



**MEDICAL UNIVERSITY
„PROF. DR. PARASKEV STOYANOV“ - VARNA**

**FACULTY OF DENTAL MEDICINE
DEPARTMENT OF CONSERVETIVE DENTISTRY AND ORAL
PATHOLOGY**

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DRUG ADDICTED PATIENTS - ORAL HEALTH AND MANAGEMENT

ABSTRACT

**of dissertation for the award of educational and scientific degree
"Doctor"**

Scientific specialty "Therapeutic Dentistry"

Supervisor: assoc. prof. Asya Krasteva-Panova, PhD, D.Sc.

VARNA, 2022

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The dissertation was approved and directed for presentation at a meeting of the Department of Conservative Dentistry and Oral Pathology of the Faculty of Dental Medicine at the Medical University "Prof. Dr. Paraskev Stoyanov"- Varna

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The materials are available in the research department of MU-Varna and on the website of the university.

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

Abbreviations used

AB – antibodies

DCC – diagnostic consultative Center

RECMV – Research Ethics Commission MU-Varna

ICD – international classification of diseases

PAS – psychoactive substances

WHO – World Health Organization

AIDS – acquired immune deficiency syndrome

CVS – cardiovascular system

HDT – hard dental tissues

UMHAT – university multidisciplinary hospital for active treatment

COPD – chronic obstructive pulmonary disease

CNS central nervous system

ALAT – alanine aminotransferase

ARC – AIDS-related complex

ASAT – Aspartate aminotransferase

CD – cluster of differentiation

CFU/ml – Colony-forming unit/ ml

DMFT – decayd missing filled teeth

DSM-IV – Diagnostical and Statistical Manual – IVth Edition

ELISA – enzyme-linked immunosorbant assay

HAV – hepatitis A virus

HBV – hepatitis B virus

HCV – hepatitis C virus

HIV – human immunodeficiency virus

Ig – immunoglobulin

PBI – papilla bleeding index

PCR – polymerase chain reaction

pH – potential of hydrogen

rpm – revolutions per minute

SD – standard deviation

Spp – species

I. Introduction

Drugs are chemicals that affect a person's physical, mental and social functions by altering them in various ways. Drug use and abuse has increased in recent years and is a socially significant problem worldwide.

Increasingly, various medical professionals are involved in preventive and therapeutic activities related to substance-dependent patients. The professional training and awareness of individual doctors is at different levels. This requires a generalization of the problem and related oral and somatic pathology.

Relatively often, in general dental practice, diagnosing various diseases of the oral mucosa and hard dental tissues, dentists are faced with general somatic conditions and diseases. Some of them may be related to the use and abuse of certain substances. Given the growing number of drug addicts worldwide, dentists are increasingly working with people who abuse drugs. The oral pathology that is observed is always severe, but it is not yet described in sufficient detail in the scientific literature.

The detection of changes in the oral mucosa and hard tooth tissues in drug addicts and the development of a clear algorithm of work aimed at prevention and treatment, reflect the great practical importance and relevance of the problem due to the ever-increasing number of these patients in dental practices.

II. Aim and task

Aim

The aim of this dissertation is to assess the oral health and features of oral pathology in drug addicts, followed by the development of a specific algorithm for prevention and treatment in this group of people.

Tasks

1. To perform a comprehensive assessment of oral health in drug addicts.
2. To identify risk factors in drug addicts and their relationship with oral pathology.
3. To determine whether there is a relationship between changes in the oral cavity and the use of various drugs.
4. To establish the impact of dental status on the quality of life of drug addicts.
5. To develop an algorithm for a complex dental approach in the treatment of drug addicts and a protocol for the behavior of dentists.

III. Materials and methods

1. Materials and methods for **task 1**

A total of 154 patients were studied, of which 51 (33%) were women and 103 (67%) were men (Figure 1). One group included drug-addicted patients attending an opioid detoxification program, and the control group included patients attending a private dental office.

Gender distribution

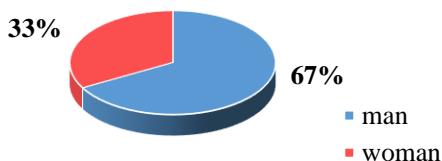


Fig.1 Gender distribution

Table 1 Age distribution of patients

| Възрастова група | Наркозависими пациенти | Контролна група пациенти |
|------------------|------------------------|--------------------------|
| 18-24 год. | 2 | 5 |
| 25-34 год. | 19 | 13 |
| 35-44 год. | 36 | 27 |
| 45-54 год. | 20 | 16 |
| 55-64 год. | 4 | 12 |

The age of drug-addicted patients was in the range of 18-65 years, with an average age of 39 years ($SD \pm 9.07$), and the mean age of the control group was 42 years ($SD \pm 11.41$), with an age rank of 18-65 years. 65г.

The examined patients are drug addicts, the patients from group 1 were treated in the University Hospital “Sveta Marina” EAD

and were outpatients in the Medical Center "Sveta Marina" EOOD - Varna.

Criteria for inclusion of persons in the study:

- persons over 18 years of age
- data on drug addiction
- without concomitant diseases that would complicate oral pathology
- Lack of pregnancy data in women
- signed informed consent by the participant

Criteria for inclusion of persons in the control group:

- persons over 18 years of age
- without concomitant diseases that would complicate oral pathology
- Lack of pregnancy data in women
- signed informed consent by the participant

In compliance with the criteria, two groups of patients were selected - drug addicts and control group. They were examined by the same dentist who is the researcher of the study - the registration of oral status and examination of saliva (single dose) for clinical, laboratory and chemical analysis.

The following parameters in saliva were studied on the basis of drug addiction and controls: quantity, pH, buffering capacity, presence or absence of Streptococcus spp, Lactobacillus spp, Candida spp., Hepatitis A, B, C.

The studies were conducted in licensed clinical laboratories. The amount of total unstimulated saliva needed to perform the tests is 1.5 ml.

