of a Type I error.

IV. RESULTS AND DISCUSSION

Results for Task 1

For the completion of this task, the protocol for working with the in vitro test Saliva Check Buffer was strictly followed. The examination was conducted for all patients between 8:00 AM and 12:00 PM.

The calculated mean age of patients with bulimia nervosa was 27.7 years, and for the control group – 29.4 years.

The distribution of the results obtained for patients with BN and the control group for each of the five steps of the procedure is as follows:

Test 1 – Determining the level of hydration in patients with BN and the control group

In the test for determining the level of hydration, the time in seconds is measured for the appearance of saliva droplets around the minor salivary glands of the lower lip. The results are categorized into three groups based on the recorded time.

If the time for droplet formation exceeds 60 seconds, it indicates reduced salivary secretion. If the time ranges between 30 and 60 seconds, it suggests normal salivary flow. If the time is less than 30 seconds, it indicates increased salivary secretion.

Tabl. 3 *Comparative analysis of the results from testing the level of hydration in the two study groups, showing the number of examined patients, the mean values obtained, standard deviation, and the minimum and maximum measured values for each group.*

Study Group	Number of Participants	Mean Value ± SD	Min / Max
Patients with Bulimia	30	54.10 sec ±16.361	28 / 75 sec
Control Group	30	46.93 sec ±10.615	30 / 65 sec
Total	60	50.02 sec ±13.922	

Table 3 presents the results of the hydration level test in the two groups, which helps to track whether there are any deviations from the norm within the groups. It is notable that the values in the bulimia group are elevated, which provides grounds for a more detailed examination of the results.

For the purpose of the study, a comparative analysis of salivary secretion was conducted between the group of patients with BN and the control group of healthy individuals. The data was processed using Microsoft Excel, through which a bar chart was created to visualize the percentage distribution of results in both groups (Fig. 2).

The chart clearly illustrates the differences in salivary secretion between patients with bulimia and the control group, comparing three main categories: increased, normal, and decreased salivary flow.

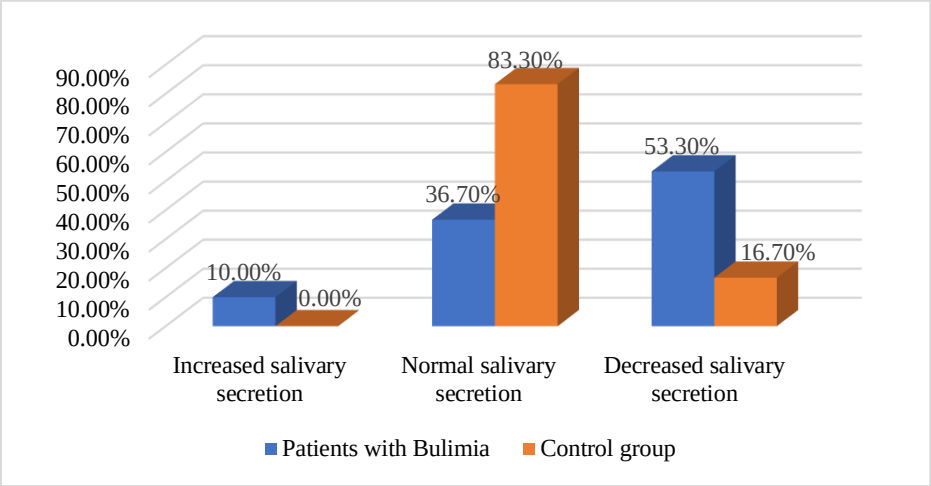


Fig. 2 *Comparative analysis of the results from the study on the level of hydration in the two groups*

The results of the conducted study indicate that patients suffering from bulimia nervosa are significantly more affected by reduced salivary secretion compared to the control group of healthy individuals. Decreased salivary secretion is observed in 53.3% of patients with bulimia, which is more than three times higher than in the control group, where it is 16.7%. This trend may be associated with the frequent episodes of vomiting in these patients, leading to damage to the salivary glands and a reduction in salivary flow, which can have serious negative consequences for oral health.

In the control group, 83.3% of the participants have normal salivary secretion, whereas among patients with BN this percentage is significantly lower (36.7%). This suggests that healthy individuals maintain normal salivary gland function, while the disorder has a negative impact on normal salivation. Increased salivary secretion is observed in only three of the patients with eating disorders examined in our study, while in the control group there are no cases of increased salivary flow.

Table 4 *One-Way ANOVA analysis for comparing the results between the group of patients with BN and the control group regarding the hydration level indicator*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	770.417	1	770.417	4.051	0.049
Within Groups	11030.567	58	190.182		
Total	11800.983	59			

Based on the obtained results, an ANOVA analysis was conducted to compare the results between the group of patients with BN and the control group, using a selected significance level of p-value = 0.05. Here, the Sig value is 0.049 and the F value is 4.05, indicating a significant difference between the two groups.

Test 2 – Visual assessment of resting salivary consistency

This test evaluates the quality, specifically the consistency, of resting saliva. It is performed through visual inspection of the viscosity of the saliva on the floor of the oral cavity after lifting the tongue. Figure 3 presents the results obtained from the study in patients with BN and the control group.

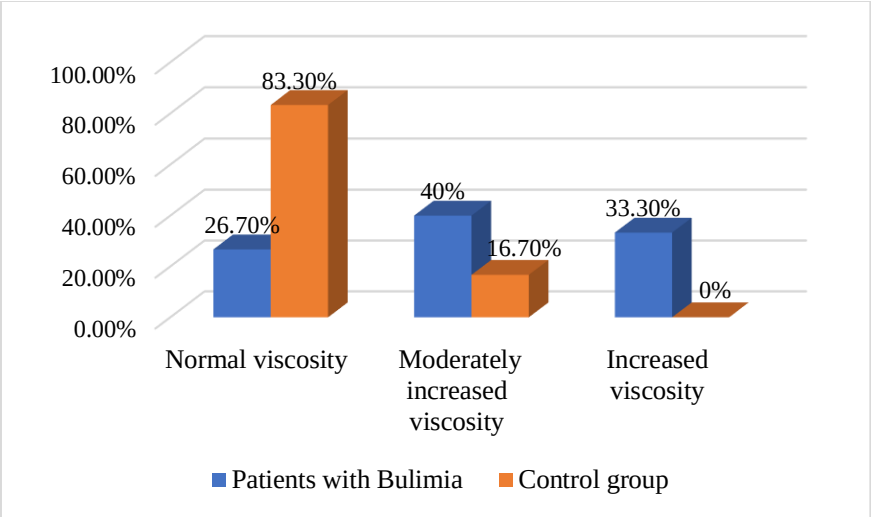


Fig. 3 *Comparative analysis of the results obtained from the assessment of salivary viscosity in the two study groups*

As seen in Figure 3, among patients suffering from BN, the highest percentage—40%—show moderately increased viscosity, characterized by foamy saliva with bubbles on the floor of the oral cavity. A total of 33.3% of the patients have increased viscosity, where the saliva appears thick and sticky, while the lowest percentage—26.7%—have normal salivary viscosity, with clear and watery saliva. In total, 73.3% of the examined BN patients show altered salivary quality compared to only 26.7% with normal viscosity. In the control group, 83.3% of the individuals have normal viscosity, with clear, watery saliva, and 16.7% show moderately increased viscosity. There are no cases of increased viscosity in the control group.

When comparing the results between the two study groups, it is found that only 26.7% of patients with bulimia have normal salivary viscosity, which is significantly

lower than in the control group. At the same time, the frequency of cases with altered salivary viscosity—moderately increased and increased—is higher in the bulimia group. This indicates that bulimia may lead to disturbances in the physiological characteristics of saliva.

Based on the obtained results, an ANOVA analysis was conducted, presented in Table 5.

Table 5 *One-Way ANOVA analysis for comparing the results between the BN patient group and the control group based on the salivary viscosity indicator.*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.150	1	12.150	31.983	0.000
Within Groups	22.033	58	0.380		
Total	34.183	59			

The statistical result p = 0.000 is lower than the selected p-value = 0.05 for this study, indicating that the difference between the groups is significant. The high F value of 31.983 further confirms a statistically significant difference in salivary viscosity between patients with bulimia nervosa (BN) and the control group. The conducted study clearly demonstrates that patients with bulimia show significantly more frequent deviations in salivary viscosity compared to the control group. These results confirm that the disorder has a negative impact on salivary viscosity.

Test 3 – Determination of pH in Unstimulated Saliva

For the purpose of this test, each patient from both study groups was asked to collect a certain amount of saliva in a specially designated measuring cup. Using the litmus strip from the test kit, the acidity of the saliva was determined by comparing the strip to the reference chart provided in the kit. Saliva pH values ranging from 6.8 to 7.8 indicate normal and healthy saliva. Measured pH values between 6.0 and 6.6 indicate moderate acidity, while values between 5.0 and 5.8 reflect high acidity of the saliva.

This test aims to assess and analyze the pH of unstimulated saliva in patients suffering from BN, as well as to compare these values with the salivary pH of healthy individuals in the control group.

Table 6 *Mean values obtained in the two study groups, standard deviation, minimum and maximum values*

Study Group	Number of Participants	Mean Value ± SD	Min / Max
Patients with Bulimia	30	6.06 ± 0.445	5.4 / 6.8
Control Group	30	6.86 ± 0.430	6.0 / 7.6
Total	60	6.46 ± 0.595	

In patients with bulimia, the average pH value is lower compared to the control group. The difference between the minimum values in the two groups is significant: 5.4 in the bulimia patients versus 6.0 in the control group. The maximum pH values in patients with bulimia are also considerably lower than those measured in the control group.

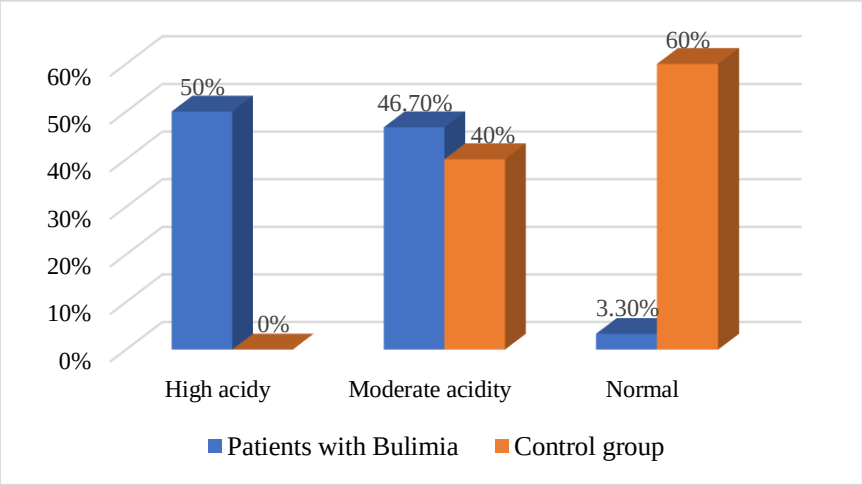


Fig.4 *Percentage distribution of the results obtained from measuring the pH of unstimulated saliva in the two study groups.*

The chart presented in Figure 4 demonstrates a significant difference in salivary acidity between patients with bulimia and the control group. While most healthy individuals maintain normal pH values, patients with bulimia show lower measured pH levels, making them more susceptible to sustaining an acidic oral environment and the associated risks. In the BN patient group, 50% of the examined individuals had high salivary acidity, 46.6% had moderate acidity, and only 3.3% showed normal salivary acidity.

The results obtained regarding resting salivary acidity in the control group show that 60% of the participants had normal pH and healthy saliva. The remaining 40% had moderate acidity, and none of the participants had measured high acidity.

An ANOVA analysis was performed to determine whether there is a significant difference between the two study groups.

Table 7 *One-Way ANOVA analysis for comparing the results between the BN patient group and the control group based on the salivary acidity indicator.*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.761	1	9.761	50.986	0.000
Within Groups	11.103	58	0.191		
Total	20.864	59			

The values obtained, shown in Table 7, indicate that $F = 50.986$ and $p = 0.000$, with a selected significance level of $p < 0.05$, demonstrating high statistical significance. This suggests that patients with bulimia have significantly lower mean pH values compared to the control group.

Test 4 – Measurement of Stimulated Saliva Quantity

This test aims to determine the amount of stimulated saliva in the two groups of examined patients. The results will be compared to identify the presence or absence of differences between the groups. For the purpose of the study, each patient chewed a piece of wax for 5 minutes, which stimulated salivation. The amount of saliva produced was then collected in a specially designated measuring cup.

Table 8 *Number of examined patients, mean value with standard deviation, and minimum and maximum values obtained in the two study groups*

Study Group	Number of Participants	Mean Value in ml ± SD	Min / Max
Patients with Bulimia	30	5.14ml ± 0.798	3.5ml/ 7.0ml
Control Group	30	5.97ml ± 0.842	4.0ml/ 7.5ml
Total	60	5.55ml ± 0.915	

As seen in Table 8, the mean measured amount of saliva in the BN patient group is 5.14 ml, with values above 5 ml considered within the normal range. The minimum measured amount is 3.5 ml, and the maximum is 7.0 ml.
In the control group, the mean value is 5.97 ml, indicating a normal amount of stimulated saliva. The minimum recorded value is 4.0 ml, and the maximum is 7.5 ml.

