Оригінальні дослідження

EVALUATION OF THE EFFECTIVENESS OF DENTAL COMPLACATIONS PREVENTION AGAINST THE BACKGROUND OF CHEMOTHERAPY IN ONCOLOGICAL PATIENTS IN ZAPORIZHZHIA

©A. M. Filon

Zaporizhzhia State Medical University

SUMMARY. The aim – to investigate the condition of the oral cavity in patients with malignant neoplasms of the mammary gland and lungs before and after chemotherapy and to analyze the effectiveness of dental prophylaxis.

Material and Methods. To achieve this goal, a statistical study of oncological patients undergoing chemotherapy at the ONCOLIFE medical center (Zaporizhzhia) was performed. 60 patients, both men and women, were enrolled in the study. All respondents were divided into groups according to cancer type: group 1 consisted of 30 lung cancer patients, group 2 comprised 30 breast cancer patients, and group 3, the control group, included 30 people without cancer. Research results have been processed with modern statistical methods on a PC with Statistica 13 software package.

Results. The data were checked for normality of distribution since the distribution of most data differs from normal; the median and interquartile range (Me(Q25; Q75)) of data presentation were designed. A comparison of indicators in three independent groups was performed with the Kruskall – Wallis test, in two independent groups – with the Mann – Whitney test, and the non-parametric Wilcoxon test was used to determine the effect of prophylactic treatment. The Chi-square test was used to compare qualitative data. Differences were considered statistically significant at a significance level of $p < 0.05$.

Conclusions. Patients with oncopathology accompanied with unsatisfactory oral hygiene, caries and its complications are more likely to get dental problems during chemotherapy treatment. Oncological patients diagnosed with lung cancer and breast cancer developed relatively similar dental complications, which confirms the negative effect of chemotherapy treatment as is.

KEY WORDS: breast cancer; lung cancer; dental complications; chemotherapy.

Introduction. Over the past five years, studies conducted by WHO indicate that breast cancer is one of the most common forms of oncological disease. As of 2020, 2.3 million women worldwide were diagnosed with breast cancer and 685,000 cancer-caused deaths were recorded. Breast cancer occurs worldwide in women of all ages after puberty, but the incidence increases with age [1, 2].

According to the regional cancer registry, breast cancer incidence in 2019 was 6.375 against 6.661 in 2018. The incidence rate in the Zaporizhzhia region is 373.9 per 100,000 of the population. Before the full-scale war in Ukraine, a total of 50,524 oncological patients were registered with oncologists at regional healthcare establishments [3].

Improving the quality of life in oncological patients is by any means no less important than the actual special treatment with chemotherapy, which is the basic standard. Patients with breast malignancies receiving chemotherapy face several challenges, including suffering from chronic fatigue, poor physical fitness, and immune system problems [4, 5]. The general somatic status of patients and its complications affect their condition and also contribute to the emergence of acute dental problems or exacerbation of chronic dental diseases, and one of the main criteria for the quality of life today is a healthy smile [6].

A healthy oral cavity, timely treatment of caries and its complications, and compliance with hygiene standards greatly reduce the risk of gum inflammation and tooth decay. A healthy smile always indicates a person's self-confidence. The ability to demonstrate teeth without any discomfort and the absence of bleeding gums and defects in the dentition increase self-esteem. Our society shares the idea of the aesthetic and functional condition of the teeth as a criterion for success. Considering this, the state of oral health in patients with oncology is particularly relevant [7]. The use of dental criteria to assess the quality of life of oncological patients is particularly important in dental practice. This permits us to estimate not only the severity of dental complications in the presence of the main oncological disease but also their psychosocial consequences. Patients with malignant neoplasms, being in a depressed moral and psychological state, definitely need social and psychological adaptation. [8].

The aim of the study to investigate the condition of the oral cavity in patients with malignant neoplasms of the mammary gland and lungs before and after chemotherapy and to analyze the effectiveness of dental prophylaxis.