To perform task 1, the following studies were applied:

Clinical-diagnostic methods for assessment of dental status:

- recording the dental status of patients and determining the DMFT index (WHO criterion), without taking into account the loss of teeth due to traumatic and orthodontic reasons
- assessment of the condition of the gingiva and periodontium - using Papilla bleeding index (PBI)
- registration of the degree of taxation of the language through photography

Laboratory-diagnostic methods for assessment of dental status

- measurement of saliva hydration level - the method is described below.
- measuring the amount of unstimulated / stimulated saliva (pre-chewing a piece of wax)
- determination of saliva viscosity
- pH of unstimulated / stimulated saliva
- buffer capacity
- presence or absence of Streptococcus spp, Lactobacillus spp, Candida spp. in saliva

assessment of the presence or absence of halitosis - subjectively and objectively through a special device HC-212SF FitScan Breath Checker

Patients were examined in an office with the help of a disposable set - a probe, tweezers and a dental mirror. Dental status is recorded in an outpatient card. The DMFT index, which is the sum of them, was used to assess carious, extracted and obstructed teeth. The periodontal status of patients was studied using the PBI index (Papilla-bleeding index, Muhlemann 1977). It is based on the provoked bleeding gums, thus making a quick assessment of the gingiva. Ready-made tests were used to assess the condition of unstimulated total saliva, which can be easily applied in an outpatient setting (Figure 2).



Фиг.2 GS Saliva-Check BUFFER , GC EUROPE N.V

Visual determination of the level of hydration of unstimulated saliva (GS Saliva-Check BUFFER, GC EUROPE N.V.) Visual assessment of salivation from the small salivary glands located on the lower lip is performed. The labial mucosa is soaked with gauze and the salivary glands are observed for how long they will secrete new saliva. Depending on the results, 3 groups of patients are formed

- 1) with a low level of hydration - for more than 60 seconds.
- 2) with a normal level of hydration - at a time of less than 60 seconds.
- 3) with a high level of hydration - in less than 30 seconds.

Consistency of unstimulated saliva (viscosity). It is determined visually.

3 groups of patients are formed:

- 1) with normal viscosity - watery clear saliva
- 2) moderately pronounced increased viscosity - frothy saliva, with bubbles
- 3) increased viscosity - sticky, frothy saliva

Measurement of pH of unstimulated saliva

(GS Saliva-Check BUFFER, GC EUROPE N.V.)

The patient collects saliva and spits it out in a special cup. The special pH strips are then immersed in the saliva. After 10 seconds the color is checked and compared with the factory scale and the values are determined:

- high acidity - 5.0 - 5.8
- moderate acidity - 6.0 - 6.6
- normal saliva - 6.8 - 7.8.

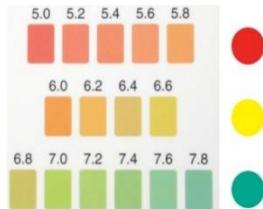


Fig.3 pH reading

Measurement of the amount of stimulated saliva

(GS Saliva-Check BUFFER, GC EUROPE N.V.)

The patient chews a piece of wax for 5 minutes and spits at regular intervals in a graduated container. The amount is determined in mL and is determined as:

- very low - less than 3.5 mL
- low - 3.5 - 5.0 mL
- normal - over 5.0 mL

Measurement of pH of stimulating saliva (GS Saliva-Check BUFFER, GC EUROPE N.V.)

Immerse the unused end of the pH band in the saliva container and check. A comparison is made with the values obtained for unstimulated saliva.

Buffer capacity study (GS Saliva-Check BUFFER, GC EUROPE N.V.) (fig. 4)

Using the pipette from the kit, a sample of the patients' stimulated saliva was placed on the strip of each of the test pads. The result is reported in the second minute:

- red - 0 points
- red-blue - 1 point
- blue - 2 points
- blue-green - 3 points
- green - 4 points

After summing all the points, the results are reported:

- very low buffer capacity - values 0-5

- low buffer capacity - values 6-9
- normal / high buffer capacity - values 10-12



Fig.4 Disposable strip of GC Saliva Check Buffer

Study of halitosis

Halitosis was measured with a special HC-212SF FitScan Breath Checker from Tanita Corporation of America, Inc. The device measures volatile sulfides and hydrocarbon gas and shows their concentration in the oral cavity. (Table 2)

Table 2. Organoleptic scale for assessment of halitosis

| Code | Description |
|-------------|---|
| 0 | Lack of bad breath |
| 1 | Barely noticeable odor |
| 2 | Slight but clearly noticeable bad smell |
| 3 | Moderate bad odor |
| 4 | Strong bad breath |

| | |
|----------|----------------------------|
| 5 | Extremely severe halitosis |
|----------|----------------------------|

2. Materials and methods for **task 2**

To perform task 2, the main source of individual information is the medical history of the drug-addicted patients included in the study.

Questionnaire method

For the purposes of the research a questionnaire was developed. The anamnestic part is filled in initially, after filling in the informed consent.

The anonymous questionnaire aims to gather information about patients, the onset of addiction, oral hygiene and health habits, eating habits, smoking, alcohol and more. After analyzing the patients and the available infectious diseases, they are compared with the clinical findings for oral health found during the examination. In addition, a questionnaire is used to make or reject the link between drug use and oral findings.

3. Materials and methods for **task 3**

As in Task 2, patients' medical records are used here to be divided into groups according to the drugs used. Using the questionnaire method, we were able to determine when patients have been addicted to drugs, since when they have been on methadone therapy and whether they are on methadone therapy for the first time.

Using the questionnaire method, we compared the answers received from the questionnaire with the changes in the oral status of drug addicts.

4. Materials and methods for **task 4**

A thorough analysis of the questionnaire has been made. All results were processed based on the responses given by drug addicts.

5. Materials and methods for task 5

Review articles from the scientific literature were used, as well as data from our study in order to systematize and develop an algorithm for a comprehensive dental approach in the treatment of drug addicts and a protocol for the behavior of dentists.

IV. Results and discussion

1. Results and discussion on task 1.

DMFT

The DMFT index (decay missing filled teeth index) was used to characterize the condition of the dentition. The index represents the sum of carious, extracted and obturated teeth. Table 3 systematizes the data obtained during the study, presented separately for drug addicts and the control group.