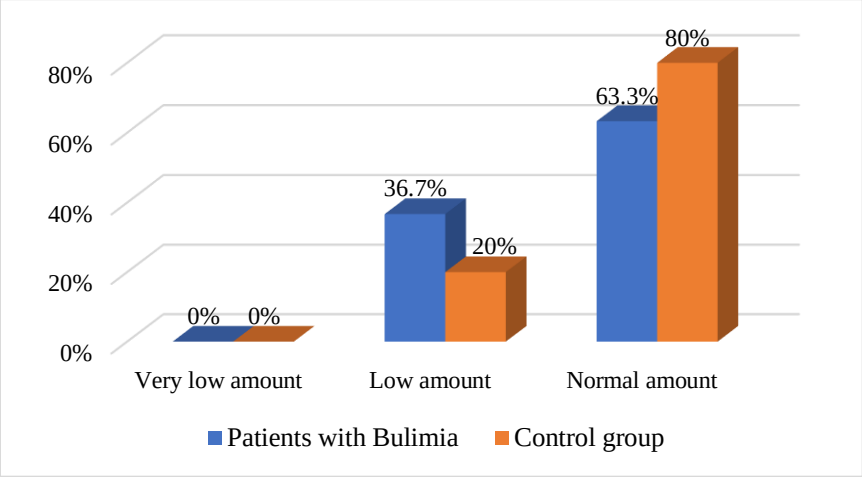


Fig. 5 *Comparative analysis of the results from the measurement of stimulated saliva quantity in the two study group*

As seen in Figure 5, the highest proportion of patients in both groups are classified in the category with a normal amount of saliva. In the BN patient group, 63.3% of the participants were found to have a normal amount of saliva. In the control group, 80% of the participants showed normal levels of stimulated saliva. In the category with low saliva quantity, 36.7% of the bulimia group are classified, while in the control group, low saliva quantity was observed in only 20% of the participants. It is notable that none of the patients in either group exhibited markedly low levels of stimulated salivary secretion, which, according to the test guidelines, is defined as a volume below 3.5 ml. The majority of patients in both groups had a normal amount of stimulated saliva.

The values obtained in this test for the two groups are relatively close. A one-way ANOVA was conducted to compare the mean values between the two groups, yielding the following result: $p = 0.157$. This value is significantly higher than the selected $p < 0.05$, indicating that, in terms of the stimulated saliva quantity, there is no statistically significant difference between the two groups. Therefore, we can conclude that the BN condition does not affect the amount of stimulated saliva produced (Table 9).

Table 9 *ANOVA analysis for comparing the results between the BN patient group and the control group based on the measured quantity of stimulated saliva*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.417	1	0.417	2.054	0.157
Within Groups	11.767	58	0.203		
Total	12.183	59			

Test 5 – Determination of the Buffering Capacity of Stimulated Saliva

Test 5 involved the evaluation of the buffering capacity of each participant from both study groups. The primary aim was to examine and analyze the saliva of patients with BN and compare it to that of healthy individuals in the control group, in order to assess its ability to effectively neutralize acids, restore normal pH levels, and, as a result, evaluate its protective functions. The results obtained are presented in the following tables and figures.

Table 10 *Number of examined patients, mean value with standard deviation, and minimum and maximum values obtained in the two study groups*

Study Group	Sample Size	Mean Buffering Capacity ± SD	Min / Max Buffering Capacity
Patients with Bulimia	30	6.00 ±1.389	4 / 9
Control Group	30	8.97 ±1.245	7 / 11
Total	60	7.48 ±1.987	

From Table 10, which presents data on the buffering capacity in the two study groups, it can be observed that the mean value for patients with BN is 6.00 with a standard deviation of 1.389. In contrast, the buffering capacity in healthy individuals from the control group is significantly higher, with a mean value of 8.97 and a standard deviation of 1.245. The minimum measured value in the first group is very low—4, while the maximum is 9. In the control group, the minimum value is considerably higher—7, and the maximum reaches 11.

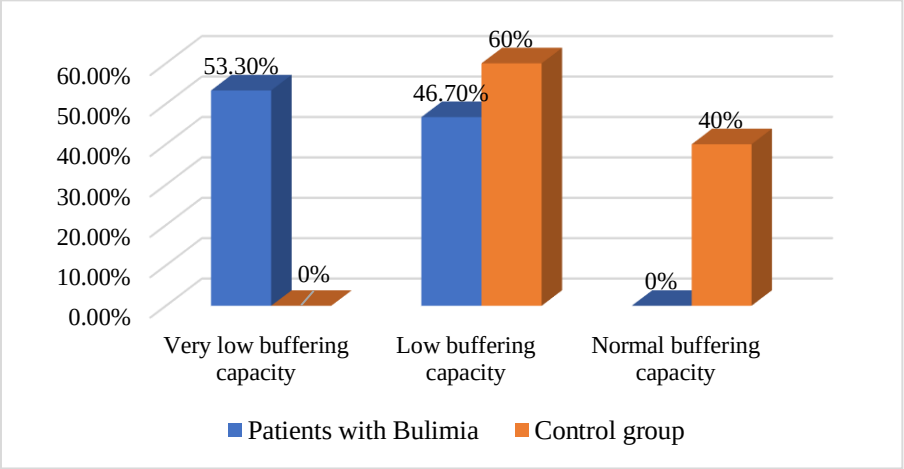


Fig. 6 *Comparative analysis of the results obtained from the measurement of buffering capacity in the two study groups.*

The comparative analysis regarding the buffering capacity indicator is presented graphically in Figure 6. It demonstrates that within the BN group, patients with a measured very low buffering capacity predominate, constituting the highest percentage. These patients account for more than half of the examined individuals in this group—53.3%—while in the control group, no participants with a very low buffering capacity were identified.

This finding indicates a significantly lower buffering capacity among individuals diagnosed with bulimia nervosa. Within the bulimic group, the remaining participants exhibited a low buffering capacity (46.6%). Notably, none of the patients with bulimia fell into the category of normal buffering capacity, underscoring impaired protective functions of saliva among these patients.

Conversely, the control group demonstrated considerably different results. Here, 60% of the subjects exhibited a low buffering capacity, suggesting that most control subjects have reduced—but not critically diminished—buffering capacity. The remaining 40% of participants were found to have normal buffering capacity, indicating substantially better protective saliva functions among healthy individuals. Furthermore, there were no participants in the control group who exhibited a very low buffering capacity.

Table 11. *Analysis of variance (ANOVA) comparing saliva buffering capacity results between the group of patients with BN and the control group*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	132.017	1	132.017	75.837	0.000
Within Groups	100.967	58	1.741		
Total	232.983	59			

Table 11 presents the results of a one-way analysis of variance ANOVA examining the differences between the two groups. The obtained F-test value is 75.837, indicating a high result, with a significance level Sig. of 0.000. This demonstrates that the difference between the two groups is statistically significant, with a probability of error less than 0.001.

Based on these findings, we can conclude that there is a significant alteration in saliva buffering capacity within the BN group, shifting toward low and very low levels. Thus, a substantial difference is observed between the two groups regarding the analyzed indicator—buffering capacity of stimulated saliva.

Discussion of Results for Task 1

The current clinical study aims to analyze and comparatively assess specific clinically measurable parameters of saliva in patients suffering from bulimia nervosa (BN), compared to a control group of healthy individuals. The primary objective of this research is to identify particular alterations in the composition and properties of saliva that arise as a consequence of the disease, assess their impact on oral health, and explore the potential role these changes might play in the pathogenesis of dental hard tissue disorders.

It is well recognized that saliva is considered the most significant biological factor for preventing dental hard tissue diseases such as dental caries and erosion. Saliva plays a central role in diluting, neutralizing, buffering, and eliminating acids; it participates in the processes of demineralization and remineralization by providing calcium, fluoride, and phosphate ions; it is involved in forming the acquired dental pellicle, serving as a protective barrier or "protective membrane." When disturbances occur in the qualitative composition and functional properties of saliva, its protective mechanisms become compromised.

Furthermore, it is well-established and supported by numerous scientific studies that one of the critical clinical indicators for evaluating salivary function is salivary flow rate. This parameter is fundamental, as it directly influences all other characteristics of saliva.

1. Regarding the first investigated parameter—the assessment of salivary hydration level—we found that patients diagnosed with BN demonstrated a significantly higher frequency of reduced salivary secretion, which could have serious negative implications for oral health. Compared to the control group, which predominantly exhibited normal levels, patients diagnosed with BN are at greater risk for dysfunction of the salivary glands. This suggests that the disease negatively affects the natural protective mechanisms in the oral cavity. Our findings align with other studies, such as the research conducted by Kisely et al. (2015), which examined changes in salivary flow among patients diagnosed with eating disorders, including BN. Similar results were also reported by Roberts et al., who observed decreased unstimulated salivary flow in patients diagnosed with BN compared to healthy controls.

The statistical analysis of our results indicates that the differences between the two groups are statistically significant. Regarding salivary hydration level, we rejected the null hypothesis in favor of the alternative hypothesis, as the proportion of patients

diagnosed with bulimia nervosa exhibiting impaired salivary secretion was higher compared to the control group.

These data highlight the association between bulimia nervosa and functional disturbances in salivary secretion, which in turn may be a critical factor in the development of various oral pathologies. Assessing salivary secretion represents an important diagnostic method for patients diagnosed with bulimia nervosa, allowing an objective evaluation of the functional status of salivary glands. Monitoring and analysis of salivary flow could serve as a significant predictor for the risk of developing dental erosions and caries, which are among the most common pathologies associated with this eating disorder. Early detection of deviations in salivary secretion through systematic monitoring could facilitate the implementation of preventive and therapeutic measures aimed at preserving oral health.

2. In Test 2, we investigated salivary viscosity in the two groups. The results indicate that patients diagnosed with BN exhibited a higher percentage of cases with moderately increased and increased saliva viscosity compared to the control group, in which normal viscosity predominated. Based on these findings, we established that saliva in patients diagnosed with eating disorders associated with vomiting presents altered characteristics—specifically, a thicker and more adhesive consistency—which compromises its protective functions.

Viscous saliva impairs the neutralization of acids in the oral cavity, disrupts buffering properties, and hinders the self-cleansing of dental surfaces from food debris and microorganisms. These factors further elevate the risk for dental caries and erosion development. Our results align with the study conducted by M. Koleva (2020), which also identified deviations from normal saliva viscosity as predisposing factors for dental hard tissue erosion.

Regarding this parameter, we rejected the null hypothesis in favor of the alternative hypothesis, namely, the proportion of patients diagnosed with BN who exhibited altered salivary viscosity was significantly greater than the proportion in the second control group of healthy individuals.

3. Concerning the next assessed parameter—pH of unstimulated saliva—the obtained data reveal substantial differences in salivary acidity between patients diagnosed with BN and the control group consisting of healthy individuals. These differences can be interpreted as indicative of a disrupted physiological balance within the oral environment in patients diagnosed with bulimia nervosa, potentially increasing their risk for developing erosions and carious lesions.

Salivary pH is dependent on the salivary flow rate; higher flow rates result in alkaline saliva, while reduced flow rates lead to increased acidity. The elevated acidity of saliva in patients diagnosed with BN is attributable to frequent purging episodes and exposure to gastric acid, characterized by a very low pH, disturbances in salivary secretion due to dehydration, damage to salivary glands, decreased salivary flow, or electrolyte imbalances. Our findings are corroborated by other studies, such as that conducted by Blazer et al. (2008), who similarly observed that salivary pH values measured in patients with bulimia nervosa were lower compared to those in healthy individuals.

We reject the null hypothesis in favor of the alternative hypothesis, which states that the proportion of patients diagnosed with bulimia nervosa exhibiting lower-than-normal salivary pH is greater than that observed in the control group.

4.Through the study conducted with Test 4 and subsequent analysis, similar to findings by other authors such as Roberts MW et al. and Dynesen et al. (2008), we observed that no substantial differences exist between patients diagnosed with BN and healthy control subjects regarding stimulated salivary flow.

With respect to the parameter of stimulated salivary flow rate, we accept the null hypothesis, indicating that there is no statistically significant difference between the two examined groups.

5. Buffering capacity plays a key role in the protective function of saliva. Testing this parameter evaluates the effectiveness of saliva in neutralizing acids entering the oral cavity. Reduced buffering capacity in patients diagnosed with bulimia nervosa is directly associated with frequent episodes of vomiting. Low buffering capacity represents a significant risk factor for the development of dental erosions and caries, as saliva becomes incapable of effectively neutralizing acids present in the oral cavity.

In this clinical study, we observed that patients diagnosed with BN demonstrated significantly impaired saliva buffering capacity compared to healthy participants in the control group, indicating reduced restorative potential. Consequently, dental hard tissues are subjected to an acidic environment, increasing the risk of demineralization, erosive defects, and carious lesions. Our findings align with studies by other authors who have established a relationship between reduced salivary flow, buffering capacity, pH, and the occurrence of erosive lesions (Järvinen et al., 1991).

Regarding the fifth evaluated parameter—buffering capacity—we observed a statistically significant difference between the two examined groups. Therefore, we rejected the null hypothesis in favor of the alternative hypothesis, which states that the

proportion of patients diagnosed with BN exhibiting reduced buffering capacity is higher than that of participants in the control group.