Material and Methods. To achieve this goal, a statistical study of oncological patients undergoing chemotherapy at the ONCOLIFE medical center (Za-

*Огляди літератури, **оригінальні дослідження**, погляд на проблему, випадок з практики, короткі повідомлення*

porizhzhia) was performed. 60 patients, both men and women, were enrolled in the study. All respondents were divided into groups according to cancer type: group 1 consisted of 30 lung cancer patients, group 2 comprised 30 breast cancer patients, and group 3, the control group, included 30 people without cancer. All respondents agreed to participate in the study and signed informed consent. To collect statistical data, patients were examined at the Department of Therapeutic, Orthopedic, and Pediatric Dentistry of the Zaporizhzhia State Medical University, and patient documentation from the ONCOLIFE Medical Center was used. We used hygiene indices such as OHI-S (Green-Vermillion), GI gingivitis (Silness-Loe) and PMA (papillary marginal index) to assess hygiene. Detected lesions of the mucous membrane were classified according to WHO. To prevent dental complications in cancer patients, professional hygiene and complete sanitation of the oral cavity were carried out before chemotherapy.

Research results have been processed with modern statistical methods on a PC with Statistica 13 software package, license number JPZ804I-382130ARCN10-J. The data were checked for normality of distribution since the distribution of most data differs from normal; the median and interquartile range (Me(Q25; Q75)) of data presentation were designed. A comparison of indicators in three independent groups was performed with the Kruskall – Wallis test, in two independent groups – with the Mann – Whitney test, and the non-parametric Wilcoxon test was used to determine the effect of prophylactic treatment. The Chi-square test was used to compare qualitative data. Differences were considered statistically significant at a significance level of $p<0.05$.

Results and Discussion. Table 1 presents the results of the examination according to indices of hygiene, gingivitis, and PMA in groups before the prophylaxis and after it.

Table 1. Indices of hygiene OHI-S (Green-Vermillion), gingivitis GI (Silness-Loe), and PMA, Me(Q25; Q75)

	Patients with lung cancer	Patients with breast cancer	People without oncological diseases	P-value, Kruskall-Wallis test
OHI-S (Green-Vermillion) hygiene index before the prophylaxis	1.75 (1.40; 2.20)*,∞	1.40 (1.30; 1.80)*	1.30 (1.10; 1.50)	0.0033
Index of gingivitis GI (Silness-Loe) before the prophylaxis	1.55 (1.10; 1.90)*,∞	1.25 (1.10; 1.60)*	1.10 (0.90; 1.30)	0.0005
PMA (papillary-marginal-alveolar) index before the prophylaxis, %	62.0 (45.0; 77.0)*,∞	53.0 (43.0; 60.0)*	36.0 (32.0; 40.0)	<0.0001
OHI-S (Green-Vermillion) hygiene index after the prophylaxis and treatment	1.35 (1.20; 1.90)*,∞	1.10 (0.80; 1.30)	1.10 (0.80; 1.30)	0.0004
P by the Wilcoxon test	<0.001	<0.001	<0.001	
Index of gingivitis GI (Silness-Loe) after the prophylaxis and treatment	1.20 (0.90; 1.60)*,∞	0.80 (0.60; 1.10)	0.80 (0.60; 1.10)	0.002
P by the Wilcoxon test	<0.001	<0.001	<0.001	
PMA (papillary-marginal-alveolar) index after the prophylaxis and treatment	42.5 (28.0; 55.0)*,∞	36.5 (30.0; 40.0)	30.0 (25.0; 32.0)	<0.0001
P by the Wilcoxon test	<0.001	<0.001	<0.001	

Legend: * – a statistically significant difference with patients without dental complications ($p<0.05$), ∞ – a statistically significant difference with patients with breast cancer ($p<0.05$).

The median value of the OHI-S (Green-Vermillion) hygiene index before the start of prevention was 1.75 for patients with lung cancer, 1.40 for patients with breast cancer, and 1.30 for people without cancer (Fig. 1).

The difference between the groups was statistically significant by the Kruskall-Wallis test ($p<0.05$). In addition, there was a statistically significant difference between lung cancer and breast cancer patients by the Mann-Whitney test.

The median value of the GI gingivitis index (Silness-Loe) before the prophylaxis was 1.55 in patients with lung cancer, 1.25 in patients with breast cancer, and 1.10 in people without cancer (Fig. 2).

