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**PROSTHETIC TREATMENT OF PATIENTS  
WITH A STRONG NAUSEA AND VOMITING  
REFLEX**

**Abstract**

Of PhD Thesis

Scientific specialty: Prosthetic dental medicine

**Scientific Advisor:**

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The dissertation contains 162 pages and is illustrated with 21 tables, 95 figures and 6 pages. The bibliography consists of 175 sources, 45 of which in Cyrillic and 130 in Latin.

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

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## ABBREVIATIONS USED

GR	gag reflex
DDM	doctor of dental medicine
CNS	central nervous system
PhR	pharyngeal reflex
PR	Palatal reflex
RA	reflex arc
CBN	cranial brain nerves
CHTZ	Chemoreceptor Triger Zone
ET	Etiological factors
MF	Monofilaments
HR	Homeopathic remedies
RP	Removal prosthesis
VD	Vertical Dimension

## INTRODUCTION

The problem of increased sensitivity in the oral cavity, in which patients find it difficult to tolerate foreign bodies such as the dental mirror, dental films and impressions in their mouths necessary for diagnosis and treatment, is still a topical and difficult situation to manage.

The etiology of nausea is wide-ranging, and there are many management techniques from psychological intervention, prosthetic intervention, surgical intervention, pharmacological intervention till non-traditional medicine acupuncture and acupressure. But neither of them is enough effective, and often a combination of two or more techniques is needed to manage the pharyngeal reflex.

The most severe to control situation in prosthetic dentistry is the taking an impression of a patient with a gag reflex. Uncontrollable contraction of the muscles of the oropharyngeal complex can compromise the accuracy of the conventional imprint and this can affect the quality of the definitive recovery.

The nausea reflex is accompanied by symptoms from the sympathetic nervous system such as sweating, palpitations and rapid pulse, which ultimately turns out to be an unwanted sensation and experience for the patient. In addition, patients requiring prosthetic treatment with removable partial or whole dentures are most often elderly with concomitant diseases or regular medication, which narrows the range of methods for managing the nausea reflex.

# PURPOSE AND TASKS

## A. AIM

1. The aim of this dissertation is to study the reflex of nausea and vomiting in at-risk patients and to create algorithms for working with them in various prosthetic manipulations.

## B. TASKS

To achieve this goal, we set ourselves the following tasks:

1. To make a quantitative and qualitative study of the degree of the nausea and vomiting reflex in patients.
  - 1.1. Study and evaluation of pharyngeal reflex.
  - 1.2. Study and evaluation of the pharyngeal reflex and the superficial sensitivity of the mucous membrane in the areas activating the nausea reflex.
2. Comparison of the degree of the nausea reflex before and after administration of different medications.
  - 2.1. Comparison of pharyngeal reflex and surface sensitivity after using contact anesthesia with Lidocaine spray.
  - 2.2. Comparison of pharyngeal reflex and surface sensitivity after taking medications.
3. Creation of an algorithm of behavior in prosthetic dentistry in patients with a reflex of nausea.
4. Conducting a questionnaire survey.
  - 4.1 Among dentists about their experiences with patients with a dominant nausea reflex.
  - 4.2. Among patients with a dominant nausea reflex.

# MATERIALS AND METHODS

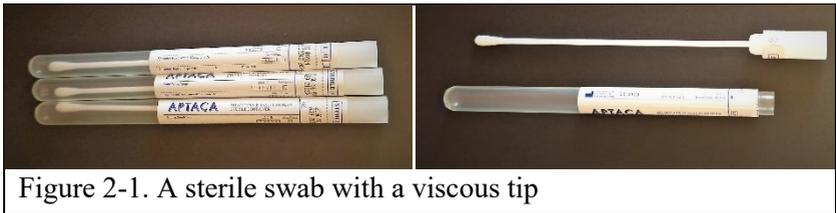
## Materials and methods for Task No. 1.

To make a quantitative and qualitative study of the degree of the nausea and vomiting reflex in patients.

For the purpose of the study, 121 patients were examined. The examinations of the two subtasks to task No. 1 were performed in the patient's first visit, after a primary examination, completion of informed consent and a questionnaire.

### 1. Study and evaluation of pharyngeal reflex.

An individual sterile swab with a plastic handle and a viscous tip in a package was used for each patient (Figs. 2-1).



Irritation was applied to the soft palate by the swab. Five intraoral zones were irritated defined by us: the zone of posterior palatal seal area, alternately in the left and right sides of the middle line, around the



Fig. 2-2a. Irritation in zone 2 with a sterile swab.



Fig. 2- 2b. Irritation in zone 5 with a sterile swab.

fovea palatinae (Figs.2-2a and 2-2b), the back third on the back of the tongue, its lateral edges and cheeks.

Irritation was administered three times in a row, and marked with a "+" when the nausea reflex was manifested and with a "-" when a nausea reflex was absent. It is filled in a specially developed table attached to the "Patient Examination Form". Besides the defined points in the soft palate area, we decided to add 3 more zones to the study the reflex arc (Annex 1 and Fig. 2-3).

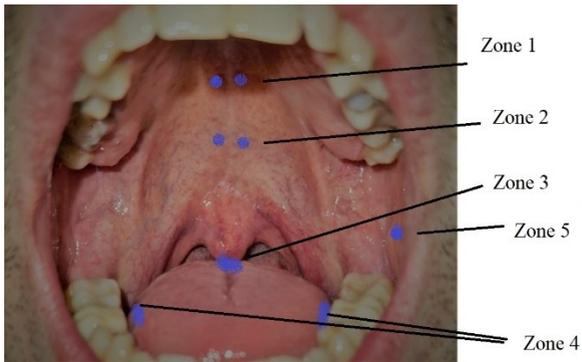


Figure 2-3 Zones for teasing

Zone 1 – Middle Tirth of the hard palate- to the left and right of the sutura palatinae

Zone 2 - Posterior palatal seal area and fovea palatini

Zone 3 - The back third of the tongue

Zone 4 - Lateral edges of the tongue - left and right

Zone 5 - Cheeks left and right

## 1.1. Study and evaluation of pharyngeal reflex and surface sensitivity of the mucous membrane in the areas activating the nausea reflex.

The monofilaments of Semmes-Weinstein (Aesthesio®, USA) were selected for the study carried out. Monofilament (MF) is a durable plastic thread of variable diameter, applied to leather or mucous membrane, bending they create a compressive force corresponding to the diameter of the MF. They are plastic fibers with approximately a logarithmic scale of actual force and a linear scale of perceived intensity. Each monofilament is indicated by a number that represents a given strength and then grouped into color-coded ranges.

For the purpose of the task, a set of five color-coded monofilaments representing the five levels of sensory thresholds was used. With dimensions: 2.83, 3.61, 4.31, 4.56 and 6.65, which are described in Tab. 2-2 and Fig. 2-4.

Table 2-2. Characterization of monofilaments			
	№ MF	Force/gram (g-f)	Sensory perception
Green	2.83	0.07	normal
Blue	3.61	0.2	Diminished light touch
Purple	4.31	2.0	Diminished protective sensation
Red	4.56	4.0	Loss of protective sensation
Orange	6.65	200	Untestable



Fig. 2-4 Set of 5 Monofilaments

MFs were applied to patients in a building sequence from the smaller to the larger number. They were applied in five zones of the oral cavity, symmetrically, on the left and on the right (Figs 2-5a and b and Fig. 2-6a and b).



Figure 2-5a. Irritation in zone 5 with monofilament size 4.56, red coding.



Figure 2-5b. Irritation in zone 1 with monofilament size 4.56, red coding.

Figure 2-5a and b. Irritation in different zones with the same kind of monofilament.



Figure 2-6a. Irritation in zone 2 of size MF 2.83, green coding.



Figure 2-6b. Irritation in zone 2 of size MF 4.31, purple coding.

Figure 2-6a and b. Irritation in the same zone with different size monofilament.

In each area, the presence or absence of sensation and the presence or absence of nausea was sought by marking it as follows with "+" or "-". The data were plotted into a specially created table (APPENDIX 1).

The principle of operation was as follows: when the tip of a fiber of a given length and diameter touches the mucous membrane at right angles, the force of application increases until the fiber bends. After bending, the continued squeezing of the nozzle creates more bending, but no more application force. The following recommendations were followed: due to the physical properties of the material making up the filaments, it is recommended to operate at a temperature between 18°C and 24°C. Sterilization is achieved by chemical agents, are not autoclavable.

## **Materials and methods of Task No. 2.**

### **2.1. Comparison of pharyngeal reflex and superficial oral sensitivity before and after using contact anesthesia with Lidocaine spray.**

120 patients took part in task No2. One of the patients was excluded from the respective study due to evidence of lidocaine allergy. For the purpose of the first subtask to task No. 2 was used painkiller contact agent for local action - Lidocaine 10% (Actavis Reykjavik, Iceland) – Fig. 2-7.

For the purpose of the study, the mucous membrane was dried with an air jet and the local anesthetic was initially sprayed onto a sterile swab and applied to the mucosal surface of the desired areas. In this way, it was possible to achieve better control over the analgesic effect in the precisely defined five zones described above, without being scattered outside them. The time required for the anesthetic effect of lidocaine hydrochloride to occur is 1 to 3 minutes. A round-robin check was carried out for the validity of the analgesic effect that occurred. Then it was proceeded to examine and evaluate the palate reflex and examine

and evaluate the surface sensitivity of the mucous membrane in the areas activating the nausea reflex. The results were plotted in a table for tests performed after administration of Lidocaine spray in the patient's examination form (Appendix 1).



Figure 2-7 Lidocaine- EGIS

## **2.2. Comparison of pharyngeal reflex and superficial oral sensitivity before and taking medications.**

In the first visit after the examinations under task No. 1, a premedication consisting of homeopathic remedies (HR) was appointed and an appointment was made for the next visit no earlier than the third day. Three types of homeopathic remedies were selected. They are monomedicine of a pharmaceutical laboratory founded in 1932 BIORON, headquartered in Lyon, France. Since 2009 in Bulgaria the company BOIRON is represented by "**BOARON BG**" Ltd. They are registered and available in the pharmacy network, they are available in the form of triple impregnated granules, placed in cylindrical translucent plastic packages. The latter have different coloring, respectively of the different dilutions: green – 5CH, blue – 9CH, orange – 15CH and violet – 30CH.

One monomedicine chosen by us was Gelsemium sempervirens (BOIRON Bulgaria ) with a dilution of 30CH (Fig . 2-8). The second selected product was Ipecacuanha 9 CH (BOIRON Bulgaria)(Fig. 2-9). The third monomedicine was Coccus cacti 5CH (BOIRON Bulgaria)(Fig. 2-10).



Figure 2-8 Gelsemium sempervirens 30 CH (BOIRON Bulgaria)



Figure 2-9 Ipecacuanha 9 CH (BOIRON Bulgaria)



Figure 2-10 Coccus cacti 5CH (BOIRON Bulgaria)

Each participant was told how HR was taken; each intake is five granules that are sucked under the tongue until completely dissolved. The intake of medicines could be done at any time, without being consistent with the diet. A medical prescription form was given with the recorded preparations, dosage, daily intake and admission schedule,

in the form of premedication. After three days, each patient had appeared at his pre-booked appointment for a quantitative and qualitative examination of the nausea reflex to be done again. The data were filled in a new table for tests performed after taking HR in the patient examination form (Annex 1).

### **Materials and methods of Task No. 3.**

#### **Creation of an algorithm of behavior in prosthetic dentistry in patients with a reflex of nausea.**

Based on the results obtained from the performed examinations under task 1 and 2, two algorithms of behavior in patients with enhanced palatal reflex were compiled.

In the first algorithm of behavior, the means of choice was a local anesthetic – lidocaine. The cases of prosthetic treatment of defects of the dental arch and of complete edentulous with removable partial or total dentures were considered.