In our opinion, clinical tests assessing saliva quality are simple and rapid to perform, yielding clear and easily reproducible results. Thus, these tests could successfully be integrated into routine clinical practice, assisting in the diagnosis of eating disorders and serving to motivate patients toward improved oral health.

Results for Task 2
Results for Task 2.1

For the purpose of completing Task 2.1, a total of 30 patients diagnosed with BN were examined. To evaluate the prevalence and risk of dental caries development among patients with eating disorders, 788 teeth and 3,587 tooth surfaces were examined. The prevalence of carious lesions was assessed using the DMFT and DMFS indices.

The examination began with recording the dental status, which was documented on a specially designed outpatient clinical record.

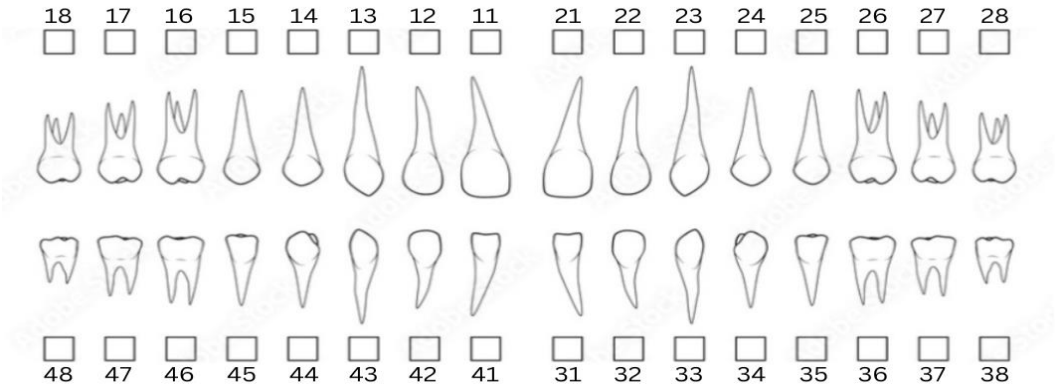


Fig. 7 *Outpatient clinical record for documenting dental status.*

Within this record, teeth presenting primary caries, restorations, restorations with secondary caries, missing teeth, and teeth with crowns were documented. The recordings were made using the following designations:

- caries – "C"
- restoration – "R"
- restoration with secondary caries – "R/C"
- missing tooth – "M"

- crown – "K"

To evaluate the prevalence of carious lesions and restored teeth, the DMFT index calculation was applied. In this index, each tooth is counted as an individual unit; the total number of affected teeth is summed to obtain the DMFT score. Third molars were excluded from the examination; thus, the maximum possible DMFT score is 28. The risk of caries development is categorized according to the DMFT values as follows:

- 0.0 to 1.1 – very low
- 1.2 to 2.6 – low
- 2.7 to 4.4 – moderate
- 4.5 to 6.5 – high
- 6.6 and above – very high

For the purposes of our study, we concluded that the DMFT index does not provide sufficiently detailed information about the location of carious lesions in patients diagnosed with BN, as it accounts only for the total number of affected teeth. Therefore, we proceeded to calculate the DMFS index, which assesses the involvement of each individual surface of every tooth. All affected surfaces were recorded using the same abbreviations as those mentioned for the previous index. The number of tooth surfaces examined for all present teeth, excluding third molars, is 128, thus making the maximum possible DMFS score 128.

For both DMFT and DMFS calculations, teeth with crowns placed for reasons other than dental caries were excluded from the evaluation.

In calculating the DMFT and DMFS indices, teeth and surfaces with caries, restorations, and missing teeth or surfaces were counted. Additionally, for the purposes of our investigation—to determine the presence of secondary carious lesions and their most frequent locations—we included a third category: restorations with secondary caries.

To determine which tooth surfaces were most frequently affected by primary and secondary carious lesions, as well as those most commonly restored, the results obtained for each patient were entered into an Excel spreadsheet. Due to the varying number of surfaces in anterior and posterior teeth, the examined teeth were categorized into four groups: upper anterior teeth, lower anterior teeth, upper posterior teeth, and lower posterior teeth. Surfaces were indicated as follows:

- M – mesial
- D – distal
- V – vestibular
- P/L – palatal/lingual
- O – occlusal

Following a detailed analysis of the data, the subsequent grouped horizontal bar chart was generated.

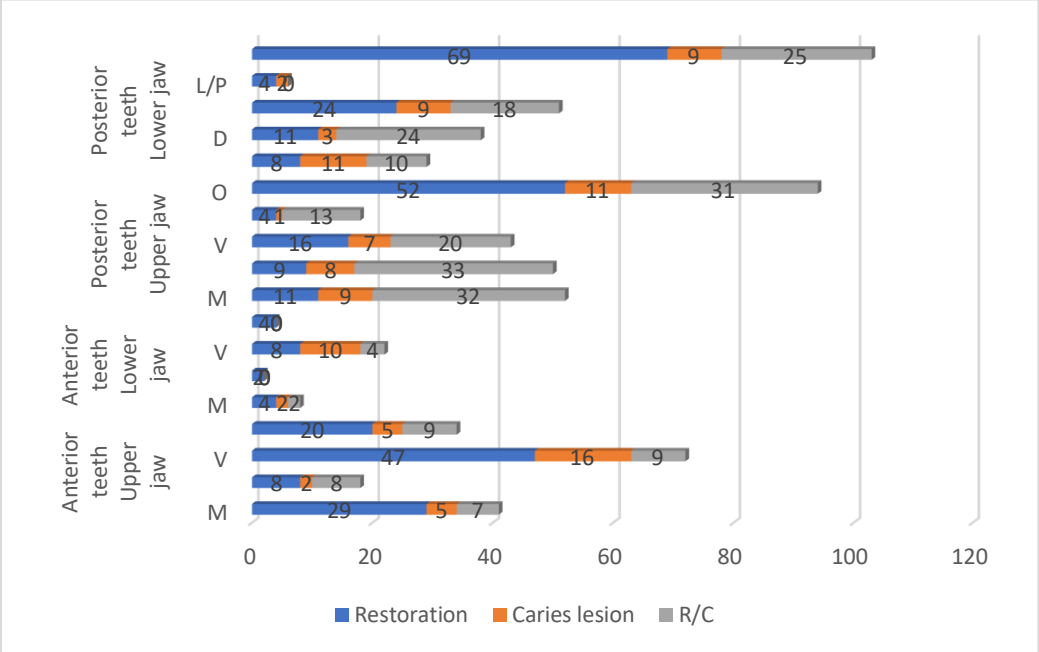


Fig. 8 *Distribution of restored teeth, carious teeth, and teeth with secondary caries among anterior and posterior teeth in the upper and lower jaws.*

As shown in Fig. 8, the graph illustrates the distribution of teeth across three categories: restorations (fillings), carious lesions, and restorations with secondary caries (R/C), segmented by tooth group and their specific surfaces (M – mesial, D – distal, V – vestibular, L/P – lingual/palatal, and O – occlusal). The data differentiates between anterior and posterior teeth, with each category distinctly color-coded: restorations in blue, carious lesions in orange, and restorations with secondary caries in gray. Notably, teeth with restorations constitute the largest group, followed by restorations exhibiting secondary caries, while untreated carious lesions represent the smallest group.

The subsequent figure presents the percentage distribution of affected tooth surfaces.

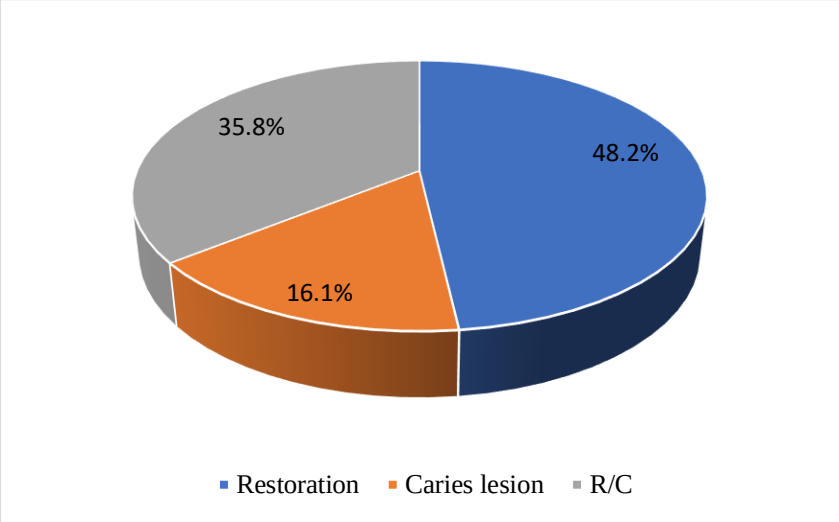


***Fig. 9**. Percentage distribution of the total number of restorations, carious lesions, and restorations with secondary caries*

It is clearly evident that the highest percentage of all affected surfaces are those with existing restorations—48.2%. These are followed by surfaces with restorations and secondary caries—35.8%, while 16.1% of the affected surfaces present with primary carious lesions (Fig. 9).
To provide a more detailed assessment of the distribution, we will examine the dental surfaces categorized into four groups: anterior teeth of the maxilla and mandible, and posterior teeth of the maxilla and mandible.

❖ Anterior teeth of the maxilla

Figure 10 presents in detail the number of surfaces affected by restorations, restorations with caries, and primary carious lesions.

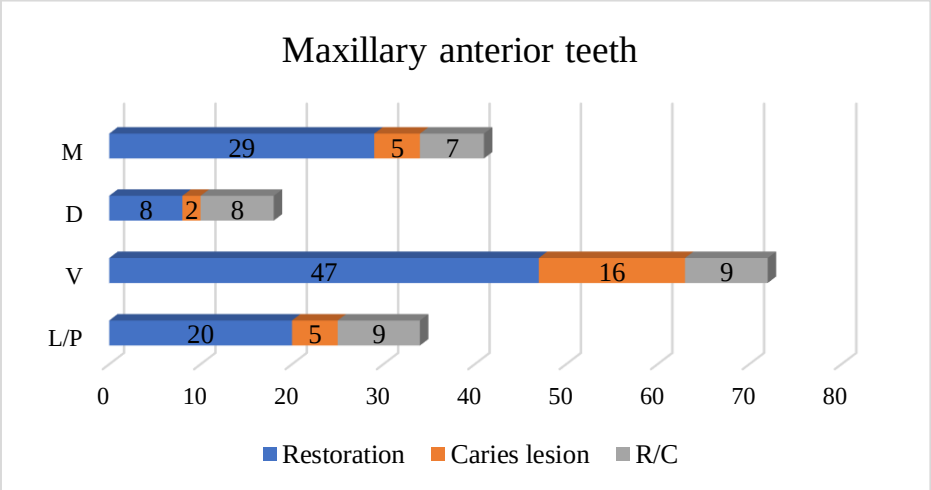


***Fig. 10** Graphical representation of the distribution of the number of restorations, carious lesions, and restorations with secondary caries in maxillary anterior teeth*

It is noteworthy that, among the maxillary anterior teeth, the vestibular surfaces exhibit the highest prevalence across all three parameters, followed by the mesial and palatal surfaces, with the distal surfaces being the least affected. The conducted analysis underscores the vestibular surfaces as the most significantly compromised in this group. To illustrate these findings, selected clinical cases are presented (Figs. 11, 12, 13).

Fig. 11 *Clinical Case 1 – Female patient with BN, presenting with restorations on the anterior teeth and existing secondary carious lesions*

Fig. 12 *Clinical Case 2 – Female patient with BN, presenting with restorations on the anterior teeth and existing secondary carious lesions.*

Fig. 13 *Clinical Case 3 – Female patient with BN, presenting with restorations on the anterior teeth*

Clinical Case 1 – Female patient with an eating disorder that transitioned from anorexia nervosa (AN) to bulimia nervosa (BN). According to the patient, the condition has persisted for six years. She visits the dentist frequently. Multiple restorations are observed, along with secondary carious lesions and inadequate oral hygiene.

Clinical Case 2 – Female patient suffering from bulimia for 5.5 years. Restorations are present on all vestibular surfaces, with secondary carious lesions, involvement of the incisal edges, reduced occlusal height, inadequate oral hygiene, and complaints of xerostomia.

Clinical Case 3 – Female patient with BN. Restorations are present on the mesial surface of tooth 12, the entire vestibular surfaces of teeth 11 and 21, and at the cervical region of tooth 22.

❖ Mandibular Anterior Teeth

Figure 14 provides a detailed representation of the number of surfaces affected by restorations, restorations with caries, and primary carious lesions.