Table 3 DMFT in the studied groups of patients

| Age group | Drug addicts | | | | | | Control group | | | |
|-----------|--------------|------|-----|-----|-----|---|---------------|-----|-----|-----|
| | N | DMFT | DT | MT | FT | N | DMFT | DT | MT | FT |
| 18-24 | 2 | 11.5 | 6.5 | 3.5 | 1.5 | 5 | 6.6 | 2.2 | 1.2 | 3.2 |

| | | | | | | | | | | |
|--------------|----|------|------|-----|-----|----|------|-----|-----|-----|
| 25-34 | 19 | 12.4 | 5.6 | 3.9 | 2.9 | 13 | 9.6 | 3.8 | 1.5 | 4.3 |
| 35-44 | 36 | 17.8 | 7.5 | 6.4 | 3.9 | 27 | 11.4 | 4.2 | 2.4 | 4.8 |
| 45-54 | 20 | 19.6 | 6.7 | 7.1 | 5.8 | 16 | 14.2 | 3.3 | 4.3 | 6.6 |
| 55-65 | 4 | 22.3 | 7.25 | 9 | 6 | 12 | 20.2 | 5.3 | 8.8 | 6.1 |
| Общо | 81 | | | | | 73 | | | | |

According to our study, the average DMFT index for all age groups of drug addicts is 16.72, while in the control group it is 12.4. Respectively, the average values for drug addicts are: DT - 6.7, MT - 6, FT - 4, and for the control groups - DT - 3.8, MT - 3.6, FT - 5.

In the control group the results show: carious teeth are most in the group of 35-44 years old, absent in patients aged 55-65, and obstructed teeth are observed most in 45-54 years old.

In drug-addicted patients, the data can be summarized as follows: the lowest incidence is in the group of 18-24 year olds, and with age the incidence of dental caries increases as the number of obstructed and extracted teeth increases. Methadone, which is used for therapy, causes xerostomia in a very large percentage of patients, and its high sugar content increases the risk of caries.

The average frequency of the DMFT index obtained in the two study groups has a significant difference. The number of carious, obstructed and extracted teeth is significantly higher in drug addicts than in healthy controls.

PBI

We used the PBI index to study the periodontal status of patients.

Usually this contingent of patients neglect all their complaints, as well as their periodontal health. The clinical course of

the disease is longer and treatment becomes more difficult. In our study we used PBI, because marginal periodontitis and alveolar bone loss begin interproximal, respectively, the effectiveness of all preventive procedures are associated with the presence or absence of interdental plaque. The obtained data are summarized in Table 4.

Table 4 PBI in the studied groups of patients

| Age group | Drug addicts | | Control group | |
|-------------|--------------|-------------|---------------|-------------|
| | N | PBI | N | PBI |
| 18-24 | 2 | 1.20 ± 0.05 | 5 | 0.48 ± 0,22 |
| 25-34 | 19 | 2.09 ± 0.92 | 13 | 0.86 ± 0.90 |
| 35-44 | 36 | 2.39 ± 0.84 | 27 | 1.34 ± 0.37 |
| 45-54 | 20 | 2.91 ± 0.21 | 16 | 1.66 ± 0.24 |
| 55-65 | 4 | 3.08 ± 0.43 | 12 | 1.88 ± 0.93 |
| Общо | 81 | | 73 | |

Note: Statistical significance P <0.05 compared to the control group

In a large proportion of drug-addicted patients, we observed unsatisfactory oral hygiene, in some with massive supra- and subgingival calculus deposits. In many of the patients examined, the gingiva was hyperemic, bleeding even with mild mechanical irritation.

Significantly worse values were found in drug-addicted patients compared to the control group ($p <0.05$). The difference observed is statistically significant.

Tongue coverage

We examined the degree of taxation visually and it was photo-documented. Our data report: in 92.59% (75 patients) of the methadone therapy group, coated tongue was observed, and in healthy controls in 6.85% (5 patients). There is a significant statistically significant difference in the coating on the dorsal surface of the tongue in drug-addicted patients, which on the one hand corresponds to their poor oral hygiene habits, a prerequisite for the presence of halitosis and various bacterial and fungal infections.



Fig.5 Drug-addicted patient, coated tongue, 25 years.

The coated sign is an indicator that there is a chronic problem in a person's body. In a large percentage of drug-addicted patients, the clinical trial revealed the presence of coated tongue. The presumed factors for its presence are low level of oral hygiene, as well as reduced salivary flow.

Saliva analysis

Saliva was analyzed in all patients, and the collection conditions were the same - in the morning on an empty stomach. It was explained to each patient that acidic foods were not allowed

before the test. The tests were reported using Saliva Check®, GC America Inc., Alsip, IL, USA.

The data we received for both groups are presented in Table 5 and Figure 6. It can be seen that the highest percentage of drug addicts (77.78%) fall into the group of low hydration, while the control group - the highest percentage are with a normal level of hydration (57.53%).

Table 5 Data from the study of viscosity in both groups

| Hydration level | | |
|----------------------------------|----------------------|-----------------------|
| | Drug addicts N /% | Control group N /% |
| Low level of hydration | 63 (77,78%) | 8 (10,96%) |
| Normal level of hydration | 13 (16,05%) | 42 (57,53%) |
| High level of hydration | 5 (6,17%) | 23 (31,51%) |



Fig.6. Comparison of viscosity in the two studied groups

In our study, we found that only 10.96% of the control group had low levels of hydration compared to drug-addicted patients (77.78%), who were much more at risk for dental caries and various bacterial and fungal infections. due to the low level of hydration. The protective effect against dental caries depends on the normal rate of saliva - the state and level of hydration.

According to our study, patients who use drugs have more viscous saliva than the control group of patients. The results are shown in Table 6 and Fig. 7.