For the compilation of the second algorithm of behavior of prosthetic treatment of patients with amplified palatal reflex, the three HRs, which were used for task 2, were selected.

### **Materials and methods of Task No. 4.**

#### **4.1. Conducting a questionnaire survey among dentists about their experience with patients with a dominant nausea reflex.**

Conducting a questionnaire survey among 150 dentists about their experiences with patients with a dominant nausea reflex. For the purpose of this dissertation, a questionnaire (Appendix 3) was prepared. In the statistical processing of the primary information collected, the following were used:

-Nonparametric analysis — search for statistical dependence between two traits measured on qualitative scales, by using  $\chi^2$  (Pearson's criterion of agreement, chi-square).

-Descriptive analysis. The following were used:

- One-dimensional tables of the frequency distribution and of the variety of traits characterizing the different parameters.

- Two-dimensional frequency distribution tables (cross-tabulation) to search for a relationship between category quantities.

- Graphical analysis – to illustrate processes and phenomena.

A critical significance level of  $p=0.05$  was used. The null hypothesis was rejected at a value of  $p>0.05$ , and the alternative hypothesis was confirmed at  $p<0.05$ .

#### **4.2. Провеждане на анкетно проучване сред пациенти с доминиращ рефлекс на гадене.**

A direct survey was conducted among patients with problems related to the gag reflex at the Department of Dental Materials Science and Prosthetic Dentistry at the Medical University of Varna. Subject of observation were 118 patients admitted to the department with the need for prosthetic treatment and voluntarily took part in the study (Location 4). The data were processed by statistical analysis with the IBM SPSS Version 26 program and the information was presented by means of diagrams.

A critical significance level of  $p=0.05$  was used. The null hypothesis was rejected at a value of  $p>0.05$ , and the alternative hypothesis was confirmed at  $p<0.05$ .

## **RESULTS AND DISCUSSION**

### **1. Results and discussion on task No. 1**

#### **1.1 Study and evaluation of pharyngeal reflex**

Categorical sign "Concomitant diseases".

In order to statistically interpret the results, a descriptive analysis and a method of crosstabulation (counterfactual analysis) were applied. The

data were entered and processed with the statistical package SPSS 23. For a significance level at which a null hypothesis is rejected,  $p < 0.05$  was chosen.

Table 3-1 presents the data from the results on the basis of "concomitant diseases" of the studied patients – and they are divided into two groups – the first group - "w.d" (without deviations) – i.e. absence of concomitant disease, and the second group – "with concomitant disease".

<b>concomitant disease</b>	<b>Frequency</b>	<b>Percentage distribution, %</b>	<b>Cumulatively distribution</b>
<b>without deviations</b>	39	32.2	32.2
<b>With concomitant disease</b>	82	67.8	100.0
<b>Total</b>	121	100.0	

The percentage distribution of the participants in the study - patients from the group "w.d." (32.2%) is almost twice less than those "with concomitant diseases disease" (67.8%). The crosstabulation is the second method of statistical processing in order to process the results.

The presence of GR by zones are showed in fig 3-5. In zone 2 (the Posterior palatal seal area and fovea), the nausea reflex was observed in 100% of the patients studied, followed by the 3-posterior third zone of the tongue (91.74%). It is less pronounced on the lateral edges of the tongue (zone 4 – 52.89%), in the middle of the palate (zone 1 - 45%) and weakest in zone 5 – buccal mucosa (38.01%).

- By categorical sign of "gender".

Descriptive analysis and method of crosstabulation by categorical sign "sex" for different zones were applied.

Table 3-3 summarizes the results of a descriptive analysis of frequency by the sign of "gender". The percentage distribution in the study, with 57% of patients being women and 43% being men out of 121 people.

<b>Table 3-3. Descriptive analysis of frequency by the sign "gender".</b>				
		<b>Frequency</b>	<b>Percentage distribution,%</b>	<b>Cumulatively distribution</b>
<b>Gender</b>	<b>Female</b>	<b>69</b>	<b>57.0</b>	<b>57.0</b>
	<b>Male</b>	<b>52</b>	<b>43.0</b>	<b>100.0</b>
	<b>Total</b>	<b>121</b>	<b>100.0</b>	

Analysis of results:

The percentage distribution of patients in the study was 57% for the female sex, and 43% for the male sex out of a total of 121 people. Patients with concomitant disease were 67.8% and patients without deviations were almost twice less 32.2% for zone 2. In each of the zones, the percentage distribution of the presence or absence of a nausea reflex is different. In the area of the zone 2, the nausea reflex was observed in 100% of the patients studied, in the 3-posterior third of the tongue 91.74%. Zone 4 is the lateral edges of the tongue (52.89%), the middle of the palate (zone 1 – 45.45%), and zone 5 – the buccal mucosa (38.01%).

### **1.1. Examination and evaluation of pharyngeal reflex and surface sensitivity of the mucous membrane in the areas activating the nausea reflex.**

It was applied a descriptive (descriptive) analysis and a method of crosstabulation (counterfactual analysis). The data were entered and processed with the SPSS 23 statistical package. For a significance level at which a null hypothesis was rejected,  $p < 0.05$  was chosen. The main

statistical processing method that was applied for the purpose of processing the results was crosstabulation.

Figures 3-10 to 3-19 graphically present the results of the examination for presence/absence of flair and nausea and the different numbers of monofilaments for each zone .

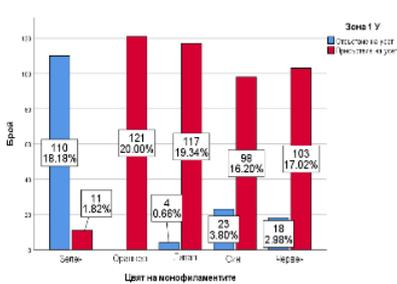


Fig. 3-10 Relationship between number of patients and presence/absence of flair for zone 1.

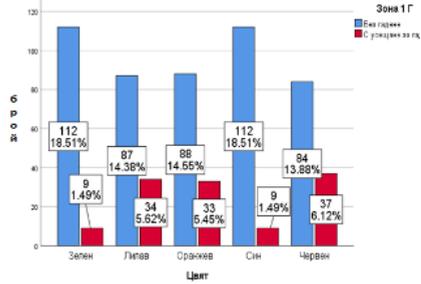


Fig. 3-10 Relationship between number of patients and presence/absence of flair for zone 1.

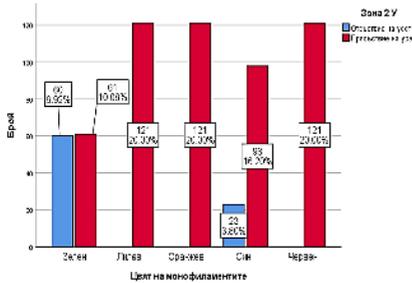


Fig.3-12 Dependence between number of patients and presence/absence of flair for zone 2.

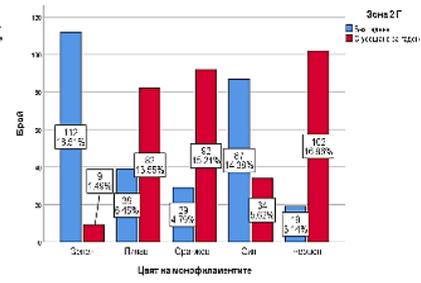


Fig. 3-13 Relationship between number of patients and presence/absence of nausea for zone 2.

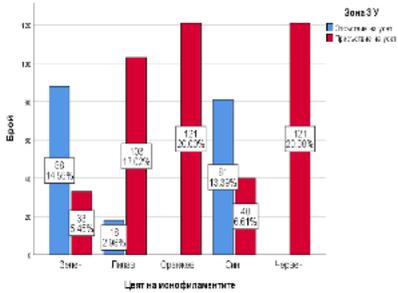


Fig. 3-14 Relationship between number of patients and presence/absence of flair for zone 3.

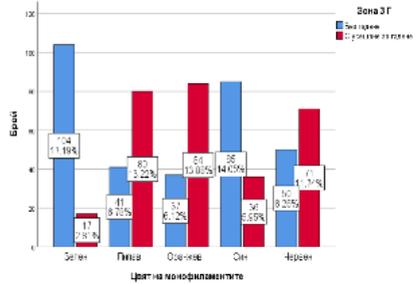


Fig. 3-14 Relationship between number of patients and presence/absence of flair for zone 3.

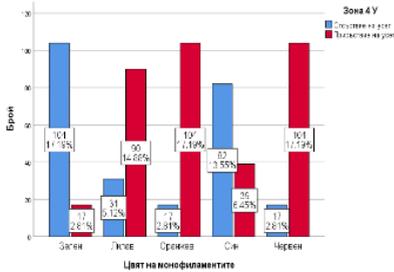


Fig. 3-16 Relationship between number of patients and presence/absence of flair for zone 4.

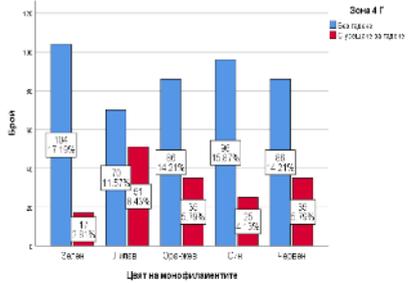


Fig. 3-16 Relationship between number of patients and presence/absence of flair for zone 4.

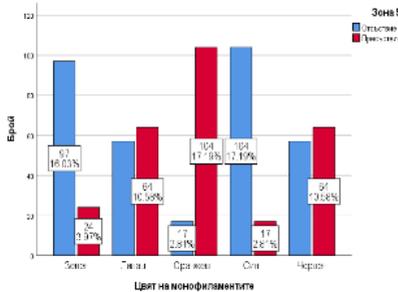


Fig. 3-18. Relationship between number of patients and presence/absence of flair for zone 5.

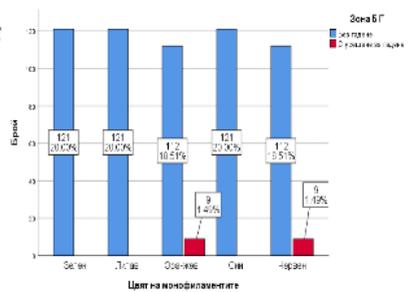


Fig. 3-18. Relationship between number of patients and presence/absence of flair for zone 5.

## Conclusions to Task No. 1

The most sensitive area of the oropharynx is Zone 2 - posterior palatal seal area and fovea palatini and the back third of the tongue. Less sensitive are the middle of the palate and the least sensitive are the lateral edges of the tongue and buccal mucosa. In terms of the gag reflex, it is strongest in the most sensitive areas - posterior palatal seal area and the posterior third of the tongue. It gradually weakens in the middle of the palate and is almost absent in the cheek area.

In zone 2, the nausea reflex had 100% of the participants to the viscous tip, which applied irritation with a larger area and without defined pressure. For the same zone, GR have 76.0% to the largest monofilament (number 6.65 and compressive force 200g) and 7.4% to the MF with the smallest size. Therefore, the nausea reflex depends on the size of the receptor field.

## 2. Results and discussion on task No. 2

### 2.1. Examination of pharyngeal reflex after administration of Lidocaine.

After application of a Lidocaine, the number of patients tested with the gag reflex was significantly reduced by 48.76% (arithmetic mean for all areas). Considered separately for each area, the most significant reflex of nausea was influenced in zone 2 (by 72.7%) and the least affected area was zone 5 (table 4-1 and figure 4-6). 16.84% of the patients studied had a nausea reflex after lidocaine administration.