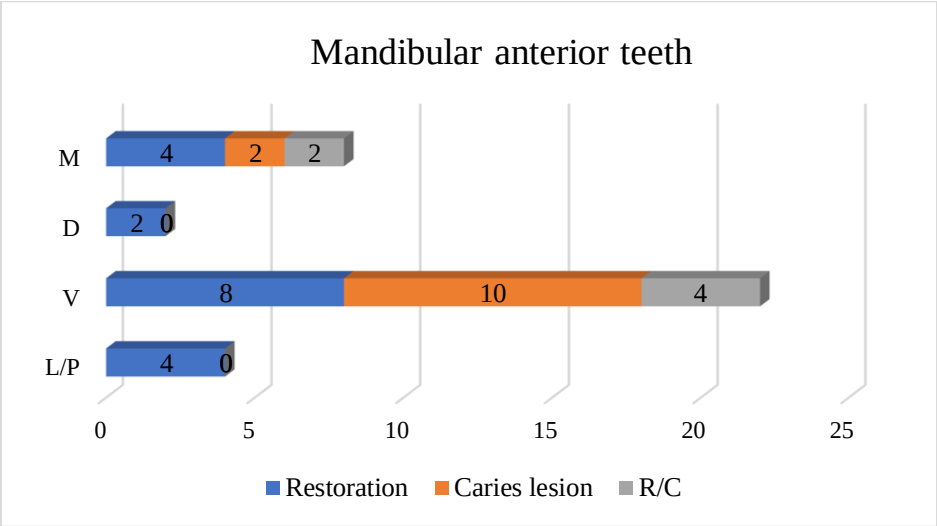


Fig. 14 *Graphical representation of the distribution of the number of restorations, carious lesions, and restorations with secondary caries in mandibular anterior teeth*

An analysis of the results once again reveals that the vestibular surface is the most affected in the mandibular anterior teeth. This is followed by the mesial and lingual surfaces, while the distal surfaces exhibit the fewest defects. Half (50%) of all affected areas are restored, carious lesions account for a substantial portion—33.33% of the affected surfaces—and 16.67% of the surfaces present with both a restoration and caries. These findings underscore the need for restorative treatment, as well as the implementation of more effective preventive measures.

❖ Maxillary Posterior Teeth

Figure 15 provides a detailed representation of the number of surfaces affected by restorations, restorations with caries, and primary carious lesions.

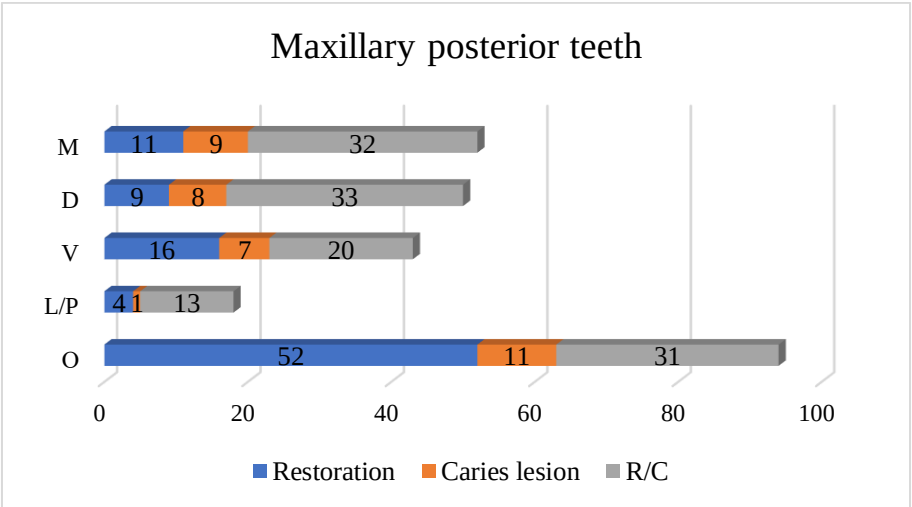


Fig. 15 *Graphical representation of the distribution of the number of restorations, carious lesions, and restorations with secondary caries in maxillary posterior teeth*

Figure 15 clearly demonstrates that the occlusal surfaces of the maxillary posterior teeth exhibit the highest prevalence of restorations, carious lesions, and restorations with recurrent caries. The mesial and distal surfaces show relatively similar values, with a predominance of restorations accompanied by secondary caries. On the vestibular surface, the highest number is observed in restorations with caries, while the palatal surface appears to be minimally affected.

The results indicate that a very high proportion of the surfaces are affected by a pathological process—specifically caries, whether primary or secondary—or have previously been affected and subsequently restored. The distribution pattern highlights the necessity for preventive measures, particularly targeting the occlusal and mesial surfaces.

The analysis concludes that within the group of maxillary posterior teeth, the occlusal surfaces are the most severely affected.

❖ Mandibular Posterior Teeth

Figure 16 provides a detailed representation of the number of surfaces affected by restorations, restorations with caries, and primary carious lesions.

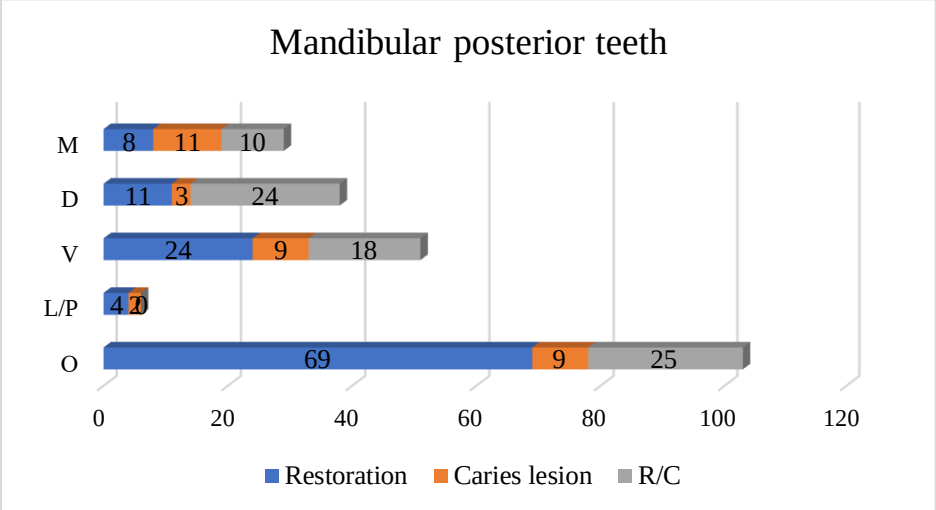


Fig. 16 *Graphical representation of the distribution of the number of restorations, carious lesions, and restorations with secondary caries in mandibular posterior teeth*

In the group of mandibular posterior teeth, the highest prevalence of all three examined categories is once again observed on the occlusal surfaces, which are clearly the most severely affected.

Within this group, restorations represent the most prevalent category—48.15%—with a predominance on the occlusal and vestibular surfaces. Restorations with caries (O/C) account for 34.87%, mainly concentrated on the distal and occlusal surfaces. Carious lesions represent the lowest proportion—14.12%—primarily affecting the mesial surfaces.

Based on the analysis of all examined teeth and surfaces, the DMFT and DMFS indices were calculated (Table 13) to assess the caries risk in patients with eating disorders. The calculated DMFT value is 12.2, which, according to the index scale, is classified as very high. The mean DMFS value is 23.4, indicating that on average, 23.4 surfaces are affected per patient. However, this average may not be sufficiently indicative, as some patients in our study exhibited no carious lesions. However, the DMFS index enabled the identification of the most frequently affected surfaces in cases where caries was present.

Table 13 *Results for the DMFT and DMFS indices*

DMFT	DMFS
12.2	23.4

The detailed analysis revealed that the occlusal surfaces are the most severely affected across all three examined categories in the group of posterior teeth of both the maxilla and mandible.

In the anterior teeth, both maxillary and mandibular, the most frequently affected surfaces are the vestibular ones, with a higher prevalence observed in the maxilla and a significantly lower distribution in the mandible.

Discussion of the Results – Task 2.1

The study demonstrates significantly high values for both DMFT and DMFS indices, which are consistent with findings reported by other authors (Maria Lourenço et al., 2017). Previous research has yielded contradictory results regarding caries indicators in patients with eating disorders. Some authors have found no significant differences

(Johansson AK et al., 2012), while others report substantially higher values—such as Kisely et al. (2015), who observed elevated DMFS scores and reduced salivary flow.

The pattern evidenced by our findings toward increased DMFT and DMFS values has also been confirmed by more recent research on patients with eating disorders (Naiana de Melo Belila et al., 2021). In their study, Pallier A et al. (2019) examined patients with eating disorders and reported a DMFT index of 7.9 ± 7.5, categorizing these individuals as being at high risk for the development of carious lesions, which also correlates with our findings.

Other authors, such as Costacurta et al. (2014), Jugale et al. (2014), and Lourenço et al. (2018), have also demonstrated in their studies that dental caries is observed in patients with altered nutritional status, such as those with eating disorders. These findings are in accordance with the results of our study.

The outcomes of our investigation indicate that patients exhibit a very high number of existing restorations, suggesting that they seek dental care relatively frequently. However, the number of restorations with secondary caries is also considerable, reflecting the rapid progression of new carious lesions. Furthermore, primary carious lesions are also widely prevalent.

The development of carious lesions is influenced by additional factors such as an unbalanced diet, frequent consumption of large quantities of food rich in fermentable carbohydrates, sweetened foods, and beverages. Poor oral hygiene, the intake of medications, reduced salivary flow, and impaired salivary function in cleansing the oral cavity and tooth surfaces also play a significant role in the development of dental caries in the examined patients. The progression of caries in individuals with eating disorders varies depending on the duration and frequency of bulimic behavior, as well as dietary habits and oral hygiene practices.

In terms of localization, carious lesions and restored surfaces were most frequently observed on the occlusal and vestibular surfaces of the mandibular molars and premolars, followed by the maxillary molars and premolars. In the maxillary anterior teeth, the vestibular surfaces were the most severely affected. The least affected surfaces were the lingual surfaces of the mandibular anterior teeth, a finding potentially attributable to the protective position of the tongue, the proximity of numerous minor salivary gland ducts, and the cleansing function of saliva.

Results for Task 2.2

The objective of this task was to examine the clinical presentation of erosive defects of the hard dental tissues in patients with BN, by assessing their localization and extent. A total of 316 teeth with erosion were recorded, of which 181 were in the maxilla and 135 in the mandible. As shown in Figure 17, this corresponds to 40.25% of all examined teeth.

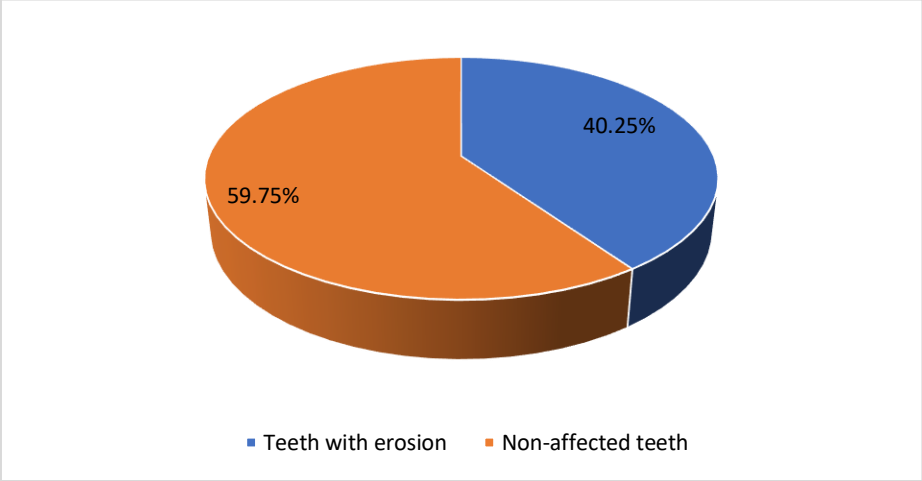


Fig. 17 *Percentage distribution of teeth affected by erosion and healthy teeth*

For the assessment, we applied the BEWE system, which utilizes a numerical coding scheme to classify the extent of the affected area. The scoring ranges from 0 to 3, depending on the severity of dental erosion. A score of 0 indicates no erosive changes, a score of 1 reflects enamel involvement only, scores of 2 and 3 indicate dentin involvement. Specifically, a score of 2 corresponds to a clearly visible defect with less than 50% loss of hard dental tissue (HDT), while a score of 3 indicates extensive loss involving more than 50% of the surface area.

Due to the specific pattern of involvement in different tooth groups and surfaces in the maxilla and mandible, we decided to conduct a separate analysis for each arch. We will then focus on a detailed examination of the most frequently affected dental surfaces.

❖ Maxilla

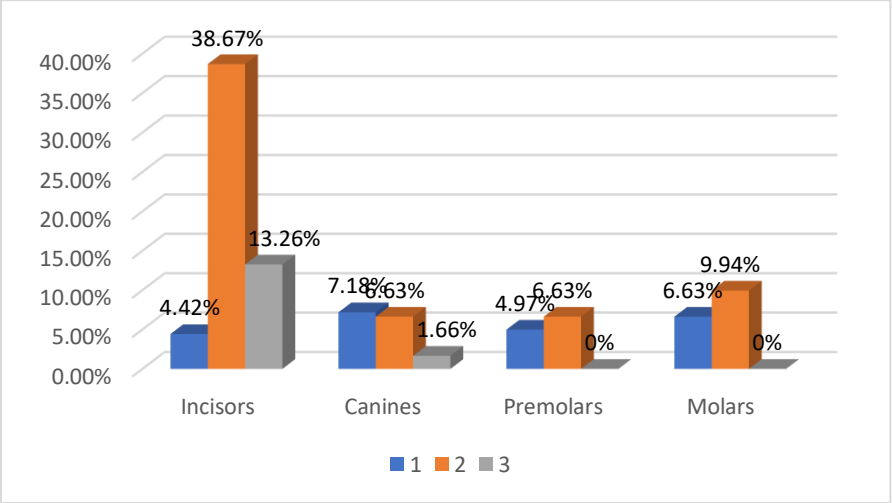


Fig. 18 *Percentage distribution of erosions among different tooth groups in the maxilla*

Figure 18 illustrates the percentage distribution of erosions among the teeth in the maxilla. It is evident that the incisors are the most frequently affected teeth in the upper arch. The BEWE index scores are represented by the values 1, 2, and 3. Notably, score 2 demonstrates the highest prevalence.

