

DOI: 10.21802/artm.2024.1.29.66
UDC 616.31-001+616.34-002**INDEX ASSESSMENT OF THE STATE OF THE ORAL CAVITY
IN PATIENTS WITH GASTRO-ESOPHAGEAL
REFLUX DISEASE**

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Abstract. It has been established that diseases of the gastrointestinal tract, namely gastroesophageal reflux disease, affect the oral cavity. It should be noted that GERD is one of the most common diseases of the digestive tract in the world. The close relationship of the oral cavity, due to the similarity of functions, the common blood supply, innervation, and the morphological structure of the gastrointestinal tract leads to a violation of immunological reactivity, physical and chemical changes in saliva. SORP is a powerful receptor field that perceives the receptor influences of the whole organism. With increased acidity of gastric juice, there is hypersalivation, hypertrophy of the filiform papillae of the tongue in combination with foci of desquamation, pallor and swelling of the mucous membrane of the oral cavity, catarrhal gingivitis. With reduced acidity of gastric juice, there is a large number of plaques on the tongue, atrophy of filiform papillae, decreased salivation, dry lips, and angular cheilitis are observed. The index evaluation of the state of the oral cavity based on the index of plaque on the back of the tongue, the index of oral hygiene -OHI-S, the determination of the acidity of the oral fluid in patients with GERD indicates a dependence on the level of acidity of gastric juice. Homeostasis of the oral cavity is maintained due to the acid-alkaline balance, the main indicator of which is the pH of the oral fluid. Oral fluid is considered an integral environment of the human body, therefore metabolic processes affect its composition.

Aim. To study the indexes of the state of the oral cavity according to the indicators: index of plaque on the tongue according to (WTS); pH of oral fluid; hygiene index - OHI-S.

Materials and methods. To achieve the goal, 60 patients aged 25 to 55 years were examined. Of them, 30 are practically healthy people, 30 are patients with gastroesophageal reflux disease (of which 15 have increased acidity of gastric juice, and 15 have been examined with reduced acidity). IN THE RESEARCH PROCESS, WE STUDY INDICATORS index of plaque on the tongue according to (WTS); pH of oral fluid; hygiene index - OHI-S.

Results. At the initial examination, plaque (W.T.C INDEX) was noted in patients with GERD. Thus, in the main group, the preference for a thick plaque on the back of the tongue was noted. Evaluating the state of oral hygiene (according to the Green-Vermillion index), it should be noted that, in general, hygiene was satisfactory in the main group of the examination. With increased acidity of gastric juice, at the age of 25-35, the satisfactory condition of the oral cavity according to the Green-Vermillion index was noted and was 1.4 ± 0.1 , and the group of female patients of the same category had an unsatisfactory state of oral hygiene and was 1.76 ± 0.06 . With low acidity, the hygienic index of the oral cavity in men aged 25-35 years was 1.3 ± 0.1 and was satisfactory, while in women of the same age it was 2.0 ± 0.4 , which was unsatisfactory. Thus, in the 2nd group of women with reduced acidity aged 45-55 years, the indicator was 2.7 ± 0.2 , and in men of the same age, it was 2.3 ± 0.3 . Thus, when studying the pH of oral fluid in the main group, we noticed that the lower the pH level, the more acidic the environment. The acid-alkaline balance of the oral fluid is important for metabolism.

Conclusion. So, the studied indices make it possible to assess the hygienic condition of the oral cavity, acid-alkaline balance in accordance with the level of acidity of gastric juice in GERD.

Keywords: gastroesophageal reflux disease, index evaluation of the tongue.

Introduction. The oral cavity is called a kind of mirror that reflects the state of the whole organism. Often, pathological processes in the oral cavity are a manifestation of various systemic diseases, including the gastrointestinal tract (GIT), namely gastroesophageal reflux disease (GERD) [1].

It should be noted that GERD is one of the most common diseases of the digestive tract in the world. Its prevalence is estimated to be highest in Europe and North America. In these regions, the proportion of people who experience reflux symptoms at least weekly varies from 8.8 to 27.8% [2,3]. Attention is often drawn to the study of gastroesophageal disease not only among scientists but also among practitioners, as the prevalence of the disease in the world has been proven [4,5].