Table 6. Viscosity study data in both groups

| Viscosity | | | |
|-----------|---------------------|--|----------------------|
| | Drug addicts | | Control group |
| | N / % | | N / % |
| + | 19 (23,46%) | | 41 (56,16%) |
| ++ | 52 (64,2%) | | 31 (42,47%) |

| | | |
|-----|-------------|-----------|
| +++ | 10 (12,35%) | 1 (1,37%) |
|-----|-------------|-----------|

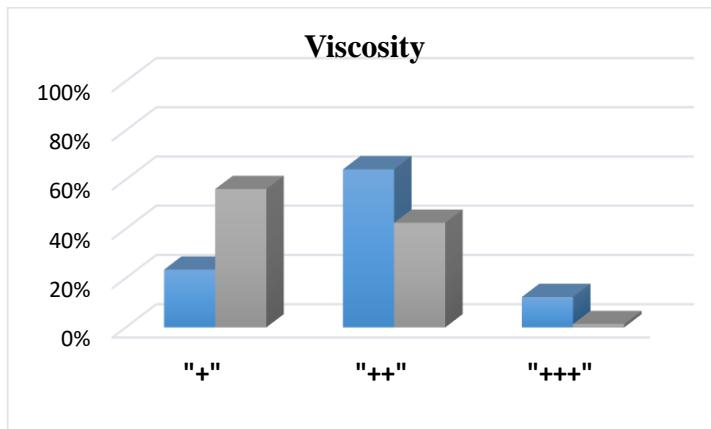


Fig.7. Comparison of viscosity in the two studied groups

Our data document that the viscosity of the group of patients using drugs is higher than that of the control group. This fact correlates with other studies. The increased viscosity may be due to the reduced amount of water in the saliva. Previous research has proven the relationship between viscosity and the number of carious, missing and obstructed teeth.

The results we obtained show a slightly lower pH in drug-addicted patients. We can attribute this to the fact that they often have reduced salivary flow, which reduces the buffer capacity. In the majority of drug-addicted patients studied, the pH was moderately acidic. Our study showed that the lowest measured pH is 5.7, and according to literature data under normal conditions and a healthy

tooth, the pH of saliva is in the range between 6.7 and 7.4. The results are shown in Table 7 and Fig. 8.

Table 7 Data from the study of pH in both groups of stimulated and unstimulated saliva

| pH | | | | |
|-------------------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Unstimulated saliva | | Stimulated saliva | |
| | Drug addicts N / % | Control group N / % | Drug addicts N / % | Control group N / % |
| high acidity – 5.0 – 5.8 | 3 (3.70%) | 0 (0%) | 0 (0%) | 0 (0%) |
| moderate acidity – 6.0 – 6.6 | 52 (64.20 %) | 14 (19.18%) | 5 (6.17 %) | 1 (1.37%) |
| normal saliva – 6.8 – 7.8 | 26 (32.10%) | 59 (80.82%) | 76 (93.83%) | 72 (98.63%) |

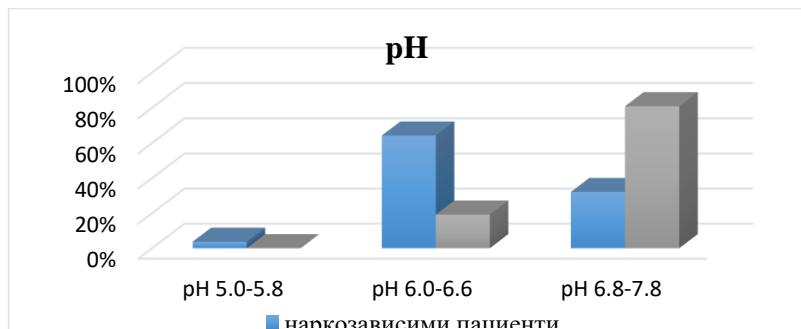


Fig.8. Comparison of pH of unstimulated saliva of the two groups

Although there is a decrease in pH in drug-addicted patients, in none of the patients we studied did we find a pH below the critical 5.5, which begins the decay of the tooth surface.

Microbiological examination of total unstimulated saliva

According to the data obtained, growth of *S. mutans* greater than 10⁵ CFU / mL in drug-addicted patients was observed in 71.60%. Higher concentrations of Lactobacillus were observed in the group of patients on methadone therapy, which correlates with their higher caries activity. The data are presented in more detail in Tables 8 and 9.

*Table 8 Comparison of the growth of *S. mutans* in the two groups*

| Growth of <i>S. mutans</i> (CFU / ml) | | |
|---------------------------------------|-------------------------|-------------------------|
| | <10 ⁵ CFU/mL | >10 ⁵ CFU/mL |
| Drug addicts | 23 (28.40%) | 58 (71.60%) |
| Control group | 23 (31.51%) | 50 (68.49 %) |

*Growth of *S. mutans* (CFU / ml)*

| Growth of <i>S. mutans</i> (CFU / ml) | | |
|---------------------------------------|-------------------------|-------------------------|
| | <10 ⁵ CFU/mL | >10 ⁵ CFU/mL |
| Drug addicts | 28 (22.22%) | 63 (77.78%) |

| | | |
|----------------------|-------------|-------------|
| Control group | 51 (69.68%) | 22 (30.14%) |
|----------------------|-------------|-------------|

The data we obtained correlate with international research - the growth and incidence of *S. mutans* and *Lactobacillus* are much higher in drug-addicted patients. The presence of carious microorganisms correlates with the fact that patients on methadone therapy have a greater number of carious lesions.

Candida infection is an opportunistic condition caused by the genus *Candida* in the presence of predisposing factors. *C. albicans* is the most common pathogenic species that causes diseases in the oral cavity. This was proven in our study.

Halitosis

Table 10 presents the results of the two groups of patients compared to the data obtained from HC-212SF FitScan Breath Checker. It can be seen that the highest percentage of drug addicts falls into the group with a moderate bad smell. Severe bad breath as well as extremely severe halitosis are also found in a much higher percentage than in healthy controls.

Table 10 Comparison of halitosis compared to hardware examination

| Halitosis | | |
|---|-----------------------|------------------------|
| | Drug addicts N (%) | Control group N (%) |
| 0 - Lack of bad breath | 0 (0%) | 31 (42.47%) |
| 1 - Barely noticeable odor | 7 (8.64%) | 14 (19.18%) |
| 2 - Slight but clearly noticeable bad smell | 14 (17.28%) | 16 (21.92%) |
| 3 - Moderate bad odor | 26 (32.10%) | 8 (10.96%) |
| 4 - Strong bad breath | 21 (22.22%) | 3 (4.11%) |
| 5 - Extremely severe halitosis | 13 (16.05%) | 1 (1.37%) |

The most common causes of halitosis are dental plaque and poor oral hygiene. Miyazaki and team conducted an analysis in which they proved that the main cause of halitosis is the deposition of the tongue, as well as the positive correlation between the periodontal condition of the oral cavity and the deposition of the tongue.