The following table provides detailed information regarding the number of erosions in each tooth group of the maxilla, as well as their distribution across the BEWE classification categories.

Table 13 *Number of affected teeth in each group according to the BEWE index score*

Maxillary Teeth	BEWE 1	BEWE 2	BEWE 3
Incisors	8	70	24
Canines	13	12	3
Premolars	9	12	0
Molars	12	18	0

As shown in Table 13, the incisors are the most frequently affected teeth by erosion in the maxilla. The highest number of erosions is observed at moderate severity BEWE

2, indicating an extensive presence of well-defined defects involving the dentin. Erosive lesions classified as BEWE 3 are also substantial, suggesting the presence of more advanced cases, typically seen in patients with a longer duration of the disorder. Lesions with a BEWE 1 score are comparatively less common.

In the canine group, erosions are more evenly distributed between BEWE 1 and BEWE 2, while severe lesions BEWE 3 are rare. Premolars show lower overall susceptibility to erosive damage. The most frequently recorded severity in this group is BEWE 2, followed by BEWE 1 with 9 documented cases. The absence of BEWE 3 lesions among premolars suggests greater resistance to severe erosion.

In the molar group, erosions are predominantly of moderate severity BEWE 2, followed by mild lesions BEWE 1. Similar to premolars, no severe erosions BEWE 3 were registered.

This analysis underscores that the maxillary anterior teeth, particularly the central and lateral incisors, represent the most severely affected and erosion-susceptible group in patients with BN. Although the canines also exhibit erosive involvement, their severity is comparatively lower. Conversely, the premolars and molars demonstrate a higher degree of resistance to erosive wear within the maxillary dentition.

❖ Mandible:

The following figure presents the percentage distribution of erosive defects observed in the mandibular arch.

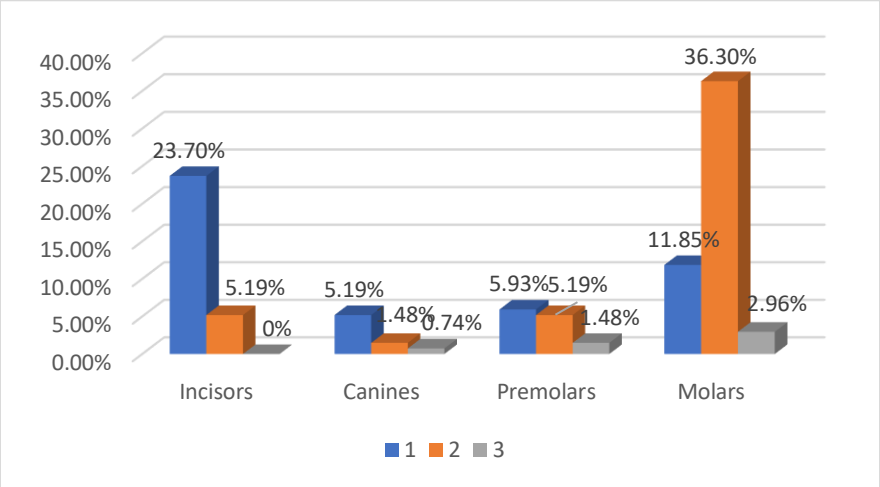


Fig. 19 *Percentage distribution of erosions among different tooth groups in the mandible*

The graph presented in Figure 19 illustrates the percentage distribution of dental erosions in the mandible by tooth group, categorized by severity according to the BEWE index. As clearly shown, the molars are the most affected group in the lower jaw, with a predominance of erosions classified as moderate BEWE 2. Erosive changes are also observed in the mandibular incisors, however, the extent of involvement is considerably lower compared to the maxilla. The affected cases are primarily of mild severity BEWE 1, suggesting the presence of superficial erosions confined to the enamel, with minimal loss of hard dental tissue.

The following table provides detailed information on the number of erosive lesions within each mandibular tooth group, as well as their distribution according to the BEWE classification system.

Table 14 *Number of affected teeth in each group according to the BEWE index score*

Mandibular Teeth	BEWE 1	BEWE 2	BEWE 3
Incisors	32	7	0
Canines	7	2	1
Premolars	8	7	2
Molars	16	49	4

Table 14 reveals that the molars are the most affected tooth group in terms of erosion. The most commonly observed lesions are of moderate severity BEWE 2. Mild erosions BEWE 1 are also relatively prevalent, whereas severe erosions BEWE 3 are rare. The mandibular incisors are also relatively frequently affected, although predominantly by mild forms of dental erosion. Erosions of moderate severity BEWE 2 are rarely observed in this group, and no cases of severe erosion BEWE 3 were recorded.

Erosive damage among premolars appears to be relatively evenly distributed. Mild erosions BEWE 1 are the most common, followed by those classified as BEWE 2. Severe erosions BEWE 3 are exceedingly rare in this group. The canines exhibit a comparatively low frequency of erosion overall. Mild forms are the most prevalent within this group, although their occurrence is limited when compared to the other tooth groups.

Regarding the distribution of erosive defects according to their severity based on the BEWE system, the following analysis was conducted.

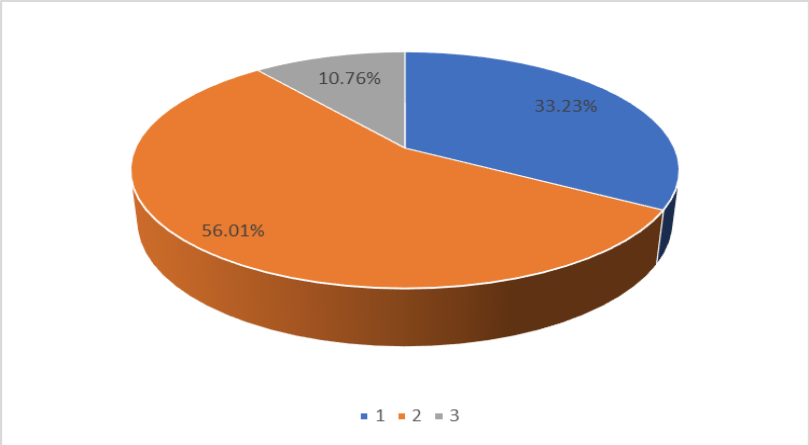


Fig. 20 *Percentage distribution of erosive defects according to their severity based on the BEWE system*

The graphical representation illustrates the percentage distribution of dental erosions according to their severity. Erosion of moderate intensity accounts for the largest proportion—56.01%—representing more than half of the cases. This highlights that a significant number of teeth present with clearly defined defects involving the dentin, while the loss of hard dental tissue remains below 50% of the surface area. This category necessitates active monitoring, preventive measures, and the implementation of restorative interventions to address the loss of tissue (Fig. 20).

Erosive lesions of mild severity comprise a substantial portion of the cases, representing approximately one-third—33.23%. This indicates an early-stage erosion process that requires preventive strategies to halt further progression.

Severely advanced erosive lesions are less common, constituting the smallest share of cases—10.76%. These cases require restorative treatment to compensate for the substantial hard tissue loss and the associated reduction in vertical dimension.

The calculated mean BEWE score was 7.36, which, according to the risk classification, corresponds to a "low risk" category. Based on treatment guidelines, this level of risk warrants routine oral hygiene practices, dietary assessment, continued monitoring, and re-evaluation of the index after two years.

While using the BEWE system, we encountered certain challenges and limitations, as the final score is based on the number of affected sextants rather than individual teeth. The analysis revealed that in patients with BN, erosive lesions predominantly affect the palatal surfaces of the maxillary anterior teeth—specifically sextant 2—as

well as the occlusal surfaces of the molars, primarily in the mandibular arch, corresponding to sextants 4 and 6.

This finding indicates that certain sextants are more severely affected than others, and in some cases, erosive changes may not be present in all sextants. As a result, the final BEWE score was, in some cases, lower than the actual clinical severity, since the risk level is calculated based on the sum of the highest score recorded in each of the six sextants.

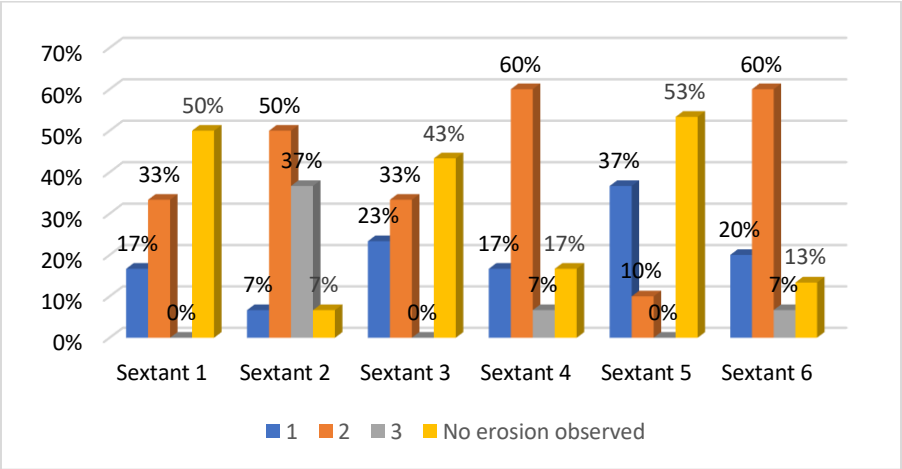


Fig. 21 *Summary percentage distribution of all teeth with and without erosions, categorized by sextants*

Comprehensive data on all examined teeth—with and without erosive lesions—as well as their distribution across the six sextants and corresponding BEWE scores, were entered into Microsoft Excel. Based on these data, a diagram was generated to summarize the findings, as shown in the aforementioned figure (Fig. 21). The objective was to illustrate the spatial distribution of erosive wear within different regions of the oral cavity, providing a valuable basis for assessing the severity of dental tissue degradation in patients with bulimia and understanding the manifestation of erosion across individual sextants.

This visual representation further confirms that sextants 2, 4, and 6 are the most severely affected. A pronounced predominance of BEWE score 2 is observed in most sextants, with the exception of sextant 5. The analysis indicates that only in sextant 5 does BEWE score 1 prevail—accounting for 37% of cases—suggesting that erosive wear in this region is predominantly mild, limited to the enamel, and does not involve dentin.

A detailed assessment of the dental surfaces affected by erosion follows. The analysis focused on the following surfaces:

O – occlusal surface
P – palatal surface
I – incisal surface
L – lingual surface
V – vestibular surface

The following diagram provides a summarized visualization of the most frequently affected dental surfaces in patients suffering from BN.

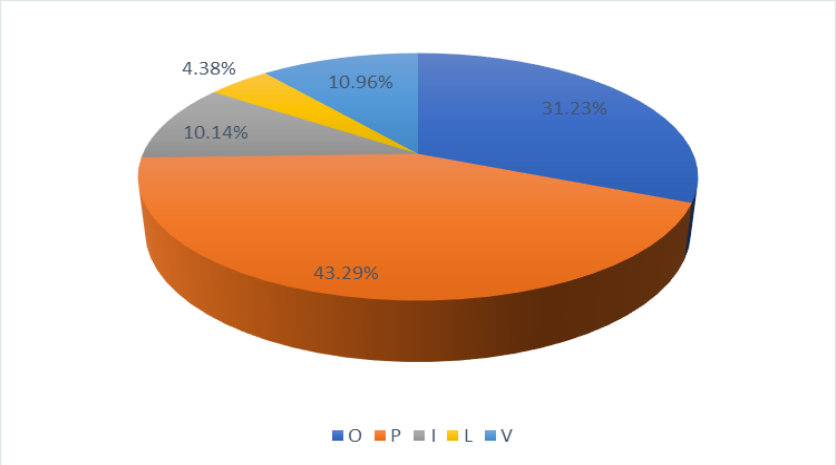


Fig. 22 *Summary percentage distribution of erosions by surface in the examined patients with BN*

As observed, the palatal surfaces are the most severely affected in patients with eating disorders. This finding aligns with previous studies, which report that the inner surfaces of the maxillary anterior teeth exhibit increased susceptibility due to frequent self-induced vomiting and the repeated exposure of these surfaces to gastric acid and its low pH. Additionally, the position of the tongue contributes to the erosive process, as its filiform papillae have the potential to act as a reservoir for gastric acid and possess abrasive properties.

The occlusal surfaces of the molars represent the second most commonly affected area in cases of BN-related erosion, with 31.23% of the affected teeth exhibiting erosive lesions on their occlusal surfaces (Fig. 22).

Given the variation in surface involvement between the maxilla and mandible, a separate analysis was conducted for each arch.