The oral mucosa is a powerful receptor field that perceives receptor effects of the whole body. Numerous

studies by clinicians confirm that 75% of patients with oral mucosa pathologies have gastrointestinal diseases [1].

According to various authors [6,7,8], the homeostasis of the oral cavity is maintained by acid-base balance. This is the limit of the concentration of hydrogen (H⁺) and hydroxyl groups (OH⁻) ions in a liquid system and is indicated from 0 (complete saturation with hydrogen ions) to 14 (complete saturation with hydroxyl ions (OH⁻)). Thus, if there is an increase in the concentration of (H⁺) ions in the body, a shift to the acidic side occurs, i.e., the environment is acidified at an acidic shift and, conversely, an increase in the concentration of (OH⁻) leads to a shift to the alkaline side [7], which is associated with the pH of the oral fluid.

Most often, changes occur on the tongue. A healthy tongue is pink, without any plaques, but not smooth. Any deviations in the shape, number, and depth of

grooves, thickness, and location of plaques indicate changes in the body. Plaque that covers the entire surface of the tongue indicates a gastrointestinal disease, namely, GERD. Depending on the acidity (low or high), such patients most often complain of tongue burning.

In case of increased acidity of gastric juice, hypersalivation, hypertrophy of the filiform papillae of the tongue in combination with foci of desquamation is observed. This is due to the weakening of the pharyngeal and cardiac valves of the stomach, as a result of which the contents of the stomach with its secretory component are thrown into the oral cavity, thus affecting the taste buds. With the low acidity of gastric juice, there is a large number of layers on the tongue, and atrophy of the filiform papillae is observed (my article).

Objective of the study. To study the indices of oral health in terms of tongue plaque index by (WTS); oral fluid pH; and OHI-S hygiene index.

Materials and methods of the study. To achieve this goal, 60 patients aged 25 to 55 years were examined. Of these, 30 were practically healthy individuals, 30 patients with gastroesophageal reflux disease (15 of them with high acidity, and 15 subjects with low acidity of gastric juice).

The index of plaque on the tongue was determined by the WTC (Winkel Tongue Coating). This index takes into account its area. To register the index, the tongue is conditionally divided into two segments: frontal and distal, each of which is divided into three separate areas, where the amount of plaque is determined. [4]

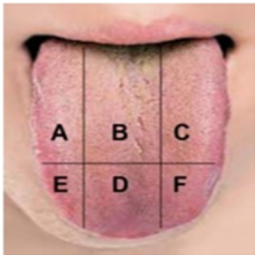
Areas of W. T. C. index	W. T. C. index (points)
 <p>Areas for determining the degree of plaque on the tongue by W. T. C. index (Winkel E. G., 1998)</p>	0 – no plaque in the <u>tonhue</u>
	1 - thin plaque
	1 - thick plaque
	The calculation formula: $W. T. C. INDEX = A+B+C+D+E+F$

Fig.1. INDEX W.T.C

The acidity of saliva depends on the rate of salivation [8]. The pH of the oral fluid was measured on an empty stomach using a universal indicator paper impregnated with a special substance (litmus), which changes its color depending on the acidity (pH) of the solution. The strip was dipped into the liquid and applied to a special scale and the color of the paper was compared. The pH measurement range is from 0 to 14. The ratio of acid and alkali in the oral fluid is called acid-base equilibrium (ABE) [7].

Neutral environment at pH=7; Acid one at pH<7; Alkaline one at pH>7.



Fig. 2. pH scale of oral fluid

To determine the index, the vestibular surfaces of teeth 16, 11, 26, 31 and the lingual surfaces of teeth 36 and 46 are stained with Schiller's iodine solution or another dye. On the examined surfaces, first the Debris-index, and then the Calculus-index are determined.

Evaluation criteria:

Dental plaque (DI)

Calculus index (CI)

0 - absence of plaque

0 - calculus is not detected

1 - plaque covers 1/3 of the tooth surface

1 - supragingival calculus covers 1/3 of the tooth crown

2 - plaque covers 2/3 of the tooth surface

2 - supragingival calculus covers 2/3 of the tooth crown; subgingival calculus in the form of separate conglomerates

3 - plaque covers >2/3 of the tooth surface

3 - supragingival plaque covers 2/3 of the tooth crown and/or subgingival plaque covers the cervical part of the tooth

The calculation formula:

$$OHI-S = (S DI/n) + (S CI/n)$$

where S is the sum of the values, DI is plaque, CI is calculus, and n is the number of teeth examined (usually 6).