	GR before Lidocaine num., % of total	GR before Lidocaine num., % of total	Difference in %
<b>Zone 1</b>	55 45,45%	12 9.9%	35.55%
<b>Zone 2</b>	121 100%	33 27.3%	72.7%

<b>Zone 3</b>	111 91.74%	37 30.6%	61.14%
<b>Zone 4</b>	64 52.89%	13 10.7%	42.19%
<b>Zone 5</b>	46 38.01%	7 5.8%	32.21%
<b>Average, %</b>	65.62%	16.84%	48.76 %

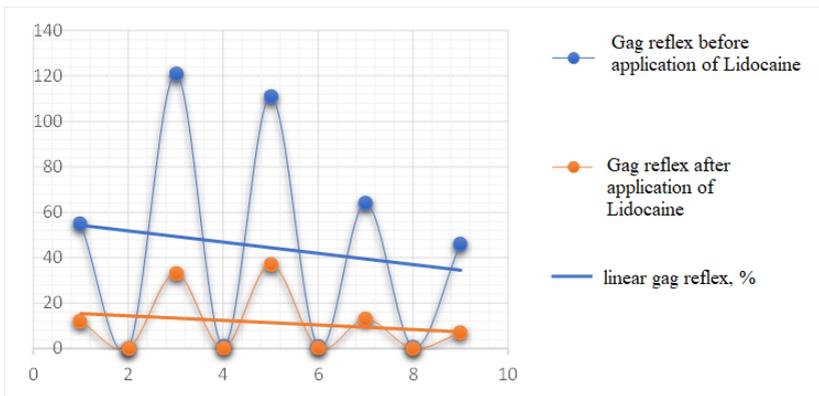


Figure 4-6 Comparison of the extent of the nausea reflex before and after Lidocaine application.

### **Comparison of pharyngeal reflex and mucosal surface sensory in the areas activating the gag reflex after Lidocaine application.**

In Figures from 4-7 to 4-16 are graphically presented in percentage distribution of patients from both groups (absence / presence of sensation and nausea) by zone and depending on the monofilament applied.

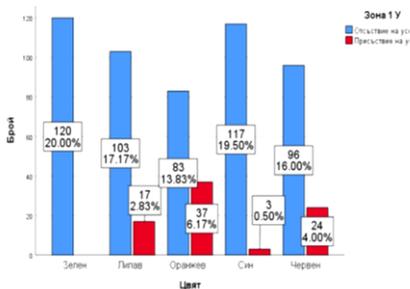


Fig. 4-7. Relationship between the number of patients with absence/presence of sense and MF number for zone 1.

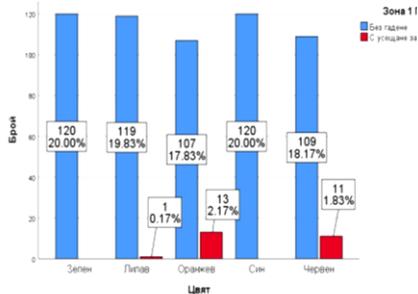


Fig. 4-8. Relationship between the number of patients with absence/presence of gag reflex and MF number for zone 1.

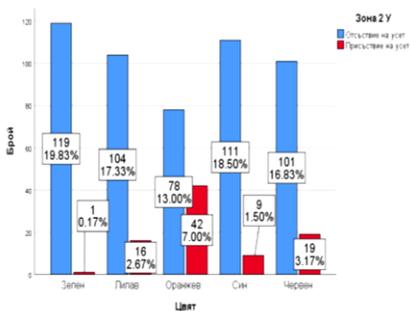


Fig. 4-9 Relationship between number of patients with absence/presence of sense and MF number for zone 2.

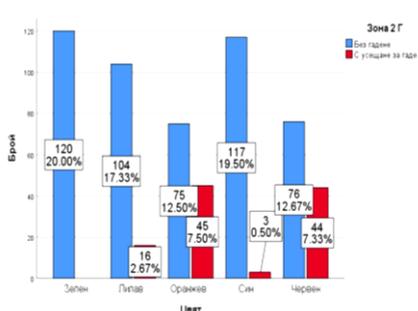


Fig. 4-10 Relationship between number of patients with absence/presence of gag reflex and MF number for zone 2.

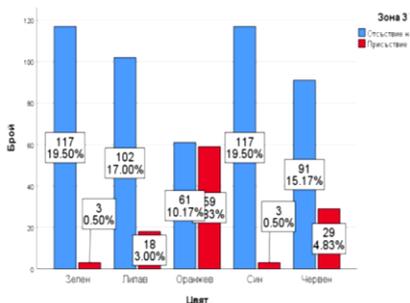


Fig. 4-11. Dependence between the number of patients with absence/presence of sense and MF number for zone 3.

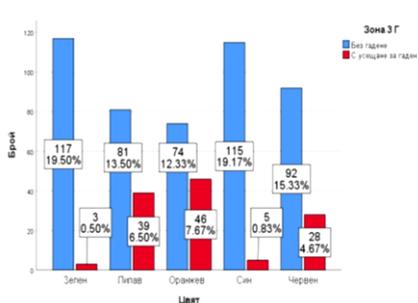


Fig. 4-12. Dependence between the number of patients with absence/presence of gag reflex and MF number for zone 3.

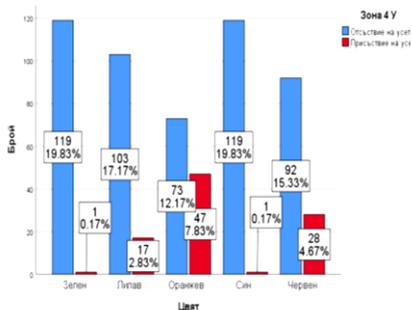


Fig. 4-13 Dependence between the number of patients with absence/presence of sense and MF number for zone 4.

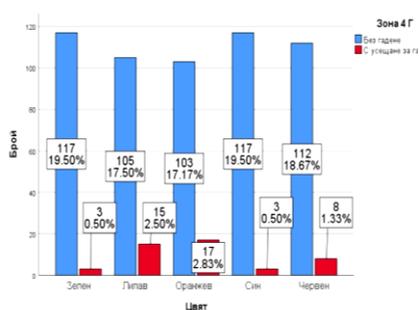


Fig. 4-14 Dependence between the number of patients with absence/presence of gagging and MF number for zone 4.

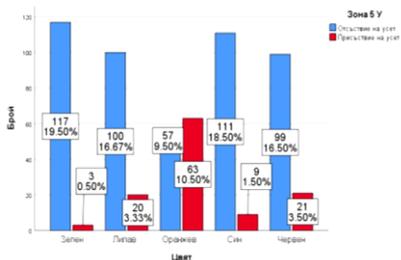


Fig. 4-15. Dependence between the number of patients with absence/presence of sense and MF number for zone 5.

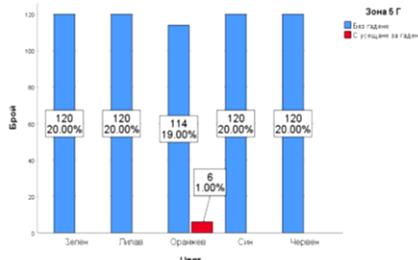


Fig. 4-16. Dependence between the number of patients with absence/presence of gag reflex and MF number for zone 5.

After application of Lidocaine, it was seen that tactile sense was significantly reduced (by 50.35%), as was the gag reflex (Fig. 4-17). The nausea reflex after the application of the contact anesthetic was decreased by 19.89% on average for all areas during the monofilament test. The nausea reflex after application of lidocaine in a small proportion of patients (10.19%) was not affected.

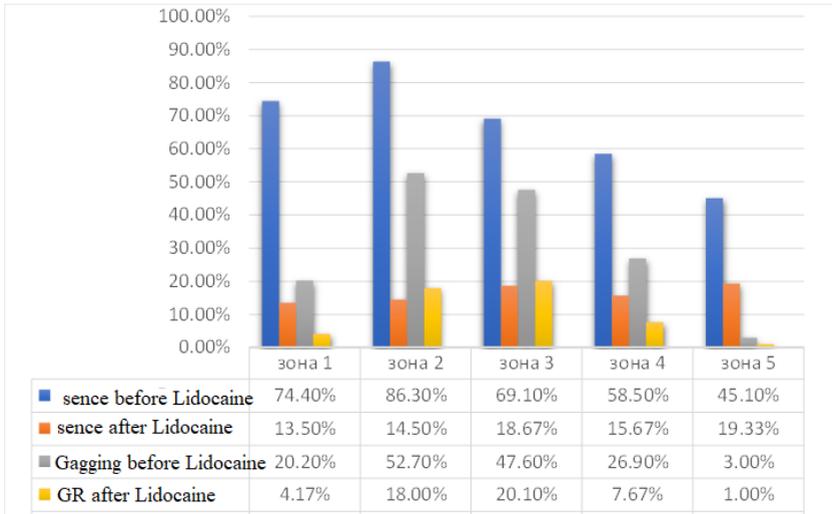


Figure 4-17 Comparison of sensitivity and reflex in the five oral zones before and after Lidocaine administration.

## 2.2. Comparison of pharyngeal reflex before and after taking homeopathic remedies.

After taking HR (Gelsemium sempervirens 30 CH, Ipecacuanha 9 CH, Coccus cacti 5CH BOIRON Bulgaria), the number of patients tested with the nausea reflex decreased by 44.30% arithmetic mean for all areas (Table 4-2 and Figure 4-23). 21.32% of the patients studied had a nausea reflex after taking HR.

	with GR before HR	with GR after taking HR	Difference in %
	num., % of total	num., % of total	
<b>Zone 1</b>	55	12	35.55%

	45.45%	9.90%	
<b>Zone 2</b>	121	60	50.40%
	100%	49.60%	
<b>Zone 3</b>	111	47	52.94%
	91.74%	38.80%	
<b>Zone 4</b>	64	10	44.59%
	52.89%	8.30%	
<b>Zone 5</b>	46	0	38.01%
	38.01%	0.00%	
<b>Average, %</b>	65.21%	21.32%	44.30%

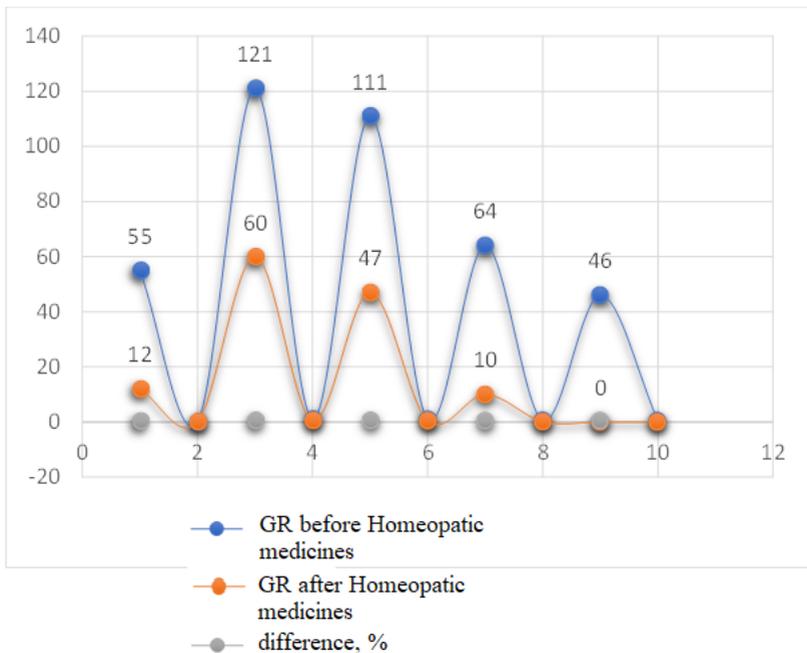


Figure 4-23 Comparison of the extent of the nausea reflex before and after taking homeopathic medicines.

## Comparison of pharyngeal reflex and superficial oral sensitivity in the areas activating the nausea reflex after taking HR.

Figures 4-24 to 4-33 present the results after taking HR and the presence/absence of sensation and nausea for each of the areas.