Similar to the previous index, the difference between groups was statistically significant by the Kruskall-Wallis test ($p<0.05$). Besides, there was a statistically significant difference between lung cancer and breast cancer patients by the Mann-Whitney test.
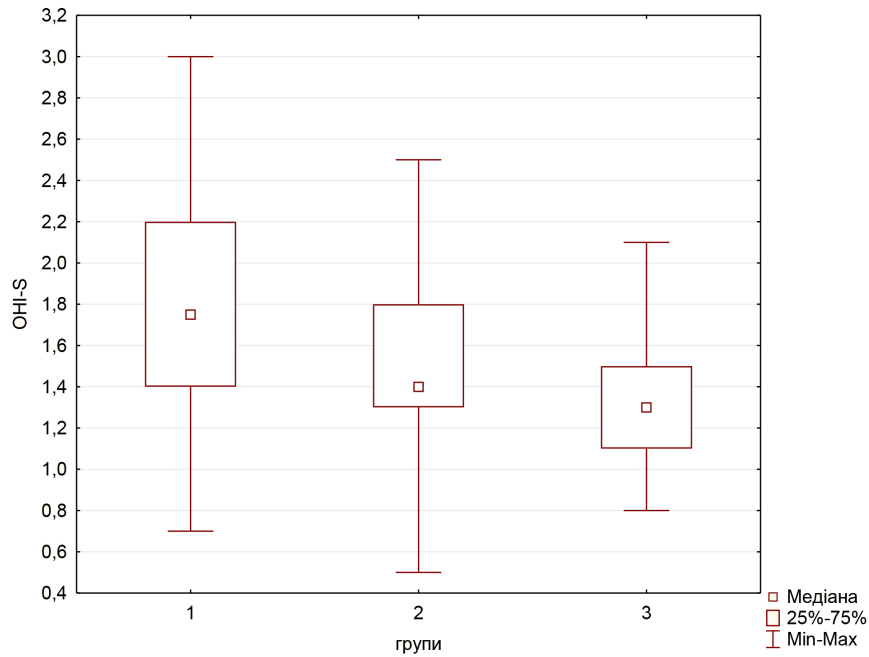
Fig. 1. Comparison of OHI-S (Green-Vermillion) hygiene index before the prophylaxis.
Legend: 1 – patients with lung cancer; 2 – patients with breast cancer; 3 – people without oncological diseases.
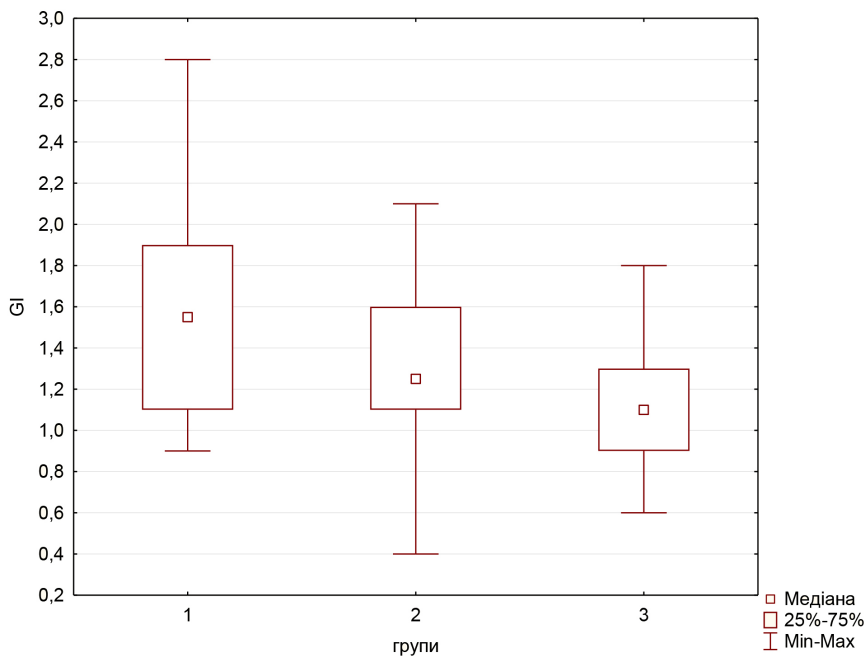

Fig. 2. Comparison of gingivitis GI (Silness-Loe) index before the prophylaxis.
Legend: 1 – patients with lung cancer; 2 – patients with breast cancer; 3 – people without oncological diseases.

The median value of the PMA (papillary-marginal-alveolar) index before the prophylaxis was 62 % in patients with lung cancer, 53 % in patients with breast cancer, and 36 % in people without cancer (Fig. 3).

The difference between the groups was statistically significant by the Kruskall – Wallis test ($p < 0.05$). In addition, there was a statistically significant difference between lung cancer and breast cancer patients by the Mann – Whitney test.