Interpretation of results:

Assessment of oral hygiene:

0 - 0.6 low level,

0.7 - 1.6 medium level,

1.7 - 2.5 high level,

more than 2.6 is a very high level.

Statistical data processing was performed using Microsoft Excel by calculating the arithmetic mean.

At the initial examination of patients with GERD, an insufficient level of tongue hygiene was noted in the main group according to the degree of tongue plaque coverage (W.T.C. INDEX). The results are presented in Table 1.

Table 1

Index assessment of plaque in the tongue

Age and gender of the examined patients	Main group		Control group n=30
	Low acidity n=15	High acidity n=15	
Women 25-44 ye	7.2±1.04	5.3± 0.9	0.6±0.6
Men 25-44 ye	7.5± 0.8	5.57± 0.5	0.7±0.4
Women 45-59 ye	7.7± 0.6	5.2± 1	1.1±0.7
Men 45-59 ye	8.0± 0	5±0.1	0.6±0.9

At the initial examination of patients with GERD, an insufficient level of tongue hygiene was noted in the main group according to the degree of tongue plaque coverage (W.T.C. INDEX).

Thus, when examining patients with low gastric acidity, a thick plaque (2 points) was observed in men aged 45-59 years, which was 8.0±0. While in women in the same age group, the index was 7.7±0.6. In women and men aged 25-44 years, it was 7.2±1.04 and 7.5±0.8, respectively. With increased acidity, plaque thickness was represented by thin plaque (1 point) in men aged 25-44 years,

which was detected in 5.57±0.5 cases, and in women of the same age, it occurred in 5.3±0.9 cases. In women aged 45-59 years, thin plaque on the tongue was detected in 5.2±1.3 cases and in men in 5.0±0.1 cases. In the control group, there was mainly no plaque (0 points) or a thin layer of plaque (1 point).

Thus, in the main group, a predominance of thick plaque on the back of the tongue was noted.

The results of the state of the oral cavity are shown in Table 2.

Table 2

Evaluation of the OHI-S hygiene index

Age and gender of the examined patients	Main group		Control group n=30
	High acidity n=15	Low acidity n=15	
	State of oral hygiene	State of oral hygiene	State of oral hygiene
Men 25-44 ye	1.4±0.1	1.3±0.1	0.7±0.3
Women 25-44 ye	1.76±0.06	2.0±0.4	0.7±0.2
Men 45-59 ye	2.0±0.06	2.3±0.3(4)	0.6±0.3
Women 45-59 ye	2.25±0.1	2.75±0.2	0.8±0.3

When assessing the state of oral hygiene, it should be noted that in general, hygiene was satisfactory in the main study group. But, as can be seen from Table 2, male patients with GERD with increased acidity of gastric juice aged 25-44 years had a satisfactory state of the oral cavity according to the Green-Vermillion index and amounted to 1.4±0.1, and the group of patients in the same category had an unsatisfactory state of oral hygiene and amounted to 1.76±0.06. Oral hygiene was unsatisfactory in men aged 45-59 years and amounted to 2.0±0.06, while in women of the same age, unsatisfactory hygiene was

observed and amounted to 2.2±0.1. With low acidity of gastric juice, the oral hygiene index in men aged 25-44 years was 1.3±0.1 and was satisfactory, and in women of the same age, it was 2.0±0.4, which was unsatisfactory. Thus, in group 2 of women with low acidity aged 45-59 years, the index was 2.7±0.2, and in men of the same age, it was 2.3±0.3. In the control group of subjects, oral hygiene was observed to be good.

The level of acidity of the oral fluid is shown in Table 3.