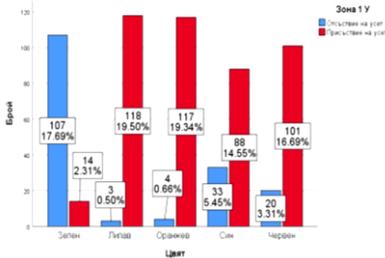


Fig. 4-24 Dependence between the number of patients with absence/presence of sense and MF number for zone 1.

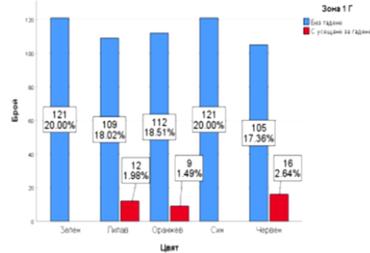


Fig. 4-25 Dependence between the number of patients with absence/presence of gagging and MF number for zone 1.

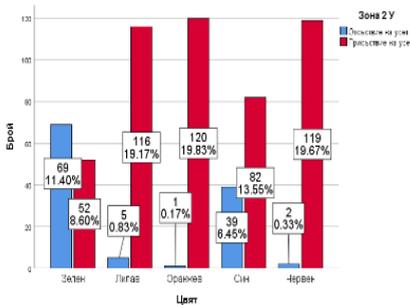


Fig. 4-26. Relationship between the number of patients with absence/presence of sense and MF number for zone 2.

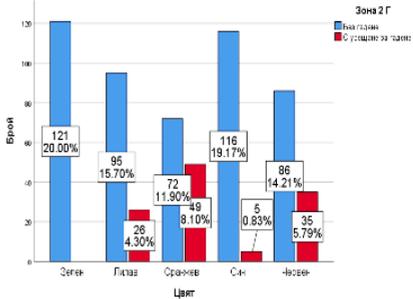


Fig. 4-27. Relationship between the number of patients with absence/presence of gagging and MF number for zone 2.

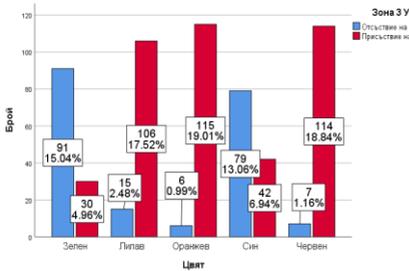


Figure 4-28 Relationship between number of patients with absence/presence of sense and MF number for zone 3.

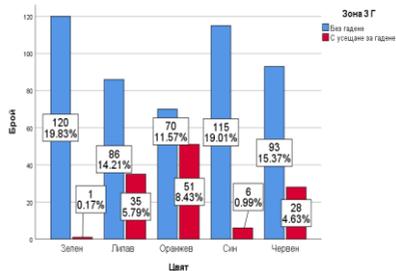


Figure 4-29 Relationship between number of patients with absence/presence of gagging and MF number for zone 3.

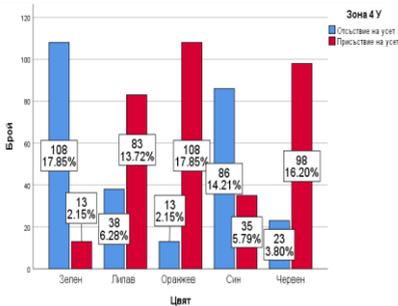


Figure 4-30 Relationship between number of patients with absence/presence of sense and MF number for zone 4.

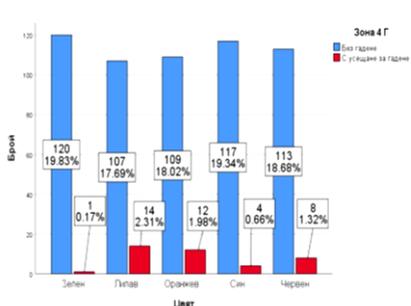


Figure 4-31 Relationship between number of patients with absence/presence of gagging and MF number for zone 4.

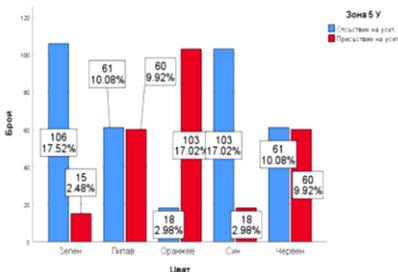


Figure 4-32 Relationship between number of patients with absence/presence of sense and MF number for zone 5.

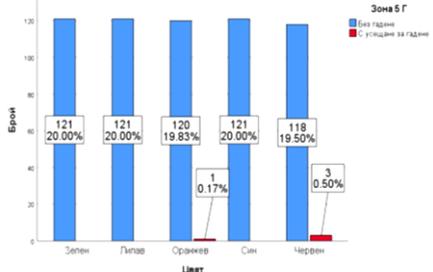


Figure 4-33 Relationship between number of patients with absence/presence of gagging and MF number for zone 5.

After taking HR, tactile sensitivity was seen to be unchanged in the five zones, while the nausea reflex was decreased (Fig. 4-34). The nausea reflex was decreased by 19.3% (arithmetic mean) for all areas in the monofilament test. It can be seen that in a small part (10.45%) of the studied patients the reflex of nausea is not affected by HR.

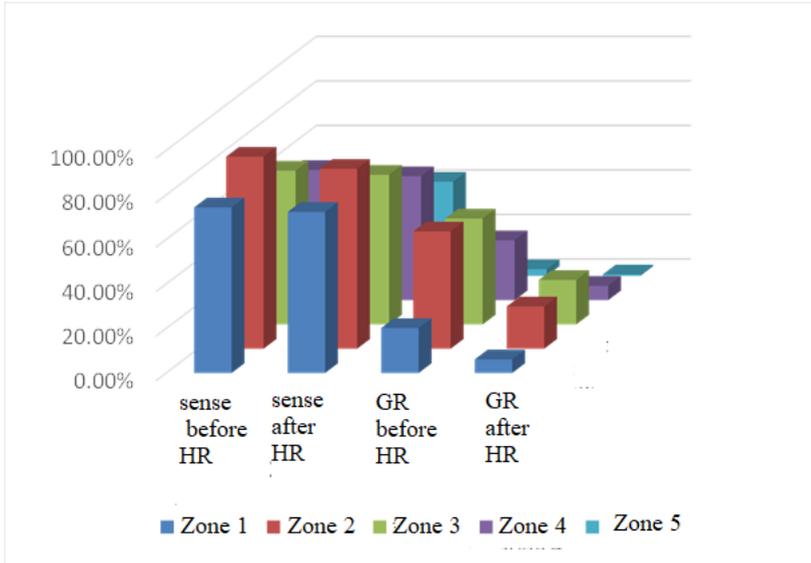
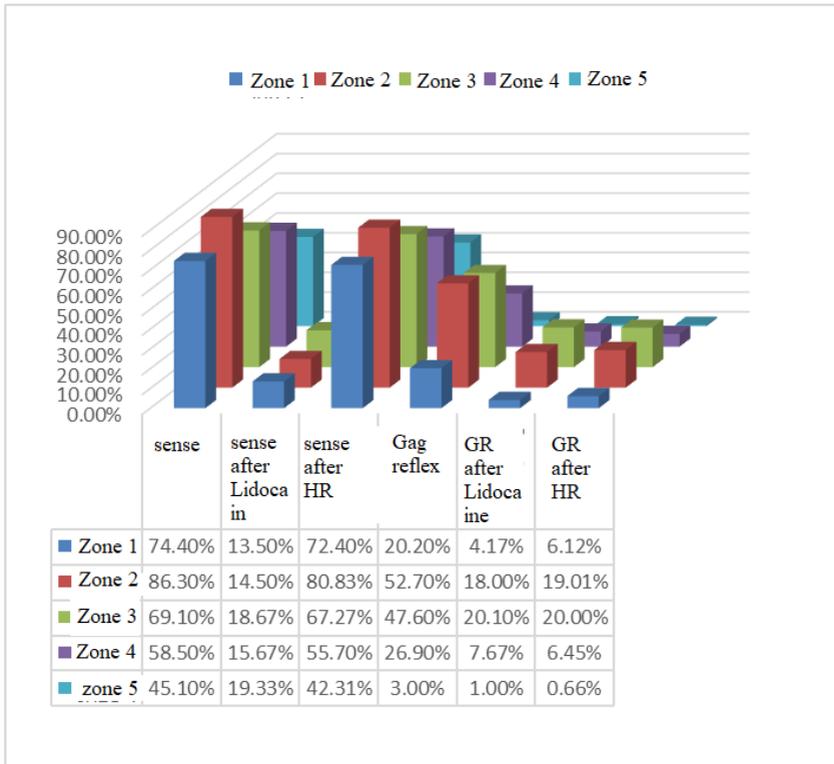


Fig. 4-34 Comparison of sensitivity and gag reflex in the five oral zones before and after HR administration.

### 3. Results and discussion on task No. 3

The results from the studies indicated that the efficacy for the gag reflex of lidocaine and homeopathic remedies was found to be approximately equivalent. The arithmetic mean difference of the five zones of patients with GR after administration of lidocaine and after taking homeopathic was less than 1% (0.26%)- Figure 5-1.



- Due to the fact that patients with the need for prosthetic treatment with removable partial or complete dentures are elderly and often with concomitant diseases and medication and allergic manifestations, the choice of lidocaine has situations where it is not suitable (tab.5-1).
- In such cases, homeopathist's (Gelsemium sempervirens 30 CH, Ipecacuanha 9 CH, Coccus cacti 5CH BOIRON Bulgaria) can be an alternative to dealing with gag reflex and an algorithm of behavior in prosthetic treatment of patients with GR can be compiled.

**Tab. 5-1 Summary of characteristics of Lidocaine-EGIS 4.6 mg/dose, solution**

Therapeutic indications	Dosage and method of administration	Contraindications	Warnings and precautions	Interaction with other medicinal products
<p>Oral anesthesia and surgical anesthesia in otolaryngology and dermatology</p>	<p>One dose is 4.6 mg lidocaine when pressing the dosing agent once.</p> <p>Dosage in dentistry: 1-3 sprays.</p>	<p>Hypersensitivity to the active substance or excipients.</p> <p>Before taking a gypsum impression due to aspiration risk.</p>	<p>In patients with epilepsy, bradycardia, conduction disorders, heart failure, impaired renal or hepatic function.</p> <p>In patients with acute porphyria, it is used only on urgent indications.</p> <p>Application of lower doses in patients with weakened defenses, elderly patients, acute diseases, and depending on their general condition.</p>	<p>Caution in patients treated with type IB antiarrhythmic drugs - risk of accumulation of toxic effects.</p> <p>Antiarrhythmics of III class (amiodarone), due to possible additive effects on the heart.</p> <p>Beta-blockers.</p>

On the basis of the results obtained from task No. 1 and No 2, two algorithms of behavior in the treatment of patients with partial removable dentures and total removable dentures were proposed:

1. Algorithm of behavior in prosthetic treatment of patients with vomitus reflex and administration of lidocaine (Fig. 5-2).
2. Algorithm of behavior in prosthetic treatment of patients with vomitus reflex and homeopathic remedies intake (Fig. 5-3).