❖ Distribution of Dental Erosions by Surface in the Maxilla

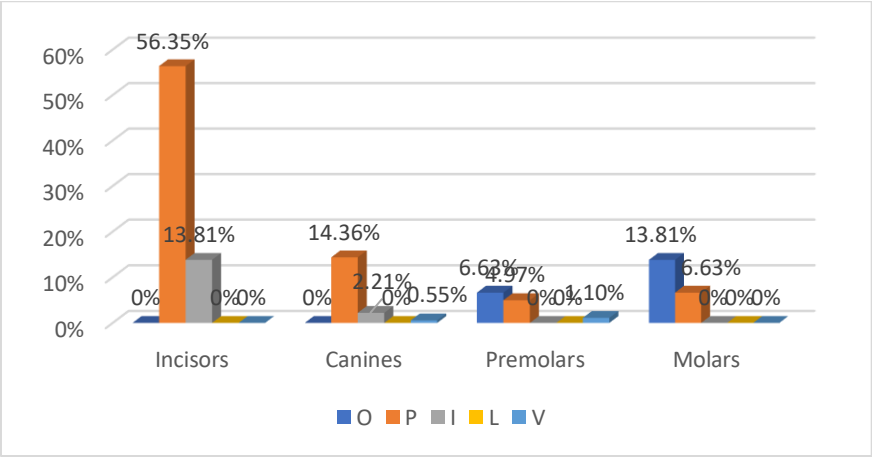


Fig. 23 *Percentage distribution of dental erosion among different tooth groups in the maxilla*

The graphical representation presented in Figure 23 is a column chart illustrating the percentage distribution of dental erosions in the maxilla, based on different tooth surfaces and tooth groups. The horizontal axis represents the tooth groups, while the vertical axis displays the percentage of affected surfaces.

The results clearly indicate that, in the maxilla, the most severely affected teeth are the incisors. The highest prevalence of erosion is observed on their palatal surfaces, with a value of 56.35%, emphasizing their specific anatomical position in patients suffering from eating disorders associated with self-induced purging.

As an illustration, we will present some of our clinical cases.

Fig. 24 *Clinical Case 1 – Female patient with BN, diagnosed with the condition for two years*

Figure 24 illustrates the clinical case of a 26-year-old female patient who has been suffering from BN for two years. Episodes of self-induced vomiting occur between 5 and 7 times per week. Mild erosive lesions are observed in the region from tooth 13 to tooth 23. The enamel is the only tissue affected, the erosion involves the cingulum, which demonstrate a loss of anatomical contour. The dentin is not exposed, which corresponds to grade 1 erosion according to the BEWE classification.

Fig. 25 *Clinical Case 2 – Female patient with BN, diagnosed with the condition for six years*

In the clinical case presented, involvement of the palatal and incisal surfaces of the maxillary anterior teeth was identified. The erosive defects affect the cingulum area, which has lost its anatomical contour and developed a concave form—an indication of an advanced erosive process. The erosion extends across the entire palatal surface of teeth 12, 11, 21, and 22. The enamel has been worn away, exposing the underlying dentin, with visible brown-yellow secondary dentin.

The dentin damage in tooth 11 is the most extensive, affecting more than 50% of the surface area, corresponding to grade 3 erosion according to the BEWE classification. In teeth 12, 21, and 22, hard tissue loss is limited to less than 50% of the surface, which corresponds to grade 2 erosive wear based on BEWE criteria. The incisal edges of the same teeth are also affected.

Multiple restorations are observed. Tooth 23 is restored; however, the cingulum is also flattened, corresponding to grade 1 on the BEWE scale. A clear prominence of the restorations above the surrounding tooth structure is noted, which is a definitive clinical indicator of erosion.

Fig. 26 *Clinical Case 3 – Erosions on the palatal surfaces of the maxillary anterior teeth in a female patient with BN for 5.2 years*

In the presented clinical case, teeth from 13 to 24 are affected. Teeth 13, 22, 23, and 24 exhibit grade 2 erosive wear according to the BEWE classification, with dentin involvement limited to less than 50% of the surface. Teeth 12, 11, and 21 correspond to grade 3, as the dentin is exposed over more than 50% of the surface.

Additionally, it is evident that teeth 11 and 22 have restorations involving the palatal regions and incisal edges, which indicates a reduction in the clinical crown height of these teeth.

Fig. 27 *Clinical Case 4 – Female patient with BN for 5 years – erosions on the palatal surfaces of the maxillary anterior teeth*

Figure 27 presents a clinical case of a female patient who has been suffering from bulimia for five years. According to the patient's history, purging episodes occur more than ten times per week. As shown, teeth 12 to 23 are affected by erosion, with the exception of tooth 11, which is restored with a metal-ceramic crown. It is clearly evident that the crown height of tooth 21 is significantly reduced in comparison to its

contralateral counterpart, suggesting that the crown in this case has served a protective role.

Tooth 12 has a restoration, but dentin exposure is visible at the cervical region—corresponding to a BEWE score of 2. Teeth 11 and 21 show complete smoothing of the palatal surfaces and reduced clinical crown height, classified as severity level 3 according to the BEWE index. Tooth 23 is less severely affected—consistent with BEWE score 2—as exposed dentin is present, though it involves less than 50% of the surface area.

In canines, erosive defects are also predominantly located on the palatal surfaces, observed in 14.36% of cases. This indicates that while canines are relatively frequently affected by erosion, the extent is not as severe as that seen in incisors. Only 2.21% of canine teeth exhibited erosion on the incisal edge, and vestibular involvement was extremely rare—observed in just 0.55% of cases. Among the posterior teeth, molars exhibit a higher prevalence of erosive defects compared to premolars. It is evident that, in molars, the occlusal surface is the primary site of erosion—accounting for 13.81%. In some patients, particularly those with a longer disease duration or more frequent self-induced purging, palatal erosions were also observed—at a rate of 6.63%. The vestibular surfaces showed no signs of involvement.Premolars in the maxilla are the least affected by erosion when compared to other teeth. Erosive defects in this group are most commonly found on the occlusal surfaces—6.63%, representing the highest frequency within this category. The palatal surfaces are affected in 4.97% of cases, while vestibular surfaces show the lowest prevalence of erosion—only 1.10% of cases observed in the maxillary first and second premolars.

❖ The distribution of dental erosions on the surfaces of the lower jaw

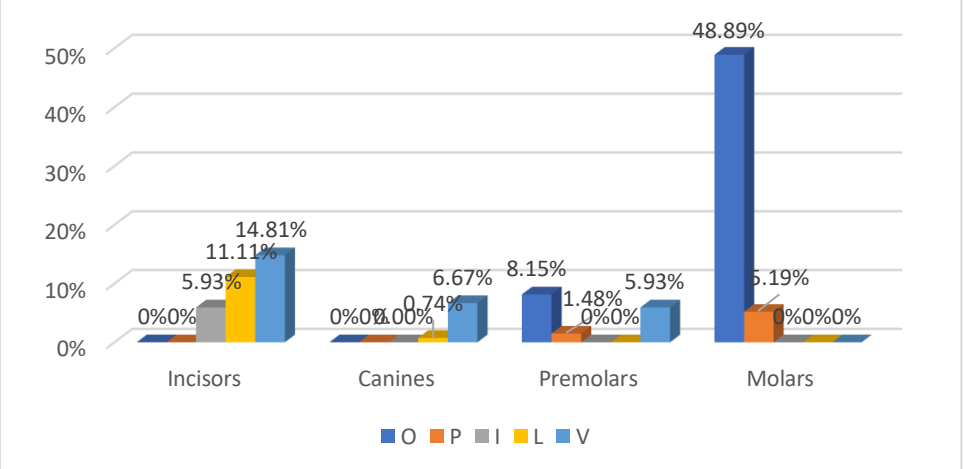


Fig. 28 *Percentage distribution of dental erosion among different dental groups in the lower jaw*

To analyze the results for the lower jaw, we performed a similar analysis as the one for the upper jaw. The graph shown in Fig. 28 illustrates the percentage distribution of dental erosion among different dental groups in the lower jaw and the distribution of erosive defects across tooth surfaces.

From the analysis, it is evident that molars are the most affected tooth group, with the occlusal surface being predominantly affected at 48.89%. Molars show the highest rate of erosion on the occlusal surface, which is significantly higher compared to all other tooth groups and surfaces. In some cases, the lingual surface is also affected in the molar group, but at a much lower frequency – only 5.19%.

As an example, we will present some of our clinical cases.

Fig. 29 *Clinical case 6 – A female patient with erosions on the occlusal surface of lower molars.*

Fig. 29 presents a clinical case of a female patient with BN, suffering from the condition for 4.2 years. It is evident that the occlusal surfaces are restored, with exposed dentin areas visible on teeth 36 and 46—degree 2. There is a completely smoothed occlusal relief and reduced height of the clinical crowns, most notably on tooth 37.

The next most affected tooth group in the lower jaw are the incisors. Erosive damage in this group is primarily localized on the vestibular surfaces, which are affected in 14.81% of the cases, followed by the lingual surfaces with a frequency of 11.11%. The incisal edges show a significantly lower frequency of involvement, recorded in only 5.93% of the cases.

In the premolar group, the occlusal surface, similar to the molars, is most commonly affected by erosion. However, the frequency of involvement is significantly lower—only 8.15%. In this group, erosions are also localized on the vestibular surfaces, observed in 5.93% of the cases. Palatal localization is extremely rare, occurring only in 1.48% of the cases. The canine teeth in the lower jaw are the least affected group, with erosions primarily observed on the vestibular surfaces in 6.67% of the cases.

Discussion of Results for Task 2.2

The primary cause of dental erosion in patients with bulimia is typically self-induced vomiting. This leads to erosive damage on specific tooth surfaces.

In our study, we found that the incisor group was the most severely affected in patients with BN, followed by the molars. A detailed analysis showed that the upper incisors were most affected, in contrast to the lower incisors, which is attributed to their proximity to the minor salivary glands and the washing and buffering potential of saliva. In cases where the lower incisors were affected by erosion, it was usually to a very slight extent, involving only the enamel. The other group with the highest level of involvement were the molars in the lower jaw. Our findings are supported by studies conducted by Lifante-Oliva et al. (2008) and Kisely S et al. (2015), who observed an increased number of dental erosions in patients with BN.

We also found that the premolars in the upper jaw, followed by the canines and the canines in the lower jaw, were the most resistant to dental erosion.

Our results confirm that erosions in patients with BN have a specific localization. In our investigation, we established that the palatal surfaces of the upper anterior teeth were the most commonly affected in the upper jaw, which correlates with findings from studies by authors such as Hermont Ap et al. (2014), as well as more recent research by Manevski et al. (2020), which states that erosive lesions on the palatal surfaces are associated with longer disease duration and more frequent purging episodes.

We found that molars are the next most affected group, with erosions most commonly occurring on the lower molars, primarily located on the occlusal surfaces. For upper molars, the occlusal surfaces are also most affected, but to a lesser extent compared to the lower molars. Palatal localization of erosions is also observed in upper molars and is typically a sign of more prolonged disease.

In our study, in accordance with the research conducted by Paszyńska, E. et al. (2015), we observed a very high rate of erosive defects in bulimic patients, affecting both the enamel and the dentin.

A study conducted by Dynesen in 2008 examined changes in the saliva of patients with BN and is in correlation with our findings, specifically that patients diagnosed with bulimia have significantly more erosions compared to a control group.

During the course of the investigation, we found that dental erosions are directly related to purging behavior, and the presence of erosive lesions indicates a condition that has lasted at least six months, in accordance with the opinion of Altshuler et al. (1990). The loss of tooth structure is directly dependent on the duration of the disease—in cases of shorter disease duration, around one year, we observed erosive defects only in the enamel, while in cases with a longer duration—greater than four years— the defects reached the dentin and covered a significant area. Significant erosion of tooth structure is closely related to the duration of the disease (Nijakowski, K. et al., 2023).

Using the BEWE index, we found that the most common degree of erosion is grade 2, which affects the enamel and 50% of the dentin. Through the BEWE system, we identified the most affected and high-risk sextants as 2, 4, and 6, which include the upper anterior teeth and lower molars. Sextant 5 was found to be at the lowest risk for developing erosion.

As noted by Johansson AK in 2012, we also believe that patients with BN often exhibit compromised oral health, with an increased frequency of dental erosions and carious lesions.

Results of Task 3

The aim of the present study was to investigate dentin hypersensitivity in patients diagnosed with Bulimia Nervosa. It is well established that frequent exposure to acidic agents associated with this condition is a major contributing factor to the development of dental erosion. In turn, erosive lesions create favorable conditions for the manifestation of hypersensitivity.

Exposure of dentin as a result of tooth erosion does not always lead to dentin hypersensitivity. For such sensitivity to be triggered, the dentinal tubules must be exposed—an occurrence frequently resulting from erosion caused by endogenous or exogenous acids, which is a key factor in the pathogenesis of Bulimia Nervosa.

The total number of teeth examined in the study was 788. However, 153 teeth were excluded as they did not meet the inclusion criteria—specifically, teeth with carious lesions, pulpitis, devitalized teeth, fractured teeth, or teeth with congenital defects or crowns. As a result, a total of 631 teeth were included in the final analysis.