Table 3

pH of the oral fluid

Age range	Main group		Control group n=30
	Acidic environment (n=15), where pH<7	Alkaline environment (n=15), where pH>7	
Men 25-44 ye	6.01±0.08	8.1±0.3	6.5±0.2
Women 25-44 ye	5.9±0.2	8.5±0.2	6.7±0.3
Men 45-59 ye	5.7±0.1	8.1±0.4	6.9±0.09
Women 45-59 ye	6.0±0.2	9.0±0.1	6.9±0.2

When examining the pH of the oral fluid in the main group, we noticed that the lower the pH level is, the more acidic the environment is. Thus, in men aged 25-35 years, this indicator is 6.01±0.1, and in women of the same age, it is 5.9±0.2. In men aged 45-55 years, the pH was 5.7±0.1, and in women of the same group, 6.0±0.2 was noted. The alkaline environment of the oral fluid has a high

pH level and is 8.1±0.3 in the age group of 25-35 years among men, and in women of the same group, it is 8.5±0.2. Accordingly, in the 45-55 age group of men, it is 8.5±0.4, and in women, it is 9.0±0.1. In the control group, the pH value was within the normal range of 6.5±7.4.

The acid-base balance of the oral fluid is important for metabolism. Normally, the acidity of a person

varies around pH 6.8-7.4, and with a high rate of salivation, it can reach pH 7.8. In the case of gastroesophageal reflux, which reaches the oral cavity, a decrease in pH level in saliva leads to pathological changes in the mucous membrane, i.e. (inflammatory process, erosive stomatitis, catarrhal gingivitis, glossitis of various kinds, tongue burning, decreased saliva flow) [8].

Conclusions. The studied indices make it possible to assess the hygienic state of the oral cavity, and acid-base balance by the level of acidity of gastric juice in GERD. The data obtained should be taken into account for the timely detection of pathological changes in the oral cavity. The results of our study indicate the need to develop therapeutic and preventive measures for the care of the oral cavity in patients with GERD to prevent the occurrence of manifestations of this disease in the oral cavity.

Prospects for further research. Consist in the scientific justification of approaches to the prevention and treatment of the condition of the oral cavity in patients with GERD.

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УДК 616.31-001+616.34-002

ІНДЕКСНА ОЦІНКА СТАНУ РОТОВОЇ ПОРОЖНИНИ В ПАЦІЄНТІВ ІЗ ГАСТРОЕЗОФАГЕАЛЬНОЮ РЕФЛЮКСНОЮ ХВОРОБОЮ

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Резюме. Встановлено, що захворювання шлункового тракту, а саме гастроєзофагеальна рефлюксна хвороба впливає на ротову порожнину. Слід зазначити, що ГЕРХ є одним із найпоширеніших захворювань травного тракту у світі. Тісний взаємозв'язок ротової порожнини внаслідок подібності функцій, спільності кровопостачання, інервації, морфологічної будови шлункового тракту призводить до порушення імунологічної реактивності, фізико-хімічних змін слини. СОРП є потужним рецепторним полем, що сприймає рецепторні впливи всього організму. Численні дослідження клініцистів підтверджують: 75% хворих із патологіями СОПР внаслідок захворювання ШКТ. При підвищеній кислотності шлункового соку спостерігається гіперсаливація, гіпертрофія ниткоподібних сосочків язика в поєднанні з вогнищами десквамації, блідістю та набряком слизової оболонки ротової порожнини, катаральним гінгівітом. При пониженій кислотності шлункового соку наявна велика кількість нашарувань на язичку, спостерігається атрофія ниткоподібних сосочків, зниження виділення слини, сухість губ, ангулярний хейліт. Це пов'язано з послабленням глоткового та кардинального клапанів шлунка, внаслідок чого вміст останнього (шлунка) з його секреторною складовою закидається в ротову порожнину, впливаючи таким чином на смакові рецептори. Проведена індексна оцінка стану ротової порожнини за індексом нальоту на спинці язика, індексом гігієни ротової порожнини -ОНІ-S, визначення кислотності ротової

рідини в пацієнтів із ГЕРХ свідчить про залежність від рівня кислотності шлункового соку. Гастроєзофагеальна рефлюксна хвороба негативно впливає на гігієну ротової порожнини, кисло-лужний баланс ротової рідини, що призводить до формування патологічних процесів у ротовій порожнині. Гомеостаз ротової порожнини підтримується завдяки кисло-лужній

рівновазі, основним показником якої є рН ротової рідини. Ротову рідину відносять до інтегральних середовищ людського організму, таким чином, метаболічні процеси впливають на її склад.

Ключові слова: гастроєзофагеальна рефлюксна хвороба, індексна оцінка ротової порожнини.

Стаття надійшла в редакцію 22.01.2024 р.

Стаття прийнята до друку 27.02.2024 р.