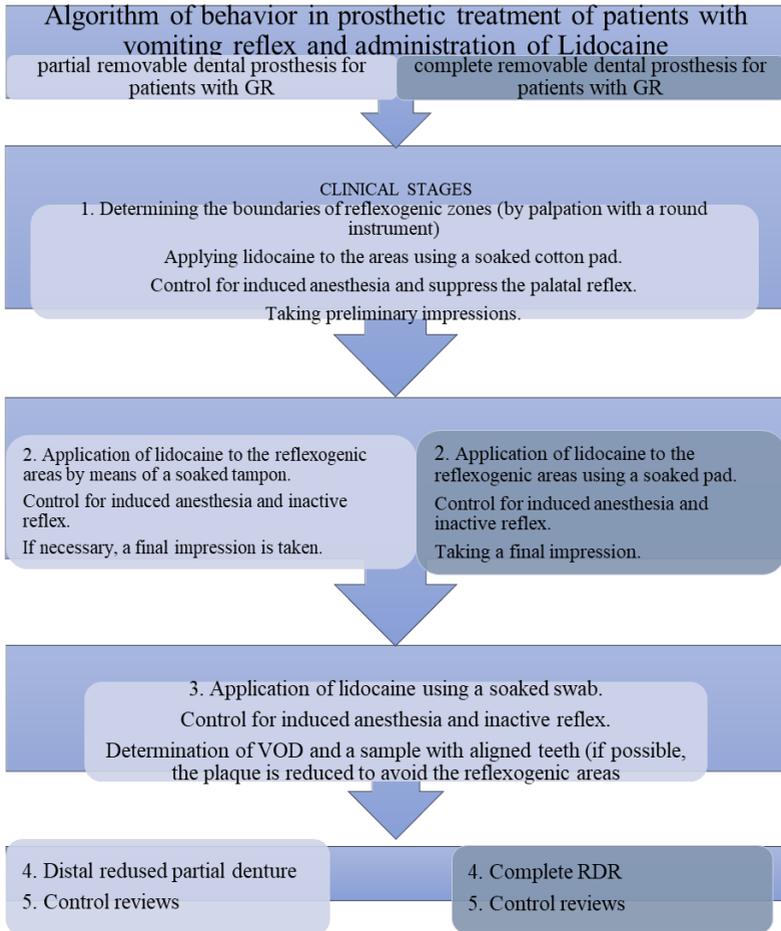


Fig. 5-2 Algorithm of prosthetic treatment of patients with WG and lidocaine-spray.

Patients within increased nausea reflex are intolerant to their dentures due to its contact with the receptor fields. Lidocaine reduces the nausea reflex, but is only applicable by the dentists in clinical settings. The algorithm of behavior to patients with an increased nausea reflex and administration of homeopathic remedies can be applied both

during the clinical stages and during the adaptation period by the patient himself.

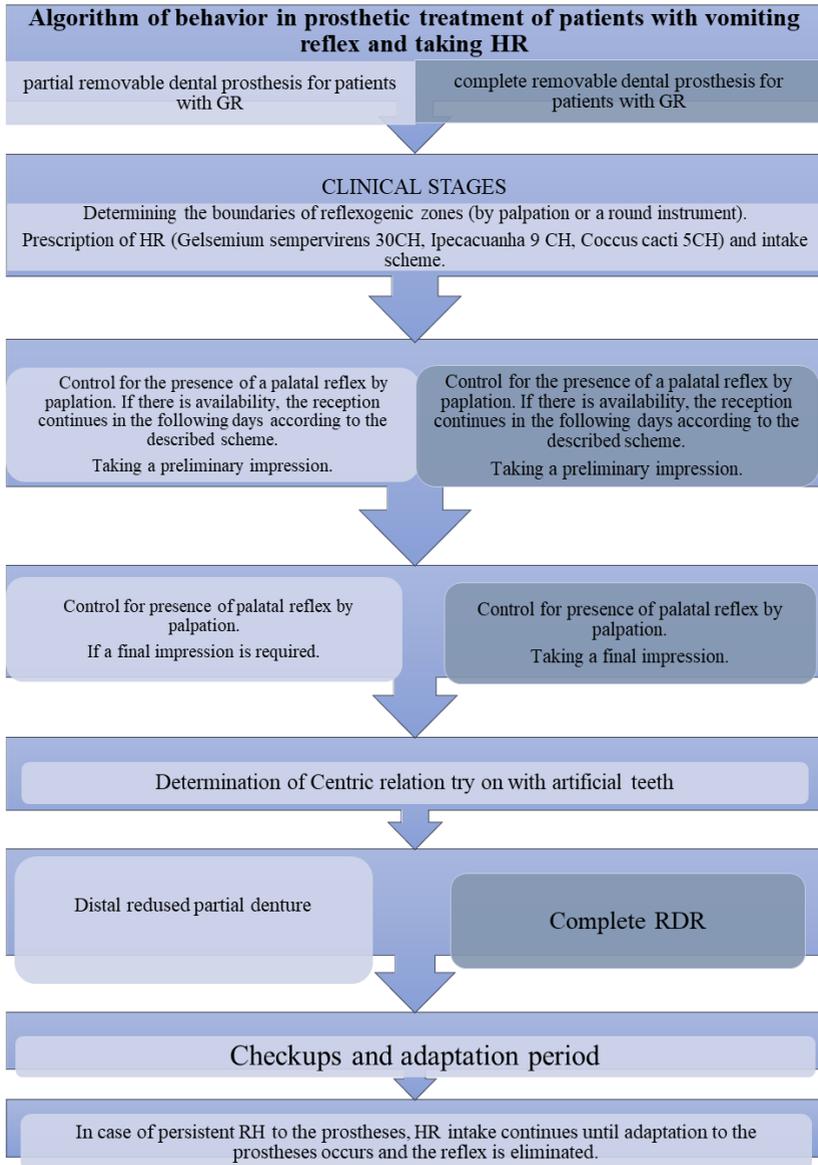


Fig. 5-3 Algorithm of prosthetic treatment of patients with GR and HR.

#### 4. Results and discussion on task No. 4

##### Results on task 4.1.

##### A survey aimed at dentists.

- Characteristic of the contingent by factorial sign.

The survey was attended by 155 dentists from all over the country. The respondents (85.8%) are general practitioners in dental medicine without a specialty, second (7.1%) are specialists in prosthetic dentistry, and the smallest share of them have another acquired specialty (0.6%).

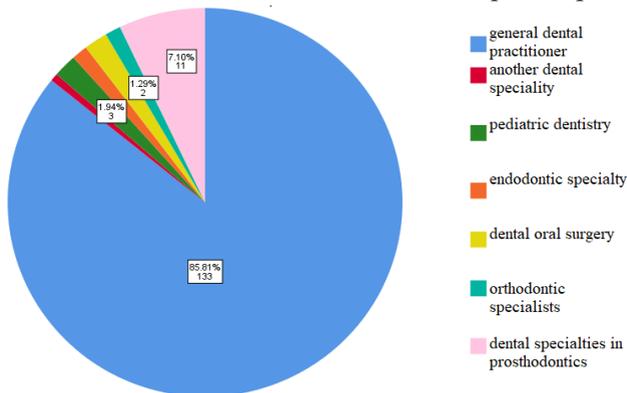


Fig.4-1. Specialty of dental medicine doctors

- Characteristic of the contingent by performing signs.

When asked if the respondents had patients with a nausea and vomiting reflex, the largest relative share (83.9%) indicated a "Yes" answer, and a significantly smaller proportion of dentists responded with "Sometimes", with no negative answers. By percentage distribution, the largest share of them gave the answer "Rare" (66.9%), and secondly, they answered the opposite – "Often" (31.2%) to the question "How often do you have patients with this problem?". The examination of a patient with the nausea reflex is "intermittent" in a large relative share of respondents (80.5%), and secondly "No problem" (19.48%).

In Figs.6-2 is presented the structural distribution of the answers to the question: "What measures do you take with patients who have a pronounced nausea reflex?". The largest share of DDM responded with "I appoint antiemetic LS" and in a smaller percentage were with "Visiting hours are longer" (34.7%).

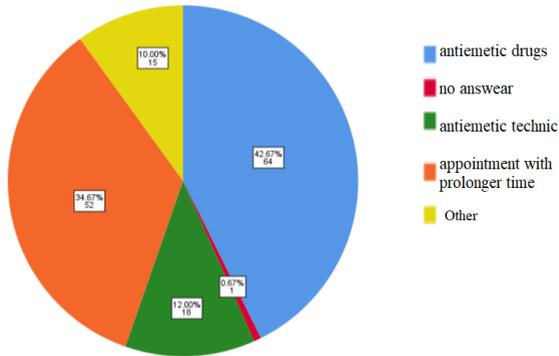


Fig.6-2. "What measures do you take with patients who have a pronounced nausea reflex?"

The percentage distribution by score sign "Does the patient visit affect your workflow schedule?" with the highest value for the answer "Yes" (62.1%) and less for "No" (37.9%).

To the question "Did it happen that you could not complete the patient's treatment with such a reflex?" the largest share of respondents gave a "yes" answer (54.8%), and 34.8% answered "no", at least with a response "only with additional intervention" (Fig. 6-3).

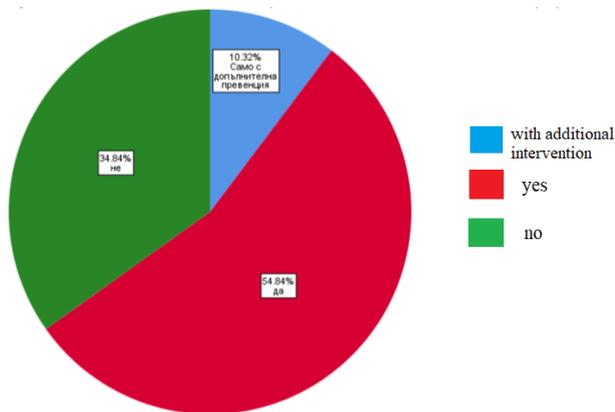


Fig. 6-3 "Have you ever been unable to complete the treatment of a patient with such a reflex?"

In Figs.6-4 are presented the results of the question "What methods and means do you use for the prevention of the reflex?". The largest percentage answered "Antiemetic agent", a smaller share gave the answer "Local anesthetic", followed by "Psychological approach", "frequent rests", "patience" and "breathing techniques".

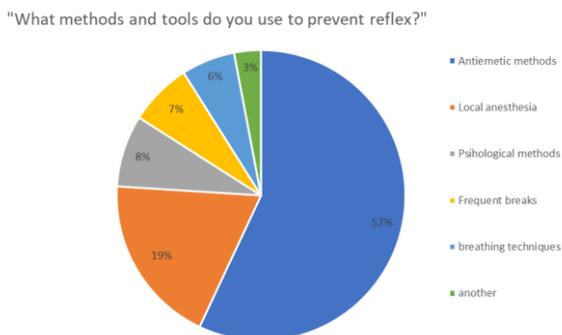


Fig. 6-4 "What methods and tools do you use to prevent reflex?"

The percentage ratio by scores of the question "Did you use contact anesthetic (Lidocaine, spray 10%)" was 67.1% for "Yes, and there was a positive effect", 22.6% with "Yes, but there was no effect" and only 10.3% answered "no" (Fig. 6-5).

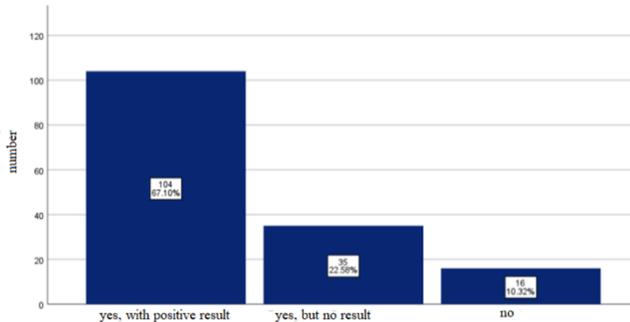


Fig. 6-5 "Have you used a contact anesthetic (Lidocaine, 10% spray)"

In Fig. 6-6 are presented the results of the question "Have you used terminal or conductive anesthesia to deal with the nausea reflex". The highest percentage is for the answer "No" (63.4%), and the lower for "Yes, and there was a positive effect", and the least are for "Yes, but it was not effective".