The scientific literature shows as another cause of bad breath and smoking, which in the studied group of drug addicts is widespread. It is important to detect halitosis early in order to determine the root cause and to treat and improve the oral status of a healthy mouth.

2. Results and discussion on task 2

To identify risk factors in drug addicts and their relationship with oral pathology.

To determine the incidence of infectious diseases among drug addicts, we used their available medical records, which include full studies. The data on the prevalence of infectious diseases observed in the studied patients are: HCV in 81.4% [66], HBV in 66.7% [54], HAV in 67.9% [55], HIV in 8.7 % [7] (Fig.9).

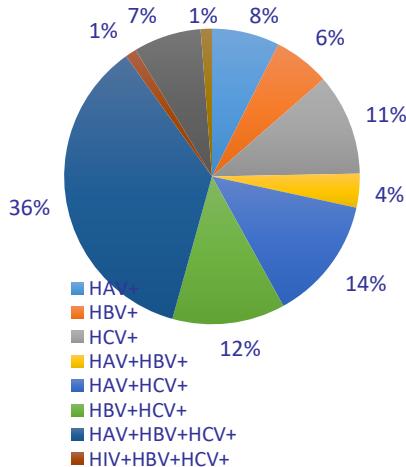


Fig.9.Infectious diseases in drug addicts

The findings of the analysis show that in the first 6 years of injecting drug use, the transmission of infections is most intense. In

addition, prevalence levels increase with increasing duration of injection, which in turn is not related to gender, age, race, education, marital status or sexual orientation. Although the number of infectious carriers of each disease among drug addicts varies, our data are consistent with those of other studies, namely that the prevalence of HIV is much lower than that of hepatitis infections.

Routine dental check-ups are important for the early diagnosis of symptoms of HIV infection or for the detection of deteriorating immunological status. The clinical symptoms observed in patients are usually of great prognostic importance. In patients with HIV, there are reflections in the periodontal tissues - specific immunodeficiency together with changes in non-specific immunity have a negative impact. Chronic gingivitis and chronic periodontitis are most often mentioned in the literature in patients with HIV as oral pathology. According to a study by Kroidl and colleagues, periodontal disease is significantly associated with elevated plaque index (PI). They show that high values of papillary blinking index PBI as a parameter for periodontal inflammation are associated with moderate and severe immunosuppression - (CD4 count <500 cells / μ l).

The prevalence of oral pathological manifestations that we found are presented in Tables 11 and 12. Photo documentation of some of the studied oral manifestations in patients is presented in Fig. 10 - 19.

Table 11 Characteristics and number of oral findings in drug-addicted patients

| Oral manifestation | Number of cases (%) |
|---------------------------|----------------------------|
| Periodontal disease | 80.25% (65 patients) |

| | |
|----------------------|------------------------|
| Candidiasis | 64.20% % (65 patients) |
| Angular cheilitis | 6.17 % (5 patients) |
| Leukoplakia | 3.7 % (3 patients) |
| Lichen planus | 3.7 % (3 patients) |
| Herpes simplex | 3.7 % (3 patients) |
| Geographical tongue | 3.7 % (3 patients) |
| Aphthous ulcerations | 2.47 % (2 patients) |
| Hairy tongue | 2.47 % (2 patients) |

Table 12 Characteristics and number of oral findings in a control group of patients

| Oral manifestation | Number of cases (%) |
|---------------------|----------------------|
| Periodontal disease | 54.79% (40 пациента) |
| Candidiasis | 13.70% (10 пациента) |
| Leukoplakia | 1.37% (1 пациент) |
| Herpes simplex | 2.74% (2 пациента) |
| Geographical tongue | 1.37% (1 пациент) |
| Hairy tongue | 2.74% (2 пациента) |



Fig.10 Drug-addicted patient, geographical language, 27 years.



Fig.11 Healthy control patient with hairy and geographical language, 45 years.



Fig.12 Drug-addicted patient, geographical tongue, 37 years.



Fig.13 Drug addict, hairy tongue, 35 years.



Fig.14 Drug addict, hairy tongue, 20 years



Fig15 Hairy tongue, healthy control, 37 years

Fig. 16 Drug-Addict with recurrent aphthous ulceration sublingually, 20 years.



Fig. 17 Lichen planus, drug addict, 36 years.



FIG. 18 Lichen planus, drug addict, 45 years.



FIG. 19 Leukoplakia, drug addict, 53 years.

In the study we did, the oral lesions we found in patients were as follows:

- leukoplakia - 2 patients with HIV, HAV, HBV, HCV, 1 patient with HAV, HBV, HCV
- lichen planus - 1 patient with HAV, HCV, 1 patient with HCV and 1 patient with HAV, HBV, HCV
- herpes simplex - 1 patient with HIV, HBV, HCV; 2 patients with HAV, HBV, HCV
- aphthous ulcers - 2 patients with HIV, HAV, HBV, HCV

From the survey we collected data on the socio-economic status of patients in order to see how it affects their lives and resp. of their oral pathology. The data are summarized as follows:

Based on the questionnaire, we obtained results for drug addicts: the majority of them are men (72%); unmarried (74.1%); without children (77.8%), without professional qualification (67.9%) and unemployed (87.7%).

Usually, people who abuse drugs are from lower strata of society, but not always. Poor nutrition is almost a trend for them. It is made up of unhealthy foods high in sugars and calories. Lack of income, which is a trend in this group of patients, makes dental treatment a non-priority. Regular treatment is almost impossible because patients are undisciplined and lead a chaotic lifestyle.

Results and discussion on task 3

To determine whether there is a relationship between changes in the oral cavity and the use of various drugs.