Among these, erosion was identified in 316 teeth, while 149 teeth were reported to be associated with hypersensitivity. In our study, nearly all examined patients reported hypersensitivity in at least one tooth, as illustrated in Figure 30.

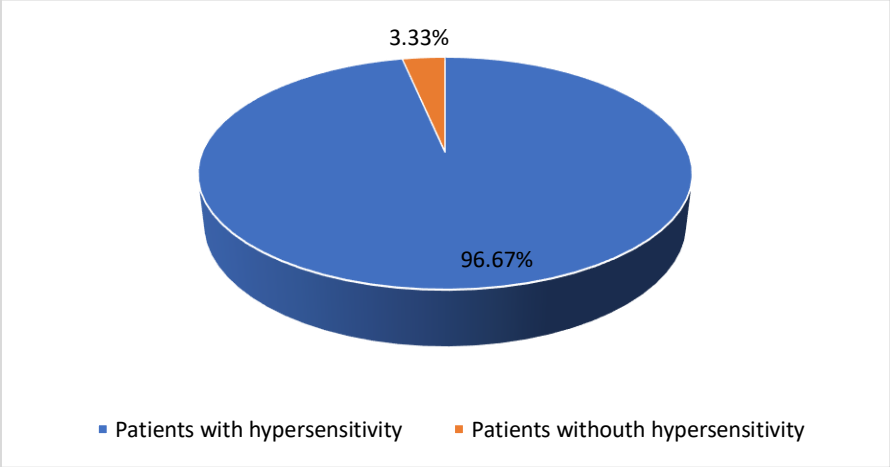


Fig. 30. *Percentage distribution of patients with and without hypersensitivity*

The analysis of the results indicates that 96.67% of the examined patients suffer from dentin hypersensitivity, which is indicative of the fact that hypersensitivity is a common issue among individuals with Bulimia Nervosa. This finding provided a basis for a more in-depth examination of the problem.

Most frequently, patients reported hypersensitivity triggered by thermal stimuli, particularly cold, as well as during toothbrushing. Pain induced by heat was reported less frequently.

After examining all available teeth, with special attention given to those affected by erosion, the collected data were entered into SPSS and Microsoft Excel for statistical analysis. The chart presented in Fig. 31 is based on the clinical data collected during the study and reflects the presence of hypersensitivity in teeth with identified erosive defects.

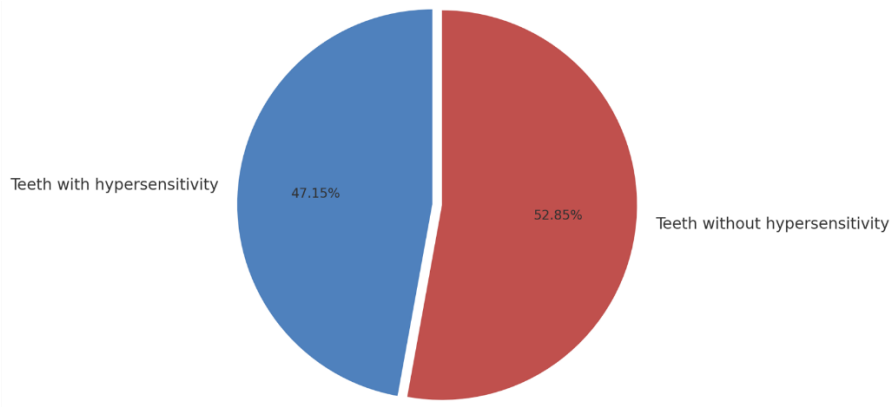


Fig. 31. *Percentage distribution of teeth with and without hypersensitivity among those with identified erosive defects*

A horizontal column chart was created to clearly visualize the percentage distribution of teeth with dentin hypersensitivity across different tooth groups, divided into the maxillary and mandibular arches.

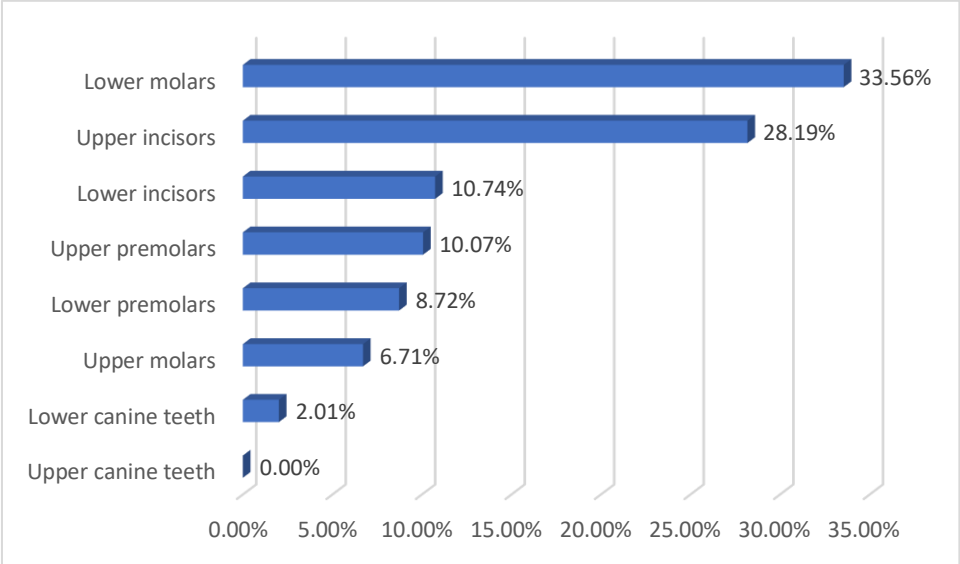


Fig. 32. *Results of the analysis showing the percentage distribution of hypersensitivity by tooth groups in the upper and lower jaw*

The data presented in the figure show that the mandibular molars are the most affected tooth group in terms of hypersensitivity, with the highest percentage of affected teeth—33.56%. The second most frequently affected group are the maxillary incisors, where 28.19% of the teeth exhibited hypersensitivity. The mandibular incisors and maxillary premolars showed similar levels of hypersensitivity—around 10%. In the mandibular premolars, this percentage was 8.05%, placing them among the less affected groups.

An interesting contrast is observed between the maxillary and mandibular molars: while the mandibular molars are the most affected, the maxillary molars are significantly less affected, with hypersensitivity reported in only 6.71% of them. The canine group was the least affected. In the mandible, hypersensitivity was detected in 2.01% of canines, while in the maxilla the percentage was just 0.67%, practically indicating an absence of hypersensitivity in this group (Fig. 32).

For a more detailed analysis, we also included surface-level data, based on which the following results were obtained and are graphically presented in Fig. 33. We examined the vestibular and palatal surfaces of the maxillary teeth, as well as the incisal, occlusal, and lingual surfaces of the mandibular teeth.

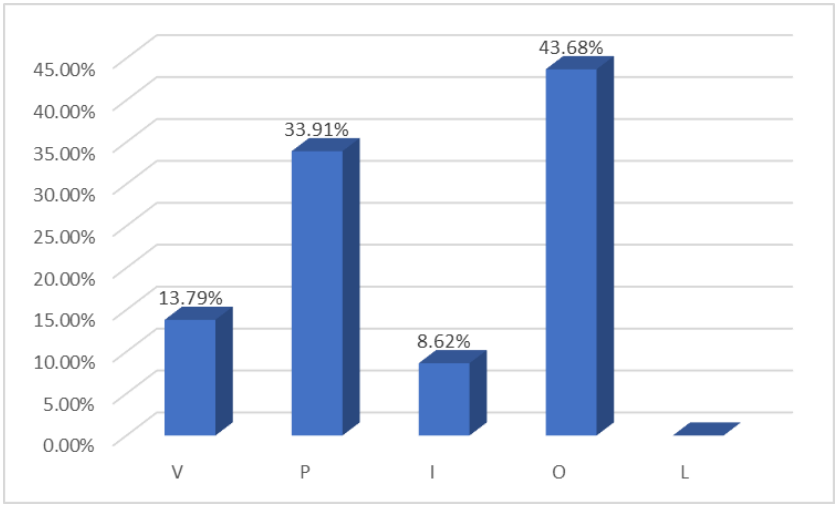


Fig. 33. *Percentage distribution of hypersensitivity by tooth surface*

Based on the presented results, the following analysis can be made: the occlusal surfaces of the posterior (chewing) teeth show the highest frequency of dentin hypersensitivity. The next most commonly affected surfaces are the palatal surfaces—specifically in the maxillary teeth. The vestibular surfaces are also affected by hypersensitivity in 13.79% of cases, while the incisal surfaces are affected in 8.62%, primarily when erosion is combined with palatal surface involvement. No hypersensitivity was observed on the lingual surfaces.

In conducting the study, we applied two methods to provoke and subsequently assess dentin hypersensitivity. The first method involved the use of a tactile stimulus, applied using a dental periodontal probe, and the second involved a cold stimulus, delivered via a directed stream of air from the dental unit.

To evaluate the intensity of the intensity of the experienced pain, we used a Visual Analogue Scale (VAS). After the application of each stimulus to each individual tooth,

the patient was asked to indicate the intensity of the experienced pain by marking a point on a 100 mm line, where 0 corresponded to “no pain” and 10 to “maximum pain.”

Data for each patient were recorded in a dedicated chart, and we used Microsoft Excel to analyze the sensitivity responses measured with the VAS for both types of stimuli. Initially, we examined the intensity of hypersensitivity in response to the tactile stimulus.

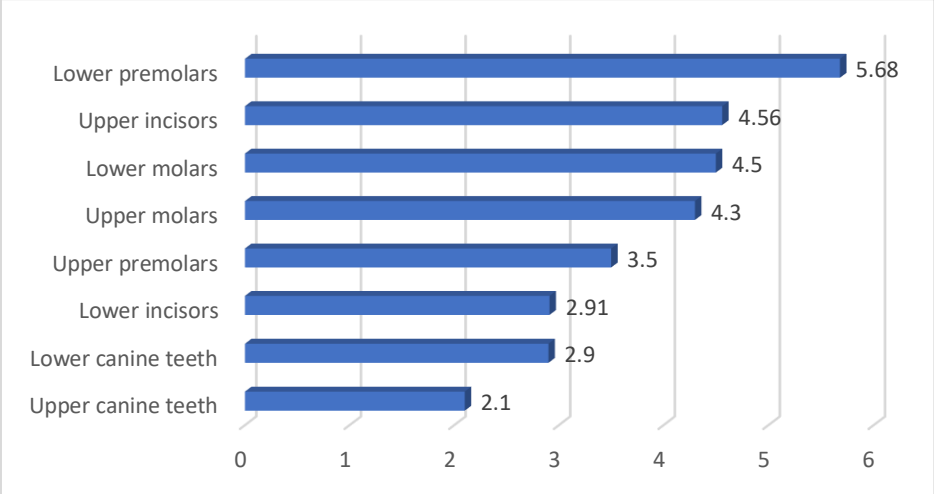


Fig. 34. *Analysis of dentin hypersensitivity intensity using the VAS scale, provoked by tactile stimulus*

The mandibular premolars showed the highest levels of pain intensity in response to the applied stimulus, with a mean value of 5.68. The maxillary incisors were the second most affected group, with a mean value of 4.56. They were followed by the mandibular and maxillary molars. The first four groups in the chart demonstrated results corresponding to "moderate pain."

The result measured for the maxillary premolars was 3.5—significantly lower than that of the same tooth group in the mandible. The incisors and canines in both the upper and lower jaws fall into the "mild pain" category, with average values ranging between 2.1 and 2.91.

This is followed by an analysis of hypersensitivity intensity measured in response to the cold stimulus.

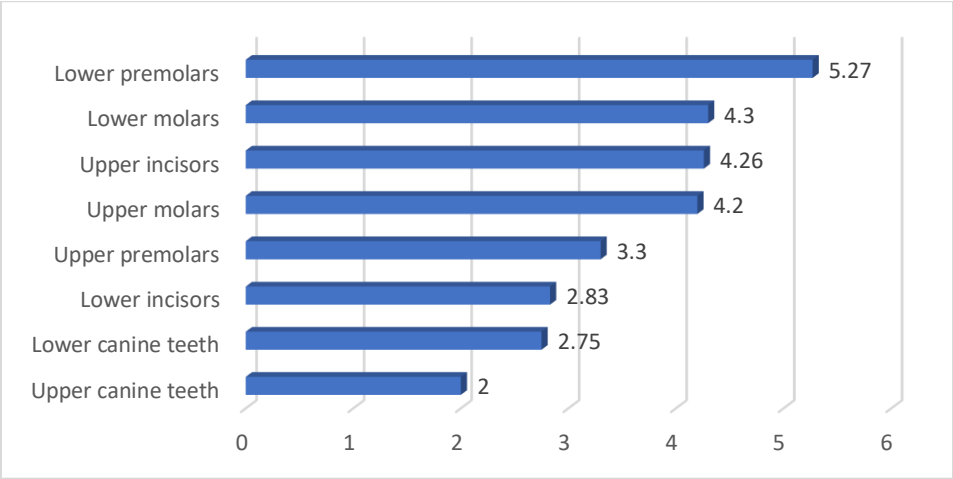


Fig. 35. *Analysis of dentin hypersensitivity intensity using the VAS scale, triggered by cold stimulus*

The highest VAS values in response to the cold stimulus were recorded in the mandibular premolar group, with an average measured value of 5.27. The mandibular molars, maxillary incisors, and maxillary molars showed a similar intensity of provoked hypersensitivity. These values fall within the category of "moderate pain."