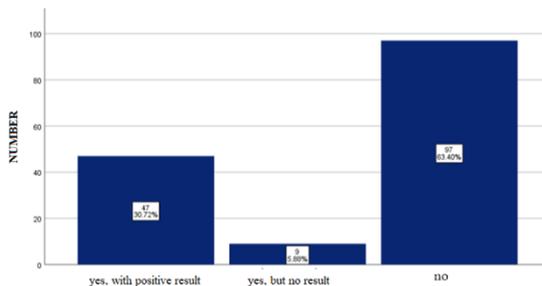


Fig. 6-6 "Have you used terminal or lead anesthesia to address the gag reflex"

Figure 6-7 reflects the results of the question "Have you used an antiemetic (Degan 10mg.)?". The most frequently chosen answer here is "Yes, and there was a positive effect" (57.1%), second is "No" and at least "Yes, but there was no effect".

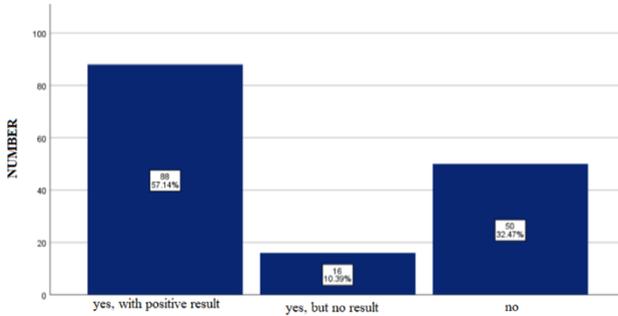


Fig. 6-7. "Have you used antiemetic (Degan 10mg)?"

The percentage distribution of the question "Have you used another antiemetic drug to prevent the nausea reflex?" shows that the largest proportion of DDMs answered "No" (61.4%), second with "Dimenhydrinate" (9.62%), followed by "Yes", "Cocculine" and "Vomitrus" (6.73%) (Fig. 6-8).

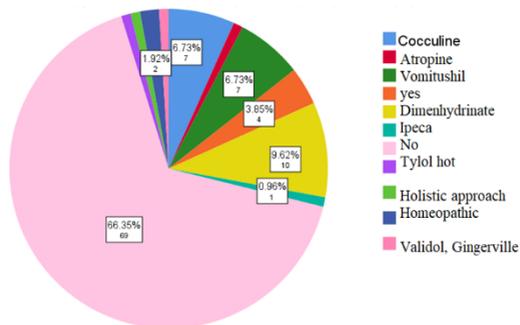


Fig. 6-8 "Have you used any other antiemetic drug to prevent the gag reflex?"

In Figure 6-9 are visible results from the question "Have you used a technique to prevent the nausea reflex? Tell me what it is." First of all, they gave the answer "No" (49%), followed by the remainder distributed respectively among the answers "Nose caressing", "Deep breathing through the nose", "I use cofferdam", "Frequent interruptions".

„Have you used a technique to prevent the gag reflex? Specify what it is.“

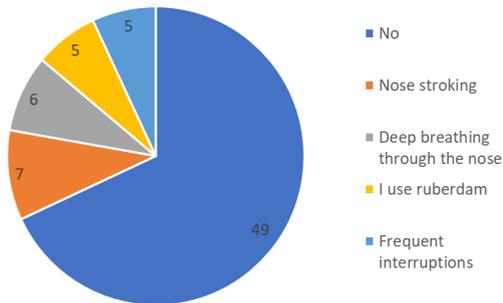


Fig. 6-9 "Have you used a technique to prevent the gag reflex? Indicate what it is."

The answers to the question "Have you used general anesthesia", with the majority of respondents answering "No" (94.1%) and the rest with "Yes".

The percentage distribution of the question "Has it happened that despite the measures taken, the gag reflex has not been overcome?", 74.7% gave a positive answer, and in a lower share answered "No".

The resulting distribution of the question "Note when the nausea reflex is most pronounced:" - the largest percentage answered "When taking an upper jaw impression" (50.3%), followed by "When working distal teeth" and in the smallest percentage "When blowing with air jet" and "Intraoral X-ray" (2.6%).

In Figure 6-12 are presented the results of the question "To what extent of importance do you define this problem for your practice? Underline the corresponding scale number!". The largest share of DDM were given by the answer "grade 3" (40%), secondly "grade 2" (34.2%) and "grade 4" and "grade 1" respectively as the smallest percentage of the given options.

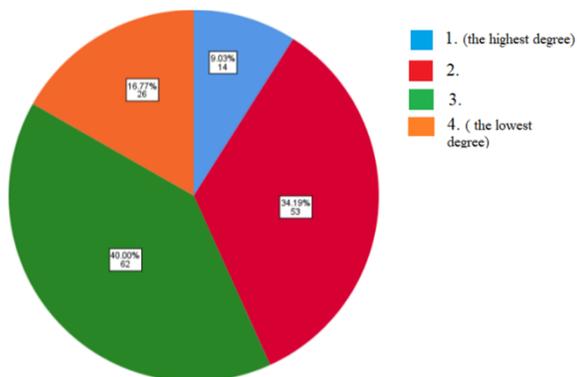


Fig. 6-12 "In what order of importance do you rate this issue for your practice? Underline the corresponding number on the scale".

### Correlation relationships

1. In order to find a correlation between the questions "Have you used the antiemetic Degan 10 mg?" and "Has it happened that you could not complete the treatment of the patient with such a reflex?", we will apply a statistical method of cross-tabulation.

The purpose of this test was to determine whether there was a correlation between the number of doctors who managed to complete the treatment despite the manifested nausea reflex and the use of Degan 10 mg.

Table 6-1 -> cross tabulation of the results of both questions

Table 6-2 -> results of  $\chi^2$  (Hi-squared) test at confidence interval 0.95

Cross tabulation ( $\chi^2$  Pearson test)\*

H0 - Null hypothesis: There is no correlation between the use of a degan and the completion of the treatment of the patient with a manifested nausea reflex.

H1 - Alternative hypothesis: Such a correlation exists and the use of Degan is directly related to the successful completion of the patient's treatment with a manifested nausea reflex.

**Pearson's  $\chi^2$  test (Completion of treatment \* Have you used Degan 10mg)**

ble 6-1. Pearson's  $\chi^2$  (chi-square) test (Completion of treatment \*\*  
ve you used Degan 10mg)

		Have you ever been unable to complete a patient's treatment with such a reflex?			Total
		yes	no	Only with additional prevention	
ive you used an tiemetic (Degan mg)?	Yes, and it had a positive effect	0	1	0	1
	Yes, but it had no effect	46	29	13	88
	No	14	1	1	16
Total		25	23	2	50
Total		85	54	16	155

Table 6-2. Results of  $\chi^2$  (chi-square) test at a confidence interval of 0.95

$\chi^2$ test - results			
	Values	Degree of freedom	Significance
Pearson's chi-square	14.815*	6	.022
Possible range	16.811	6	.030
N number of valid cases	155	0	0.0

Conclusion:

Using  $\chi^2$  Pearson criterion we estimate that the value  $\chi^2$  is equal to 14.815 at an observed degree of freedom equal to 6. For the corresponding degree of freedom and confidence interval, the value found of the magnitude  $P = 0.22$ . Since the found value  $P < 0.05$ , therefore, the null hypothesis is rejected and the alternative one is accepted, that is, the use of Degan is directly related to the outcome of the treatment of the patient with a manifested nausea reflex.

2. In order to establish whether there is a correlation between the answers to the questions "Have you used a contact anesthetic (Lidocaine, spray 10%)" and "Has it happened that you could not complete the patient's treatment with such a reflex?", we conducted again a statistical method of cross-tabulation.

The purpose of this test was to determine whether there was a correlation between the number of doctors who managed to complete treatment despite the manifested nausea reflex and the use of Lidocain 10%.

Table 6-3 → cross tabulation of the results of both questions

Table 6-4 → results of  $\chi^2$  test at confidence interval 0.95

Table 6-3. Pearson's  $\chi^2$  (chi-square) test (Completion of treatment \*\* Have you used a local? anesthetic (Lidocaine, spray 10%)

Pearson's  $\chi^2$  test (Completion of treatment \*\* Have you used a contact anesthetic (Lidocaine, spray 10%)

		Have you ever been unable to complete a patient's treatment with such a reflex?			Total
		yes	no	Only with additional prevention	
Have you used a contact anesthetic? (Lidocaine, spray 10%)	Yes, and it had a positive effect	58	36	10	104
	Yes, but it had no effect	21	9	5	35
	No	6	9	1	16
Total		85	54	16	155

Table 6-4. Results of the  $\chi^2$  (chi-square) test at a confidence interval of 0.95

$\chi^2$  test - results

	Values	Degrees of freedom	Significance (bilateral)
Pearson's $\chi^2$	4.847 <sup>a</sup>	4	.303
Possible range	4.689	4	.321
N number of valid cases	155	0	0.0

H0 - Null hypothesis: There is no correlation between the use of a contact anesthetic (Lidocaine, spray 10%) and the completion of the patient's treatment with a manifested nausea reflex.

H1 - Alternative hypothesis: Such a correlation exists and the use of a contact anesthetic (Lidocaine, spray 10%) is directly related to the successful completion of the patient's treatment with a manifested nausea reflex.

Conclusion:

Using  $\chi$  Pearson criterion we estimate that the value  $\chi^2$  is equal to 4.847 at an observed degree of freedom equal to 4. For the corresponding degree of freedom and confidence interval, the value found of the magnitude  $P = 0.303$

Since the found value  $P > 0.05$ , therefore, the alternative hypothesis is rejected and the zero is assumed, therefore the use of Lidocaine spray 10% IS NOT directly related to the outcome of the treatment of the patient with a manifested nausea reflex.

Analysis of the results :

From the conducted survey of 155 DDMs, manyhanded community are general practitioners of DDMs without acquired specialty, followed by specialists in prosthetic dentistry.

The majority of DDM respondents indicated that they have patients who exhibit an increased reflex of nausea and vomiting. And visits of

patients with GR are less common in dental hospitals, but affect the work schedule.

From the conducted survey it becomes clear that in a larger percentage distribution dentist encounters difficulties during the examination of a patient with GR and indicate that it proceeds with interruptions. Patients with an increased nausea and vomiting reflex are difficult to manage in routine dental procedures.

The experience of the majority of the DDM respondents is in the prescription of antiemetic drugs, then the administration of a local anesthetic.

More than half of the questionnaire DDM respondents used contact anesthetic "Lidocaine" and there was a positive result on the control of GR. The rest of them did not give a positive result or did not apply it at all. After a statistical method of cross-tabulation, the use of Lidocaine spray 10% NOT is directly related to the outcome of the treatment of the patient with a manifested reflex of nausea.

Less than half of the respondents indicated a positive result after the application of terminal or conductive anesthesia, In the larger percentage of them did not apply it or there was no result.

Contact anesthesia of the palate and pharynx area, sedation and general anesthesia are effective against gagging by allowing diagnosis and treatment, but take time and hide risk factors.

Regarding the prescription of Degan, the results of the conducted study show that 57% of DDM found improvement in patients after taking Degan, but the rest of the them either did not prescribe it or did not work. After a statistical method of cross-tabulation, it is believed that the use of Degan is directly related to the outcome of the treatment of the patient with a manifested reflex of nausea.

The most commonly used antiemetic remedies is Degan. The use of other antiemetic drugs among DDM is less prevalent, with Dimenhydrinate, Validol and representatives of HR ("Cocculine" and "Vomitus") being cut down.

Techniques for mastering GR after DDM are not commonly applicable, with 47% of them not applying them at all.

General anesthesia as a method of dealing with GR is rarely applicable. The reason for this is that it cannot be used in general dental practice, an anesthesia team is needed to introduce a patient under general anesthesia and requires more time.

According to the DDM, which took part in the study, GR has the brightest expression during taking an maxillary impression – first, then when working on distal teeth and thirdly, even during an examination.

It can be seen from the survey carried out that, despite the large range of measures, the gag reflex has not been overcome in most cases.