Drug addicts use more than one type of drug. All were tested on methadone therapy to treat heroin addiction. Almost everyone says they also use lighter drugs like cannabis. The results we received garding drug use is presented in Fig.20

fig. 20 Addiction data of the studied patients



In our study, we found that a small proportion of patients use only one type of drug. In them, it is extremely difficult to distinguish the effect of a particular type of drug on oral pathology. This is because the drug addicts surveyed use more than one type of illegal substance in most cases.

The data we received correlate with the literary ones. Namely, deteriorating oral health is observed in all patients using heroin, cocaine and methamphetamines. Studies show that the group of opiates (morphine, heroin and methadone) most often leads to tooth loss, extractions and generalized caries, which is most common on smooth and cervical surfaces. Cocaine has a necrotizing effect on the oral mucosa and as the process progresses, oronasal communication

is reached due to ischemic necrosis of the palate. Nasal speech, sore throat, blockage and / or bleeding, rhinorrhea, cough and loss of taste may also occur. The narcotic substances lead to hypofunction of the salivary glands, which in turn causes xerostomia, burning of the mouth, altered and impaired taste, difficulty in eating, eating disorders. The survey found that patients' heroin use began around the age of 20. When entering the methadone program, most patients used it for 7-8 years. In the study, we found that most patients do not meet for the first time with detoxification and rehabilitation programs. Table 13 shows the data on the addictions of drug addicts.

| Variable | N=81 |
|--|--------------------|
| Age (years) at the start of heroin consumption | $18,5 \pm 5,4$ |
| Duration (years) of heroin consumption | $8,0 \pm 6,9$ x |
| Duration (years) of intravenous heroin consumption | $5,5 \pm 5$ |
| Number of previous rehabilitations / detoxifications | 1.9 ± 0.5 |

Table 13 Data on addictions of drug addicts

Literature data show that significantly deteriorating oral health in smokers is due not only to poor oral care, but to a greater extent to the effect of nicotine and its components - both on the organs and on the oral cavity.

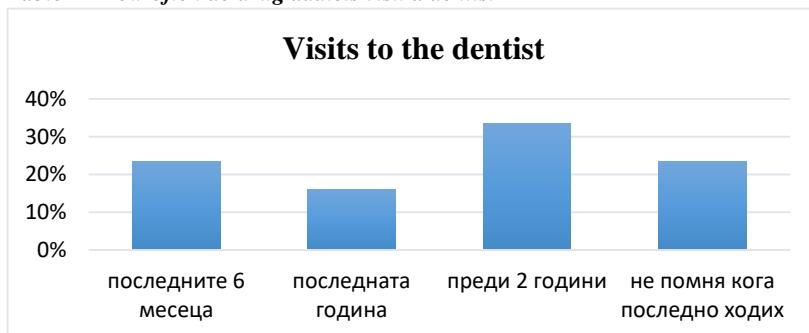
4. Results and discussion on task 4

To establish the influence of dental status on the quality of life of drug addicts.

We conducted an anonymous survey among drug addicts treated at UMHAT "St. Marina" EAD and monitored at DCC "St. Marina" EOОD in order to clarify their attitude to treatment and how dentists would deal with their problems. The same questions were answered by the control group of patients. The survey focuses on dental problems, patients' sleep problems, access to dental care. Of the 154 patients included in the study, all completed the questionnaire.

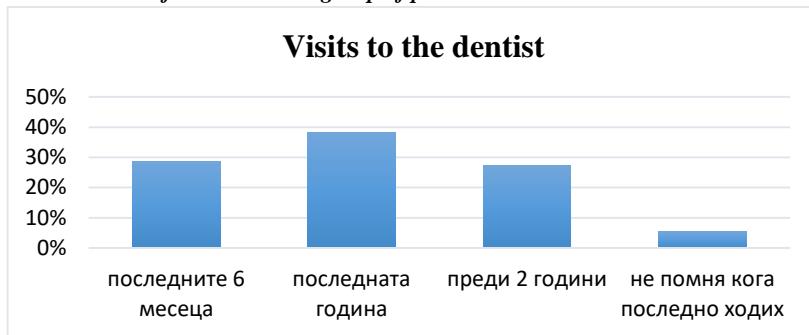
Among drug addicts, only 23.46% of respondents (19) answered yes to the question of whether they had seen a dentist in the last six months, 16.05% (16) said they had not seen a dentist in the last year, 33 , 33% (27) - have not gone in the last 2 years, and 23.46% (19) - do not remember when they were last examined in a dental office (Table 14).

Table 14 How often do drug addicts visit a dentist



Unlike drug-addicted patients, the control group showed greater interest in their dental health: 21 (28.77%) patients had been examined in the last 6 months, 28 (38.36%) patients had been examined in the last year, and 2 years ago 20 (27.39%), and only 4 (5.48%) of the respondents do not remember when they last went (Table 15).

Table 15 How often the control group of patients visit a dentist



Regarding access to dental services and difficulties in treatment - 10 (12.76%) said they had problems, 51.06% (27) said they had no problems and 36.17% (44) said they did not even tried to make an appointment and visit a dentist (Table 15). The situation with the control group is quite different. The data are given in Table 16 and Table 17.

Table 16 Access to dental services and whether drug addicts have difficulties in treatment