The median value of the OHI-S (Green-Vermillion) hygiene index after prophylaxis and treatment was 1.35 for patients with lung cancer, 1.10 for patients with breast cancer, and 1.10 for people without cancer (Fig. 4).
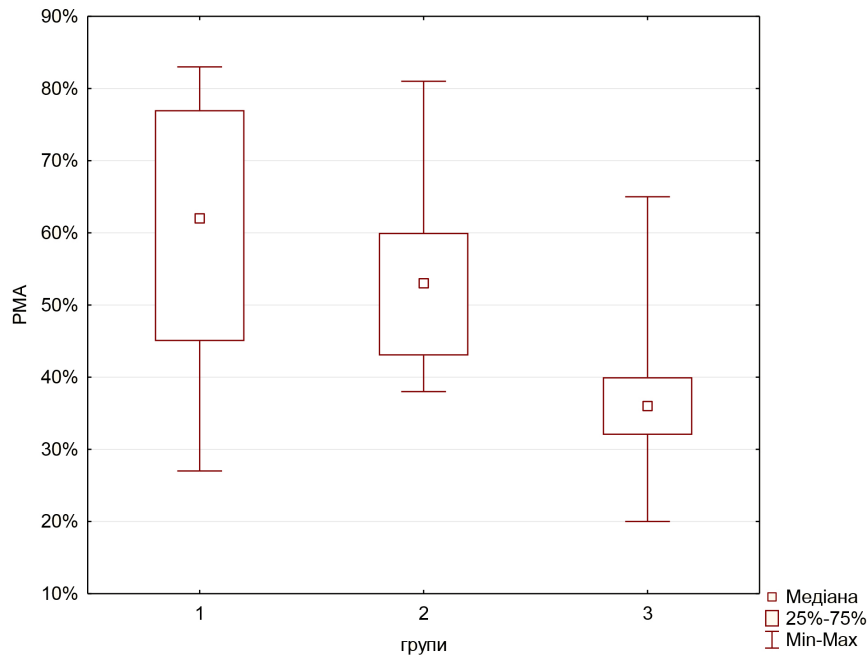
Fig 3. Comparison of PMA (papillary-marginal-alveolar) index before the prophylaxis.

Legend: 1 – patients with lung cancer; 2 – patients with breast cancer; 3 – people without oncological diseases.
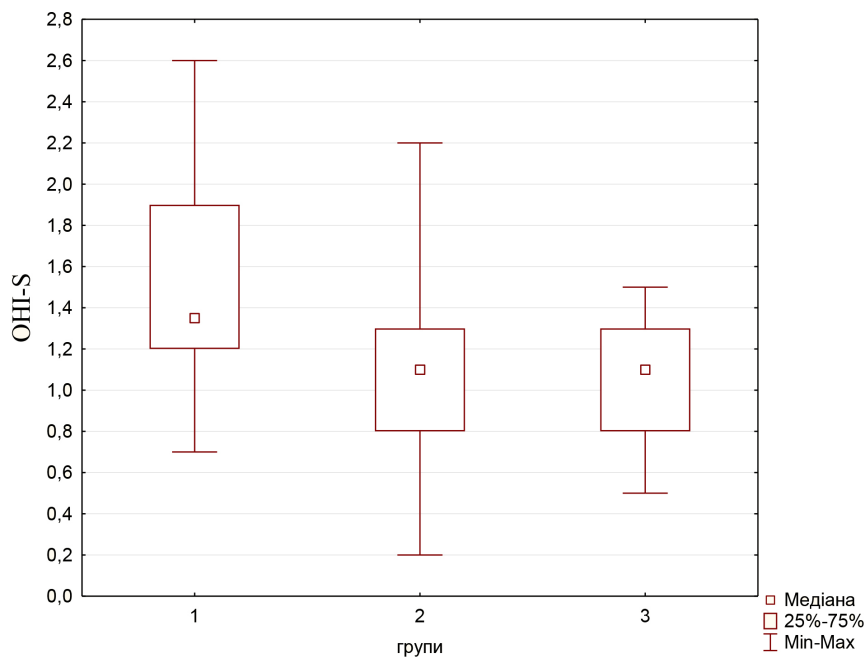

Fig. 4. Comparison of OHI-S (Green-Vermillion) hygiene index after the prophylaxis.

Legend: 1 – patients with lung cancer; 2 – patients with breast cancer; 3 – people without oncological diseases.

In the result of prophylaxis, all groups demonstrated an improvement which was statistically significant according to the Wilcoxon test. Despite a statistically significant difference between groups according to the Kruskall – Wallis test (p<0.05) and a statistically significant difference between patients with lung cancer and breast cancer according to the Mann – Whitney test, the indicators in the group with breast cancer and the group without oncological diseases (p>0.05) have equaled, which indicates the effectiveness of the performed dental prophylaxis.