#### **Results on task 4.2.**

#### **A questionnaire study aimed at patients with a nausea and vomiting reflex.**

The survey was voluntarily attended by 118 patients who entered the Department of Materials Science and Prosthetic Dentistry at the Faculty of Dental Medicine in Varna. Compared to the factorial sign "gender", 57% were women and 43% - men. By age criterion, their distribution is presented in Fig. 6-13.

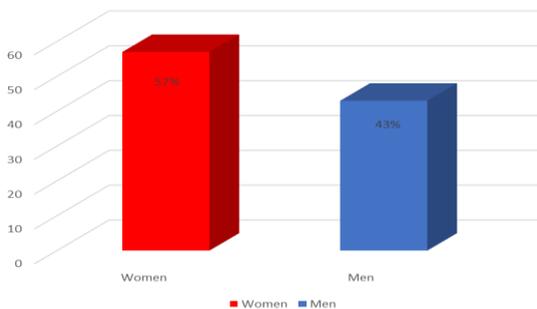


Fig. 6-13 Distribution by sex

The largest share is over 60 years old. (58%), followed in second place by the age group 40 to 50 years (26%) and 50 to 60 years (24%), and the smallest part of the respondents were aged 25 to 30 years (5%). There are no representatives from the age group from 30 to 35 years.

To the question from the survey "Do you have a feeling of nausea / vomiting during examination of the oral cavity / throat?", the highest percentage answered "Yes" (71%), which shows the topicality of the problem under consideration. Only 29% of respondents said they had no sensation of nausea/vomiting when examining the oral cavity/throat.

In Fig. 6-14 are the presented results of the question: "How prominent (in force) would you define it by strength from 0 to 10?". In the highest percentage (21%) they gave the answer "0", and secondly they rated the grade as "8", with a close percentage followed by a response "9". In a lower proportion they answered "7", "5" and "6". One participant answered "1", the answer for degree of strength "2" is missing.

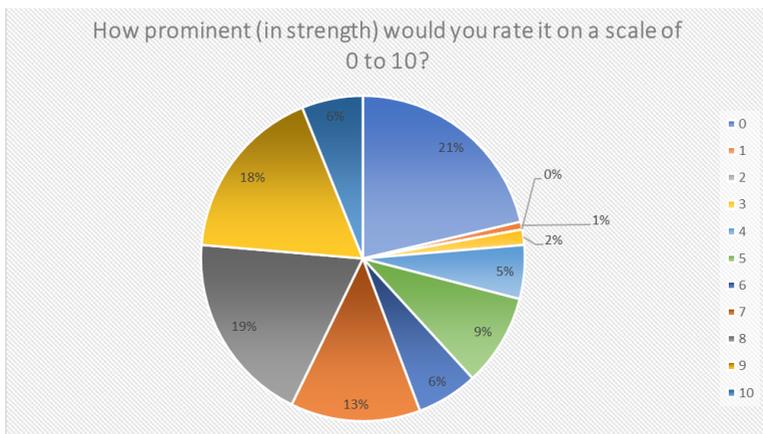


Fig. 6-14 Percentage distribution of responses to the question, "How prominent in strength would you rate it from 0 to 10?"

The respondents who wear removable dentures are 46% and a small part of them (33%) are intolerant due to a nausea reflex. The rest have never worn partial or total removable dentures.

In Fig. 6-15 are visible results from the inquiry "What is the type of removable prosthesis?", with 40% of patients answering "On an upper jaw" and fewer of the respondents giving the answer "Whole prosthesis". With a difference of 3% in third place gave the answer "Partial prosthesis". With a lower percentage, they answered "On the lower jaw".

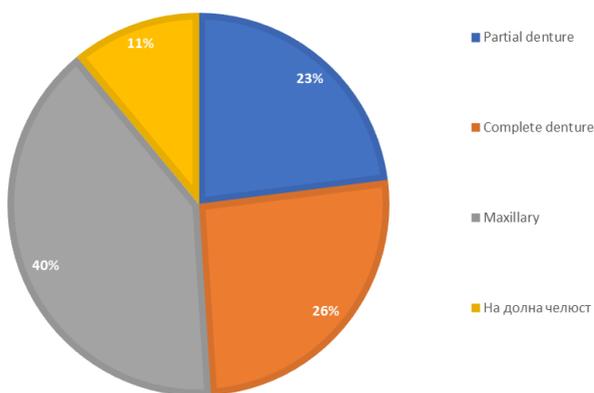


Fig. 6-15 Percentage distribution of responses to the question, "What is the type of removable prosthesis?"

In Figs. 6-16 are presented the percentage distributions of the answers by the respondents to the question "How long have you been wearing your prosthesis?". The largest share was the answer "About 10 years" (31.7%), followed by the answer "Between 1 and 5 years" (25%). The answers "Less than a year" and "More than 10 years" (16.7%) were the same. The lowest share was the answer "Just over a year" (6.7%) and "Over 5 years" (3.3%).

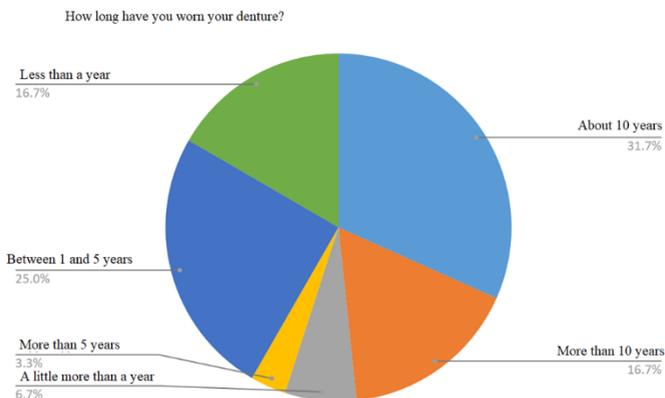


Fig. 6-16 Percentage distribution of responses to the question "How long have you worn your denture?"

In Figs.6-17 are presented the results of the question: "At what moment did the nausea occur?", with 68% of patients giving the answer "During the fingerprint", followed by the answer "Every time I put on my prosthesis?" and last in frequency the answer: "At the first placement of the prosthesis".

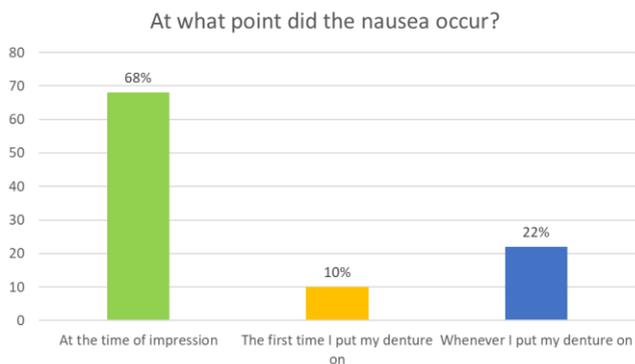


Fig. 6-17 Percentage distribution of responses to the question "At what point did the nausea occur?"

To the question: "Do you still have difficulty wearing it?" In the largest percentage share were those who answered "No" (78.3%) and 21.7% answered "Yes".

In Figs.6-18 are visible the results of the question: "Did you have previously experienced a feeling of nausea/vomiting?", with the largest part giving the answer "Yes" (67.2%), and secondly with "No" (26.6%), while at least they answered "Rare" (6.3%).

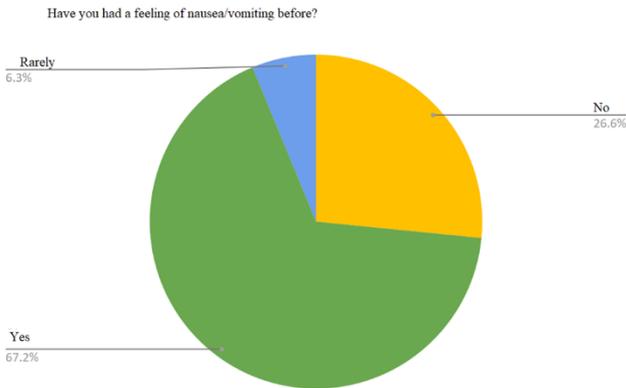


Fig. 6-18 Percentage distribution of responses to the question, "Have you had a feeling of nausea/vomiting before?"

In Figs.6-19 are presented the percentage distributions of the answers to the question "Does brushing teeth and/or flossing induce a urge for nausea/vomiting? How often does it appear?" The answer "Never" (38.1%) ranked second (18.6%), followed by the answer "Rare" (16.9%). At least of the respondents gave the answer "Yes" (3.4%).

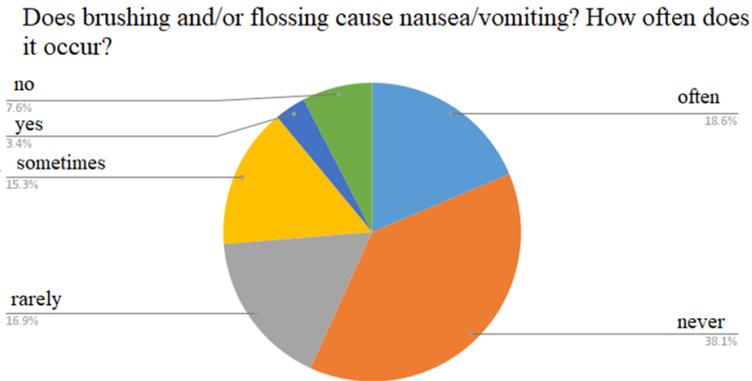


Fig .6-19 Percentage distribution of responses to the question, "Does brushing and/or flossing cause nausea/vomiting? How often does it occur?".

To the question "Has coughing caused you nausea / vomiting?" the largest part of the respondents gave the answer "No" (77%), and second with 38% of them answered "Yes". At least they responded with "Sometimes" (2%) and "Never" (1%).

To the question "How do you feel when you wait at the dentist for upcoming treatment?". The largest percentage responded with "I do not experience any nausea" (73.7%), and the second most frequent response was "I feel slightly nauseated" (17.8%). At least they responded with "I'm afraid I'll vomit" and "I'm experiencing real throat cramps." The largest percentage of respondents answered "No" (57.6%) and positively answered 42.4% to the question: "Do unpleasant, intrusive smells cause you nausea / vomiting?".

In Figure 6-20 are visible the results of the inquiry: "Have you ever experienced a feeling of nausea / vomiting in a dental office?". In the highest percentage of respondents gave the answer "No", with only 1.1% difference responding positively (41.1%). The answer "Sometimes" was given by 18.8% of the participants in the survey.

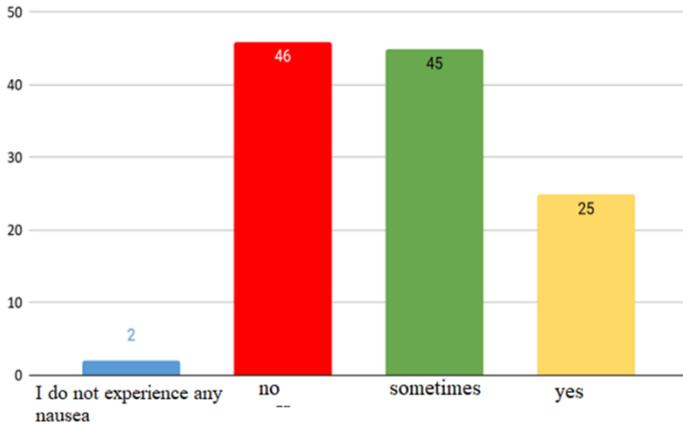


Figure 6-20 Percentage distribution of results from the question, "Does nausea occur when touching lips and cheeks with the dental mirror during the dental examination?"

In Figs.6-21 the results of the question are presented: "Highlight in which of the cases the feeling of nausea/vomiting is strongest". First of all, they indicated the answer "When taking an imprint" (45%), followed by the answer "When brushing your teeth" (25%). Third in frequency they responded with "At examination by a dentist" (18%) and fourth with a small difference they gave the answer "On an intraoral X-ray" (15%). At least they responded with "I don't feel any nausea," "Other," and "In the waiting room of the dentist's office."