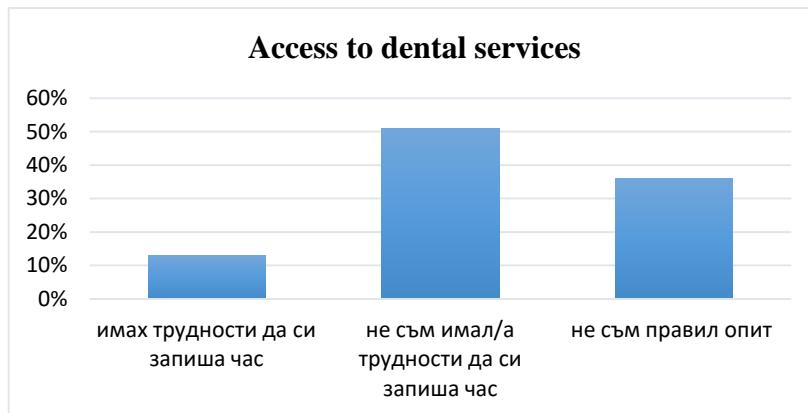
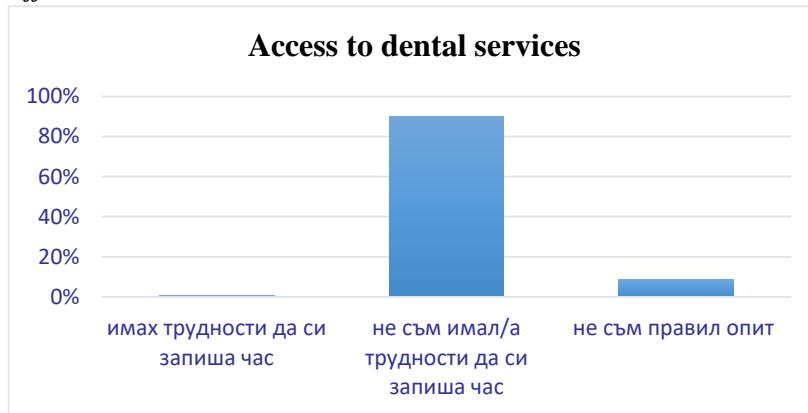


Table 17 Access to dental services and whether the control group encounters difficulties in treatment



In most of the subjects we found that the pain was masked by opiates. Thus, diseases in the oral cavity remain unnoticed, respectively. unrecognized. Many patients have additional

conditions such as hepatitis B and C. According to some authors, some patients may visit dentists to obtain analgesics.

When examining patients on methadone therapy, we observed a high incidence of dental caries. In our survey we found that this is most likely due to their eating habits and frequent use of sweet foods, as well as their poor oral hygiene.

The two groups of patients surveyed were asked to answer the question whether they had problems with their dental health in the past year and whether they consulted a dentist. The answers we received are summarized in Table 18.

Table 18 Problems that patients themselves report regarding their dental health

| Dental problems | | |
|-----------------------------------|--|---------------|
| | Drug addicts | Control group |
| Toothache | 73 (90.12%) | 25 (34.25%) |
| Caries | 70 (86.42%) | 41 (56.16%) |
| Fallen obturation | 51 (62.96%) | 27 (36.66%) |
| Gritting teeth | 41 (50.62%) | 3 (4.11%) |
| Dry mouth | 70 (86.42%) | 16 (21.92%) |
| Bleeding gums | 57 (70.37%) | 29 (39.73%) |
| Tooth loss | 61 (75.31%) | 17 (23.29%) |
| <i>I have not had a complaint</i> | 8 (9.88%) | 27 (36.97%) |
| | Consult a dentist if there is a problem | |
| Yes, I went to the dentist | 17 (20.99%) | 67 (91,78%) |
| I have not been | 64 (79.01%) | 6 (8,22%) |

5. The analysis of the survey showed that 6-month examinations are rare, and that abusers are less likely to go to the dentist. Even if there is a problem, it is often neglected. The data we received show us clearly what are the problems with drug addicts in our country, as well as their refusal of treatment by a dentist. They correlate with

other studies in the available scientific literature. It turns out that very often drug addicts have difficulty in seeking treatment and access to dental services. According to a study by Dawkes M et al. dentists have a negative attitude towards patients who use drugs. Sometimes patients resort to lying to hide their problems because of the social stigma of substance abuse.

6. Regardless of the reasons that lead to the deteriorating dental health of drug addicts, it is an indisputable fact. Reduced chewing function and impaired smile do not allow normal nutrition and social life. Too often, dentists have a negative attitude and are anxious to treat drug addicts. Patients themselves often neglect their oral problems and do not attend dental practices. Therefore, it is necessary to build the right approach to drug addicts to protect doctors and patients and in order to achieve better physical, mental and emotional, including oral health. Dentists usually have a negative attitude and unwillingness to treat drug addicts. On the other hand, patients themselves are rarely interested in their oral health, have a low level of interest in their oral problems, and rarely seek dental care. Recognizing drug addicts and treating them properly are key points in good management.

Results and discussion on task 5

To create an algorithm for a complex medical and dental approach in the treatment of drug addicts and to develop a protocol for the behavior of dentists.

In the study of drug addicts, we found different oral manifestations of the use of different drugs. When examining patients, it is extremely important to determine what substances the patient is using, whether he is being treated and with what. In the course of the research we found that according to the majority of patients, dentists often do not know how to treat drug-addicted patients or are afraid to work with them.

In drug addicts, toothache is acute. When it comes to postoperative pain, it is usually accompanied by an inflammatory component. This requires specific treatment as well as NSAIDs. Opioids should be avoided in drug-addicted patients. Studies show that the combination of acetaminophen + ibuprofen is synergistically more effective in managing opioid toothache. After a detailed history and assessment of health and risk of complications, a prescription for the shortest acting opioid and in the lowest effective dose could be prescribed, and it should not be taken for more than 7 days. Moore and Hersh have systematized the criteria for prescribing painkillers for different pain. The data are given in Table 19.

Table 19 Guidelines for prescribing painkillers in dentistry

| Guidelines for the management of acute postoperative pain in dentistry | |
|--|---|
| Pain intensity | Analgesic |
| Light | Ibuprofen (200-400 mg) at 4-6 hours, in pain |
| Mild to moderate | Ibuprofen (400-600 mg) at 6 hours, fixed intervals for 24 hours; then Ibuprofen (400 mg) every 4-6 hours for pain |
| Moderate to strong | Ibuprofen (400-600 mg) + Paracetamol (500 mg) every 6 hours, fixed intervals for 24 hours; then Ibuprofen (400 mg) + Paracetamol (500 mg) every 6 hours for pain |
| Strong | Ibuprofen (400-600 mg) + Paracetamol (500 mg) + Hydrocodone (10 mg) every 6 hours, fixed intervals for 24 - 48 hours; then Ibuprofen (400 mg) + Paracetamol (500 mg) every 6 hours for pain |

In Bulgaria there is no algorithm or protocol of behavior in dental treatment of drug addicts. This necessitated the development of one that would describe steps and treatment recommendations. Our health system does not offer dental services in rehabilitation centers. Dental treatment in these patients should begin with patient

education, prevention and prevention of oral diseases (if possible), treatment of those that occur, and prevention of opioid and analgesic abuse.