In our opinion, the difference between the data obtained in patients with breast and lung cancer may be due to the fact that more than 70 % of the

studied patients with lung cancer had a habit of smoking, demonstrated unsatisfactory oral hygiene, and presented with chronic cardiovascular or gastro-intestinal diseases. These diseases reduce the saliva-tion of the oral cavity and suppress the condition of the mucous membrane with a decrease in trophic function. As a result, the mucous membrane be-comes more irritable and the risk of gingivitis, muco-sitis, and periodontal disease occurs [8, 9, 10, 11, 12].

Similar results were observed by the gingivitis in-dex: the median value of the GI gingivitis (Silness-Loe) index after prophylaxis and treatment was 1.2 in pa-tients with lung cancer, 0.8 in patients with breast can-cer, and 0.8 in people without cancer (Fig. 5). As for the PMA (papillary-marginal-alveolar) index, its median value after prophylaxis and treatment was 42.5 % in patients with lung cancer, 36 % in patients with breast cancer, and 23.5 % in people without cancer (Fig. 6)
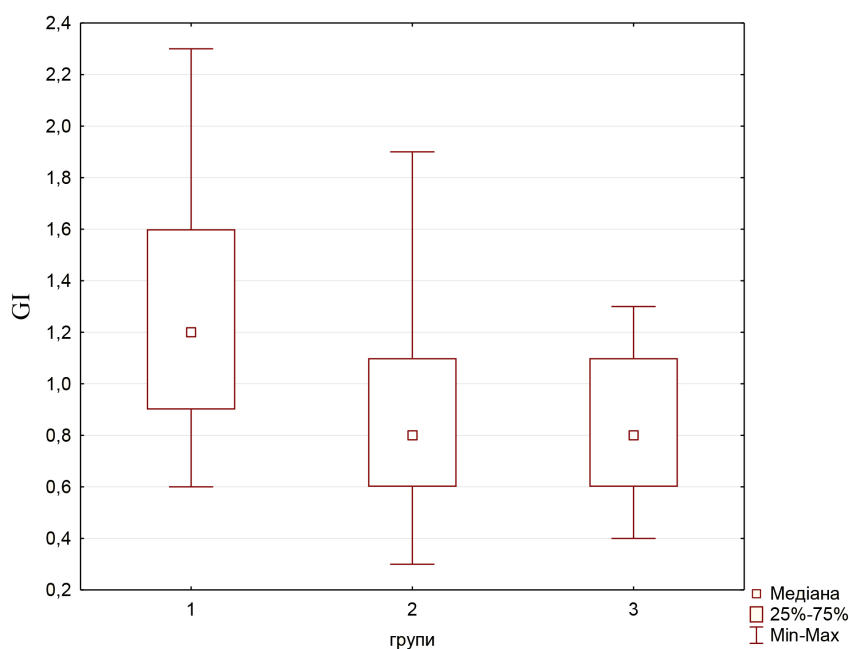

Fig. 5. Comparison of gingivitis GI (Silness-Loe) index after the prophylaxis.

Legend: 1 – patients with lung cancer; 2 – patients with breast cancer; 3 – people without oncological diseases.
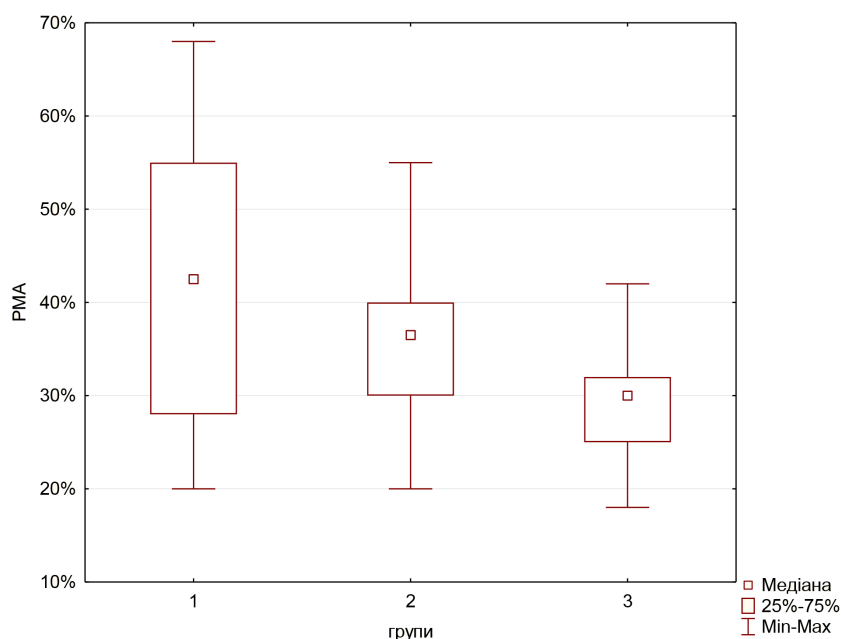