For the maxillary premolars, the reported mean value was 3.3, which is lower compared to the same tooth group in the mandible, suggesting a reduced level of hypersensitivity. The lowest hypersensitivity values were observed in the mandibular incisors and the canines of both jaws. In cases where hypersensitivity was reported in these tooth groups, it was of mild intensity, with measured values falling within the "mild pain" range as defined by the VAS scale—between 1 and 3.

It is evident that the results obtained from stimulation by both types of stimuli are similar. The VAS values measured in response to tactile stimulus were slightly higher, but hypersensitivity provoked by both methods was generally categorized as "moderate."

To determine the relationship between the presence and severity of dental erosion and the presence of hypersensitivity in individual teeth, we performed a correlation analysis.

The presence, location, and extent of erosive lesions were examined in Task 2.2 using the BEWE index, while the degree of hypersensitivity was assessed using the VAS scale. The results were used to evaluate and analyze the severity of erosive tooth wear and the recorded dentin hypersensitivity.

BEWE and VAS represent well-established, reliable assessment methods used in epidemiological studies, enabling comparison of disease severity. Our findings indicate a statistically significant positive correlation between the severity of tooth wear measured by the BEWE index and the level of dentin hypersensitivity.

***Table 15**. Correlation analysis examining the relationship between tooth wear BEWE index and dentin hypersensitivity assessed using the VAS scale in response to cold stimulus*

	Hypersensitivity (VAS Scale) – Cold Stimulus	
BEWE Index Score	Pearson Correlation	.575**
	Sig. (2-tailed)	0.000
	N	149

The correlation analysis presented in Table 15 demonstrates a positive relationship between hypersensitivity, as measured by the VAS scale in response to cold stimulus, and the severity of tooth wear assessed by the BEWE index, with a Pearson correlation coefficient of r = 0.575. This value indicates that higher BEWE scores are associated with increased tooth sensitivity when stimulated by an air jet. This suggests that teeth with higher BEWE index values tend to exhibit more pronounced dentin hypersensitivity. The significance level Sig = 0.000 indicates that the correlation is statistically significant at $p < 0.001$, reflecting a very low probability of error. This statistically significant relationship may be clinically relevant and used for risk assessment of hypersensitivity development in patients with dental erosion associated with Bulimia Nervosa (BN).

***Table 16**. Correlation analysis examining the relationship between tooth wear BEWE inde) and dentin hypersensitivity assessed using the VAS scale in response to tactile stimulus*

	Hypersensitivity (VAS Scale) – Tactile Stimulus	
BEWE Index Score	Pearson Correlation	.584**
	Sig. (2-tailed)	0.000
	N	149

Results obtained from the correlation analysis presented in Table 16 reveal a pattern similar to that observed with the cold stimulus. The relationship between hypersensitivity, in terms of pain provoked by tactile stimulation, and the severity of tooth wear assessed by the BEWE index is positive, with a Pearson correlation coefficient of $r = 0.584$. Here as well, the higher the BEWE score, indicating more severe dental erosion, the greater the sensitivity to mechanical stimulation.

The Sig. value of 0.000 indicates that the correlation is highly statistically significant at $p < 0.001$, confirming that the relationship between the two variables is not due to chance.

The positive direction of the correlation suggests that the severity of erosive damage is a key factor contributing to increased dentin hypersensitivity.

Discussion of Results – Task 3

In our study, we identified a high prevalence of dentin hypersensitivity among patients suffering from BN, predominantly observed in teeth presenting erosive damage to enamel and dentin. We observed that the most frequent triggers of hypersensitivity were thermal (cold) and mechanical stimuli. Clinically, these were simulated through the application of cold air from a dental unit and tactile stimulation by scratching the tooth surface with a dental probe—an approach previously explored by Kleier DJ et al., 1984.

Although the molar group was found to be most frequently affected by hypersensitivity, the greatest intensity of dentin hypersensitivity was not observed in these teeth. The highest levels of hypersensitivity were recorded in the mandibular premolars.

Our findings revealed a direct relationship between the severity of tooth wear and the degree of dentin hypersensitivity. Specifically, higher BEWE index scores were associated with greater reported sensitivity. These results are consistent with the findings of other researchers, supporting the view that erosive lesions are a predisposing factor for hypersensitivity (West N et al., 2013). We believe that the presence of acids plays a key predisposing role in the development of both dental erosion and hypersensitivity, as confirmed by other studies (Olley R et al., 2015).

The mean VAS scores measured in our study were approximately 4, which aligns with findings reported by Wilson RF, 2001, using the same widely adopted clinical research tool. Based on the analysis of our results, we conclude that dentin hypersensitivity may serve as a clinical indicator of active erosive tooth surface loss in patients with Bulimia Nervosa.

Based on the conducted investigations, we identified changes in saliva composition, an increase in primary and secondary carious lesions, and a higher prevalence of dental erosion accompanied by hypersensitivity in patients suffering from Bulimia.

On the basis of these observations, a protocol was developed that can be applied in clinical dental practice for the prevention and management of oral complications resulting from the condition.

Protocol for the Prevention and Management of Oral Complications Resulting from Bulimia Nervosa

This protocol includes patient guidance, motivation, and methods for prevention and treatment based on the progression of oral pathology.

1. Toothbrushing should be postponed for at least one hour following an episode of self-induced vomiting and should be limited to a maximum of three times per day.

2. The oral cavity should be rinsed with water or a neutralizing solution such as a sodium bicarbonate solution, 0.9% NaCl, or mineral water with a high pH.

3. Fluoridated toothpaste should be used regularly.

4. After vomiting episodes, the tongue should be cleaned using a dedicated tongue-cleaning tool to remove residual acids retained in the lingual papillae.

5. For patients who apply excessive pressure during toothbrushing, the use of electric toothbrushes with pressure control features should be recommended.

6. Patients should be motivated to attend regular dental check-ups every 6–12 months for routine examinations and professional oral hygiene procedures.

7. During clinical evaluation, individual risk assessment should be performed using the BEWE (Basic Erosive Wear Examination) system, which is a quick and user-friendly tool for daily practice.

As our findings indicate that specific quadrants and tooth surfaces are more frequently affected in cases of Bulimia Nervosa, the BEWE index may underestimate the actual risk. Therefore, the following steps are recommended:

7.1 In cases where erosive lesions predominantly correspond to BEWE = 1, preventive dental check-ups should be scheduled every 12 months, along with fluoride prophylaxis once a year.

7.2 In cases where BEWE scores predominantly indicate a value of 2, patients should undergo preventive dental examinations every six months, accompanied by fluoride treatment at the same interval. Restoration of affected surfaces is recommended using composite materials, favored for their superior mechanical strength, aesthetic appearance, and ease of adjustment or repair when needed.

7.3 For cases with predominant erosive lesions graded as BEWE = 3, dental check-ups should take place every 6 months. Treatment should include restoration of lost hard dental tissues using composite restorations or palatal veneers, and reconstruction of lost vertical dimension through prosthetic treatment.

8. Timely treatment of all primary and secondary carious lesions.

9**.** Repair or replacement of defective restorations, as they may contribute to the development of secondary caries.

10. Management of hypersensitivity through various methods, including fluoride application, remineralizing toothpaste, gels, foams, and laser therapy.

V. CONCLUSIONS

1. A significantly higher prevalence of hyposalivation was observed among patients with BN, which constitutes a key contributing factor to the deterioration of oral health.

2. Alterations in salivary viscosity, characterized by increased thickness and adhesiveness, were documented. These changes compromise saliva's protective, buffering, and remineralizing properties.

3. Statistically significant differences in salivary pH values were found, further exacerbating the risk of dental erosion and caries.

4. The buffering capacity of saliva was notably impaired in BN patients, limiting its ability to neutralize acidic insults and support enamel remineralization, thereby increasing susceptibility to pathological processes.

5. BN compromises the natural defense mechanisms of the oral environment, creating conditions conducive to oral tissue damage.

6. Regular, structured monitoring of salivary parameters is recommended, as it may support timely preventive and therapeutic interventions.

7. An accelerated progression of primary and secondary carious lesions was found to be directly related to disordered eating patterns characteristic of BN.

8. Higher DMFT and DMFS scores were recorded among BN patients, indicating greater cumulative caries experience.

9. Recurrent self-induced vomiting was identified as the main etiological factor contributing to the development of dental erosions in this patient population.

10. Erosive lesions in BN patients exhibited a distinct topographic distribution, predominantly affecting specific quadrants and surfaces.

11. A patient-centered risk assessment approach is essential, taking into account clinical manifestations and the extent of erosion, for the effective management of erosive tooth wear.

12. The presence of acidic agents, both endogenous and exogenous, was recognized as a major predisposing factor for the onset of dentin hypersensitivity.

13. Dentin hypersensitivity may serve as a reliable clinical marker of active erosive processes in patients suffering from Bulimia Nervosa

VI. CONCLUSION

This dissertation is motivated by the increasing incidence of eating disorders in contemporary society.. Its aim is to raise awareness among both dental medicine practitioners and patients about the consequences for oral health and the potential complications. By recognizing the signs of the disease, dentists can assist patients in seeking treatment for the underlying condition through collaboration with medical professionals. An integrated approach is necessary when considering future treatment, involving both therapy for the primary eating disorder and management of the associated dental complications. The focus should be directed not only at symptomatic treatment of existing pathologies but also at prevention and comprehensive restoration of oral health in the context of the systemic condition.

The dissertation examined the main changes in saliva. In our opinion, the use of clinical tests to assess the qualities of saliva can be successfully applied in practice and serve as an auxiliary diagnostic method for the disease.

The dissertation established that individuals suffering from eating disorders, especially those whose behavior involves self-induced vomiting, are at significantly higher risk of developing oral pathologies such as dental erosion, tooth decay, and dentin hypersensitivity compared to healthy individuals.

VII. CONTRIBUTIONS

Contributions of scientific and practical value:

Original contributions:

1. For the first time in Bulgaria, a study was conducted on the qualities of saliva in patients with Bulimia Nervosa.

2. For the first time in Bulgaria, the prevalence of carious lesions and the assessment of DMFS and DMFT indices in patients with Bulimia Nervosa were investigated.

3. For the first time in Bulgaria, erosive defects in patients with Bulimia Nervosa were examined.

4. The most commonly affected tooth groups by erosion in patients suffering from Bulimia Nervosa were identified.

5. For the first time in Bulgaria, dentin hypersensitivity in patients with Bulimia Nervosa was studied.

Confirming contributions:

1. The impact of the disease on the properties of saliva is confirmed, which predisposes patients to the development of dental caries and erosion.
2. It is confirmed that dental erosions are directly associated with self-induced vomiting, which is characteristic of the disease.
3. The specific localization of erosions on the palatal surfaces of the upper anterior teeth and the occlusal surfaces of the lower molars in patients with Bulimia Nervosa is confirmed.
4. The presence of hypersensitivity in teeth with erosion is confirmed.

Applicable contributions:

1. A protocol for the prevention and treatment of oral complications resulting from Bulimia Nervosa has been developed.

VIII. PUBLICATIONS AND PARTICIPATIONS RELATED TO THE DISSERTATION

Publications:

1.The impact of eating disorders – Bulimia Nervosa and Anorexia – on oral health. A review. Mariana Kirova, Tsvetelina Borisova-Papancheva Department of Conservative Dentistry and Oral Pathology, Faculty of Dental Medicine, Medical University – Varna, 2021.

2.Changes in the size of the parotid gland in patients with Bulimia Nervosa. Mariana Kirova, Tsvetelina Borisova-Papancheva, Denitsa Zaneva-Khristova Conservative Dentistry and Oral Pathology, Faculty of Dental Medicine, Medical University – Varna, 2023.

3.Dentin hypersensitivity in patients with Bulimia Nervosa. Mariana Kirova, Boris Valkov, Tsvetelina Borisova-Papancheva Department of Conservative Dentistry and Oral Pathology, Faculty of Dental Medicine, Medical University – Varna, 2024.

Participation in Scientific Forums:

1.Jubilee Symposium: 10 Years Alumni Club and Friends – Medical University – Varna, April 1–2, 2022
Presentation on the topic: *"Dental Erosions in Patients with Anorexia and Bulimia Nervosa."*

2.Participation in the *Closing Conference of the Union of Scientists – Varna*, during the *"Month of Science" – Varna 2023*, on October 27, 2023
Topic: *"Changes in the Size of the Parotid Gland in Patients with Bulimia Nervosa."*
Mariana Kirova, Denitsa Zaneva-Khristova, Tsvetelina Borisova-Papancheva

3.Participation in the *Closing Conference "Science in the Service of Society"*, organized by the *Union of Scientists – Varna*, during the *"Month of Science" – Varna 2024*, on October 25, 2024
Topic: *"Dentin Hypersensitivity in Patients with Bulimia Nervosa."*
Mariana Kirova, Boris Valkov, Tsvetelina Borisova-Papancheva