The collaboration of medical professionals is extremely important. In many cases, behavioral therapy is required in conjunction with dental treatment. It is also good for the psychiatrist to monitor the medication.

V. Conclusion

The results of the present study show deteriorating oral health in drug-addicted patients in the methadone maintenance program. There is a high prevalence of dental caries caused by reduced saliva production. Decreased salivary functions have severe consequences for oral health - xerostomia, increased risk of dental caries, tooth loss, fungal infections, oral mucosal lesions and periodontal disease. Like other studies, this one was conducted at a rehabilitation center. Drug-addicted patients usually seek dental care only in emergencies and to solve a single problem. It is very unlikely that a treatment plan will be made and started step by step. In addition to the effects caused by drugs, there are poor living conditions and non-satisfaction of personal needs such as brushing teeth, eating foods high in sugar.

Our research has shown that most drug users neglect the cleanliness of their mouths and teeth, as well as their dental and oral health. In the study we found that a smaller part of the patients' teeth are obstructed, which is an indicator of the lack of interest in their oral health. Extractions as a treatment of choice are more common. One of the consequences of drug addiction is the infectious diseases associated with it. They have a great influence on oral status. Hepatitis and HIV infection affect the oral cavity, while methadone used for therapy reduces salivary flow, causing xerostomia and increases the risk of tooth decay.

It can be concluded that not only the drug directly affects the oral status, but also the socio-economic status has a great influence on the poor condition of the oral cavity. The lifestyle of drug addicts, disadvantages and bad habits are key to deteriorating oral status.

VI. Conclusions

1. Regarding the comprehensive assessment of oral health among drug addicts, we found:

- high prevalence of dental caries associated with poorer oral status compared to the control group;
- low level of hydration and high percentage of patients with xerostomia; increased viscosity of saliva; reduced pH; reduced salivary flow and reduced buffering capacity in almost half of those treated with methadone;
- higher incidence of fungal and bacterial infections - *Sandida alb.* and *Str. Mutans* in most drug addicts;
- halitosis with moderate to very bad breath in almost all drug addicts;
- statistically significantly higher PBI index compared to the control group, resulting in poorer periodontal status;
- periodontal manifestations in 80.25% of the studied drug addicts against 54.79% in the control group;

2. Main risk factors in drug addicts according to the literature and analysis of our patients, and their relationship with oral pathology:

- high prevalence of concomitant viral infections - HCV, HBV, HAV, HIV;

- unhealthy habits - most of them are smokers and regularly abuse alcohol; irregular and unhealthy eating with a lot of carbohydrates;
- a large part of drug addicts cannot find support and understanding from the family and their environment;
- low social status; a large percentage of patients are unemployed

3. Due to the simultaneous use of different narcotic substances, the drug addicts we studied did not show specific changes in the oral cavity depending on the type of narcotic substance, but deteriorating oral health is observed in all patients using heroin, cocaine and methamphetamines: carious lesions , periodontal problems;

4. The impact of dental status and oral health on quality of life:

- diagnosed oral diseases have an adverse effect on the quality of life and social contacts;
- due to the toothache masked by opiates, diseases in the oral cavity remain unnoticed, resp. unrecognized and untreated;
- many drug addicts have a number of concomitant diseases such as hepatitis B and C;
- patients with methadone therapy have a high incidence of dental caries, most likely due to unhealthy eating habits and frequent use of sweet foods and poor oral hygiene;

- 86.43% of the studied drug addicts have xerostomia;
- the feeling of dry mouth is more common in patients who have been in remission for a long time (at least a year);
- Angular cheilitis, chapped lips, bad breath and discomfort, dry and coated tongue, decreased taste sensations are also found in drug addicts with xerostomia;
- Reduced chewing function and impaired smile do not allow normal nutrition and free social life.

VII. CONTRIBUTIONS

Contributions of original character:

1. This is the first detailed study and assessment of oral pathology in drug addicts in our country.
2. An up-to-date algorithm for a complex dental approach in the treatment of drug-addicted patients and a protocol for the behavior of dentists are proposed.
3. A questionnaire has been prepared for drug-addicted patients, enabling an assessment of their quality of life and how this correlates with their oral health.
4. The problems related to the treatment of oral diseases in drug addicts in Bulgaria are presented.

Contributions of scientific and applied nature

1. A comprehensive assessment of oral health in drug addicts has been performed.
2. Risk factors in drug-addicted patients and their relationship with oral pathology have been identified.
3. The influence of dental status on

VIII. Publications and participation in scientific forums

1. Chokanov S., Madzhova H. "The effect of long-term drug use on oral health." Mr. "Notices of the Union of Scientists - Varna. Medicine and Ecology Series 2018; 23: 106-111
2. Madzhova X, Chokanov S. Working with drug addicts - importance, recognition and management Magazine "Notices of the Union of Scientists - Varna. Medicine and Ecology Series 1'2019; 24: 80-84
3. Madjova Ch., Chokanov S., Madjova V. - Infectious risk in dental treatment and drug abuse patients. 8th International Trakya Family Medicine Congress, Edirne 06 -10 March 2019, p.279 Available from: <https://www.tahek.org/file/485e5d3e-4c8c-11e9-9483-f23c912c8e95/8.%20International%20Trakya%20Family%20Medicine%20Congress%20Proceedings%20Book.pdf>
4. Madjova Ch., Chokanov S., Madjova V. - Oral cavity changes in drug abusers. 8th International Trakya family Medicine Congress, Edirne 06 -10 March 2019, p.283 Available from: <https://www.tahek.org/file/485e5d3e-4c8c-11e9-9483-f23c912c8e95/8.%20International%20Trakya%20Family%20Medicine%20Congress%20Proceedings%20Book.pdf>
1. Madjova Ch., Chokanov S., Milkov M Correlation between sleep apnea and methadone therapy, 30th Annual Assembly of the International Medical Association Bulgaria (IMAB), 18-20 October 2020, Varna, Bulgaria

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