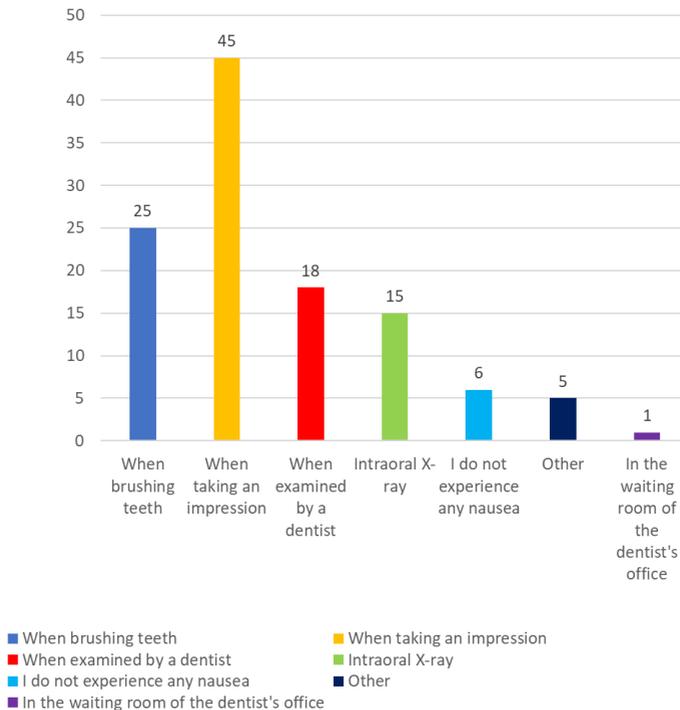


Fig. 6-21 Percentage distribution of the results of the question "Underline in which of the cases the nausea/vomiting sensation is strongest"

To the question: "Have you ever vomited during a dental procedure?" with 93.4% answering "No" and only 6.6% answering "Yes".

The results of the question: "How do you cope with the feeling of nausea/vomiting before the dental visit?". The largest share of patients gave the answer: "I do not take action" (48.1%). 19.8% of respondents responded with "I show up on an empty stomach." In a lower percentage

they responded that they take a certain type of pill against vomiting (sodium citrate, dimenhydrinate, lidocaine, degan, zofrane).

#### Analysis of results:

The survey on the occurrence of an increased reflex of nausea and vomiting involved 118 patients, of whom the female sex predominated. Most of the respondents are people over the age of 60.

The higher percentage of participants (71%) reported feeling nauseous/vomiting during an oral or throat examination, which indicates the relevance of the problem under consideration. But in determining the power of manifestation of the nausea reflex, the responses are diverse, which indicates the subjective nature of the problem studied.

Each of them needed prosthetic treatment, with 46% of them having removable prosthetic constructions from previous prosthetic treatment, and the remainder (54%) did not wear removable prosthesis (RP). 33% of patients carrying RP are adamant that they are intolerant to them due to nausea and vomiting.

Depending on the type of prosthesis, on the nausea reflex, a whole upper jaw prosthesis causes the nausea reflex more often than a partial prosthesis of the lower jaw.

Some of the study participants who first entered the Department of Prosthetic Treatment with RP experienced nausea during impression taking (68%), 10% of the interviewed patients experienced nausea only at the first placement of the prosthesis.

21% of patients reported having difficulty with the nausea reflex when wearing their new dentures. This shows that for a patient with an intense reflex of nausea and vomiting, the problem does not exist only during the clinical stages of the manufacture of removable dentures and does not end after its transmission.

From the analysis of the results of the survey on the cause of GR, it follows that the participants had a feeling of nausea and vomiting, not only from the prosthetic structures, but also before. In some of them,

brushing teeth provokes the gag reflex, coughing also provokes the reflex in a small hour t-2%. It also becomes clear that in the etiology of the augmented gag reflex there is also a psychoemotional component. Although in a small percentage, the patients surveyed answered that the appearance of nausea and vomiting is provoked by unpleasant odors, tension, a feeling of fear and obsessive thoughts. And nearly 40% experience tension and fear before dental treatment.

From the last question "How do you cope with the feeling of nausea / vomiting before the dental visit?" - the majority do not take measures or appear on an empty stomach indicating that patients are not informed and are not prepared to cope with the amplified reflex themselves during and after dental prosthetic treatment.

## CONCLUSIONS

1. It was found that the majority of patients are not well informed and are not prepared to cope with the intensified nausea reflex themselves during and after dental treatment.
2. It is confirmed that 71% of patients have a feeling of nausea and vomiting when examining the oral cavity or throat and determining the strength of the manifestation of the nausea reflex is subjective in nature.
3. It was found that 68% of patients who first enrolled for prosthetic treatment with removable dentures experienced nausea during impression taking and 10% experienced nausea at the first placement of the denture.
4. It has been confirmed that 46% of patients wearing removable dentures are intolerant due to nausea and vomiting. 21% of patients have difficulty with the nausea reflex when wearing their new dentures. Therefore, in patients with an increased reflex of nausea

and vomiting, the problem exists, both during the clinical stages and with their adaptation to the prosthesis.

5. It was found that 57% of DDMs prescribed an antiemetic drug to patients with a nausea reflex and devoted more of their clinical time.
6. It was found that more than half of the DDM used the contact anesthetic "Lidocaine" to control the nausea reflex, but in 21% it did not work.
7. It has been found that patients requiring prosthetic treatment are over 60 years old. and 68 % of them have concomitant diseases.
8. It was confirmed that the posterior palatal seal area (zone 2) the nausea reflex was strongest and was observed in all patients examined. 57% of them are female and 43% are male. In the area with the weakest gag reflex, the percentage distribution of patients was 20.66% for female and 17.36% for male.
9. Two others strong reflexogenic zones were confirmed: zone 3 – 91.74% of patients have a reflex in the area of the back third of the tongue and 52.89% have a gag reflex in zone 4, which is along its lateral edges.
10. The remaining two zones are less corrective: zone 1 (middle of the hard palate – 45% with GR) and zone 5 (buccal mucosa with 38.01%).
11. The triggering of GR depends on the size of the receptor field, not on the superficial or deep sensitivity. The nausea reflex studied with the sterile viscous tip was challenged in a larger group of patients studied compared to those tested with the monofilaments.
12. It has been confirmed that there is a direct relationship between surface sensitivity and the occurrence of a nausea reflex.
13. It was found that after administration of lidocaine, the number of patients tested with a gag reflex significantly decreased by 48.76% arithmetic mean for all areas (tested with the viscous tip). In 16.84% of patients, the nausea reflex after lidocaine administration was not affected. Sensitivity was decreased by 50.35%. Therefore, lidocaine

- first and better blocks tactile sensation, which is a disadvantage due to the risk of aspiration or ingestion of foreign bodies or saliva.
14. It was found that after taking homeopathic medicines, the number of patients tested with the gag reflex decreased by 44.30% arithmetic mean for all areas (tested with a viscous tip). In 21.32% of patients, the reflex was not affected after taking HR. The sensitivity studied with the Monofilament was found with a slight difference – 3% before and after HR administration.
  15. The difference between patients with a gag reflex after lidocaine and after taking homeopathic remedies is 4.48%, therefore HRs can be used as an alternative to lidocaine.
  16. Algorithms of behavior in prosthetic treatment of patients with a strong nausea reflex are developed.

## **CONCLUSION**

The nausea reflex occurs mainly with the tactile irritation of reflexogenic areas during dental procedures and has a variety of polyetiological. By its nature, it is a normal defense mechanism in which spasmodic and uncoordinated muscle contractions of the oropharynx, tongue and upper gastrointestinal tract occur. It is accompanied by symptoms from the parasympathetic and sympathetic nervous systems. The parasympathetic nervous system is responsible for increased salivation and deep breathing preceding actual vomiting. The activation of the sympathetic nervous system leads to sweating, palpitations and rapid pulse. Nausea and vomiting are accompanied by symptoms from the autonomic nervous system such as pallor, fainting, tachycardia, excessive sweating and hypersalivation and therefore it is a difficult situation to manage and is still a topical problem for dentists. The methods and means of managing the nausea reflex are diverse, but so far there is no one-size-fits-all approach.

The results of this dissertation show that a large number of patients with a need for prosthetic treatment and enhanced pharyngeal reflex are elderly, often have concomitant diseases or regular medication. The most reflexogenic zones have been confirmed – the zone of the Posterior palatal seal area and the posterior third of the tongue. The most sensitive areas of oropharynx, which are within the reach of prosthetic dentistry, have been studied. From the conducted survey dentists most often use antiemetic medications and topical anesthesia as conduction or terminal anesthesia is avoided. Due to frequent allergic manifestations to lidocaine and warnings about its use in certain diseases, three homeopathic remedies were selected due to the better safety profile.

During the comparative analyses of tactile sensory reflexogenic of the zones after application of lidocaine and after the intake of homeopathic remedies, it was found that there was a significant difference as the sensitivity was suppressed by anesthetics, but remained unchanged after taking homeopathic remedies. Regarding the suppression of the nausea reflex, the results obtained after the administration of lidocaine after taking HR were identical. It could be concluded that HRs can be a good alternative means to lidocaine for optimizing the process of operation during prosthetic treatment. On the other hand, both methods fail to suppress the reflex in 10% of cases.

After data analysis, an algorithm of behavior of dentists was proposed to manage the nausea reflex during and after prosthetic treatment.

# CONTIBUTIONS

## 1. Scientific and applied contributions

### 1.1. Original contributions:

- For the first time in Bulgaria, the sensitivity of the lining of the oropharynx was studied by plastic fibers with approximately logarithmic scale of actual strength and linear scale of perceived intensity.
- For the first time, homeopathic was used to influence the vomitus reflex.
- It has been found that the nausea reflex after taking homeopathic remedies is reduced in 44.30% of patients. Tactile flair is preserved.
- It was found that sensory and reflex response after administration of a local anesthetic was decreased in 48.76% of the patients studied.

### 1.2. Confirming contributions:

- It has been confirmed that in the prosthetic treatment of patients with the pharyngeal reflex, the most difficult to manage is the fingerprinting procedure.
- The most reflexogenic zones of the oropharyngeal complex were confirmed, with 100% of the subjects having gag reflex in the area between the hard and soft palates, 91.74% the posterior third of the tongue and 52.89% - the lateral edges of the tongue.
- It has been confirmed that the size of the receptor field is relevant for the occurrence of a nausea reflex.

- It has been confirmed that after transmission of a new removable prosthesis, patients with enhanced palatal reflex continue to be intolerant due to contact of the prosthetic plaque with receptor fields.
- Lidocaine has been confirmed to reduce the nausea reflex, but is only applicable by the dentists in clinical settings.

## **2. Applicable contributions:**

- An algorithm has been created for the management of patients with an increased gag reflex and the use of homeopathic medicines, which can be applied during the clinical stages and during the adaptation period by the patient himself.

## **PUBLICATIONS RELATED TO THE DISSERTATION**

1. Tsvetelina Kanlieva, Kalina Georgieva, Metodi Abadjiev. Different methods for management of gagging reflex during prosthetic treatment. International Bulletin of Otorhinolaryngology, 2022 No. 4, Vol. 18, 13-17 pp.
2. Tsvetelina Kanlieva, Maria Dimitrova. Investigation the opinion of dentist and management of the gag reflex in their dental practices. International Bulletin of Otorhinolaryngology, 2022/12/21, no.4, Vol.18, 18-21 p.
3. Tsvetelina Kanlieva, Kalina Georgieva, Metodi Abadjiev. Influence of the nausea and vomiting reflex in prosthetic treatment of patients with homeopathic medicines – a case report. Journal of IMAB, 2023, vol. 29. Issue2.