Fig. 6. Comparison of PMA (papillary-marginal-alveolar) index after the prophylaxis.

Legend: 1 – patients with lung cancer; 2 – patients with breast cancer; 3 – people without oncological diseases.

Before the prescribed chemotherapy treatment, the patients were offered free dental care, if necessary. They got an opportunity to consult a dentist, have their maxillofacial systems x-rayed, undergo a complete rehabilitation of the oral cavity, and get prosthetics if necessary.

Three months after the start of chemotherapeutic treatment, patients from the first and second groups were invited for a follow-up examination to assess the condition of the oral cavity. It was found that patients who had undergone oral rehabilitation complained significantly less about the health of the oral cavity during chemotherapy treatment.

Conclusions. 1. Patients with oncopathology accompanied with unsatisfactory oral hygiene, caries and its complications are more likely to get dental problems during chemotherapy treatment. The OHI-S hygiene index before the start of prophylaxis was 1.75 (1.40, 2.20) in patients with lung cancer and 1.40 (1.30, 1.80) in patients with breast cancer. The pre-prophylaxis GI gingivitis index was 1.55 (1.10, 1.90) in patients with lung cancer and 1.25 (1.10, 1.60) in patients with breast cancer. The PMA index before the start of prophylaxis was 62.0 (45.0, 77.0) in patients with lung cancer and 53.0 (43.0; 60.0) in patients with breast cancer.

2. Oncological patients diagnosed with lung cancer and breast cancer developed relatively similar dental complications, which confirms the negative effect of chemotherapy treatment as is. In our opinion, the difference in hygiene indices between the first and second groups is caused by the fact that 70 % of the lung cancer subjects had a habit of smoking, unsatisfactory oral hygiene, and presented with chronic cardiovascular and gastrointestinal diseases. 56.67 % of patients with lung cancer suffered from coronary heart disease. 63.33 % suffered from chronic hypertension.

Prospects for further research. One of the future research directions is to analyze the results of dental prophylaxis impact on the prevention of the development of mucositis in cancer patients during chemotherapy.

LITERATURE

1. The role of dissemination and implementation science in global breast cancer control programs: Frameworks, methods, and examples / Anne F. Rositch, Karla Unger-Saldaña, Rebecca J. DeBoer [et al.] // Cancer. – 2020. – Vol. 126, No. 10. – P. 2394–2404.

2. International Variation in Female Breast Cancer Incidence and Mortality Rates [Electronic resource] / Carol E. DeSantis, Freddie Bray, Jacques Ferlay [et al.] // Cancer Epidemiology Biomarkers & Prevention. – 2015. – Vol. 24, No. 10. – P. 1495–1506. DOI: 10.1158/1055-9965.epi-15-0535.

3. Рак в Україні, 2019-2020. Захворюваність, смертність, показники діяльності онкологічної служби. Бюлетень Національного карцер-реєстру України. 2021. № 22.

4. Oral physiology and quality of life in cancer patients / L. J. Pereira, J. Braga Caputo, P. Midori Castelo [et al.] // Nutricion hospitalaria. – 2015. – Vol. 31, Iss. 5. – P. 2161–2166. DOI: 10.3305/nh.2015.31.5.8565.

5. Systematic review of basic oral care for the management of oral mucositis in cancer patients and clinical practice guidelines / C. Hong, L. A. Gueiros, J. S. Fulton [et al.]. Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology (MASCC/ISOO) // Supportive care in cancer. – 2019. – Vol. 27, Iss. 10. – P. 3949–3967. DOI: 10.1007/s00520-019-04848-4.

6. Oral Complications of Chemotherapy and Head/Neck Radiation (PDQ®): Health Professional Version / PDQ Supportive and Palliative Care Editorial Board // In PDQ Cancer Information Summaries // National Cancer Institute (US), 2021. URL : https://www.cancer.gov/about-cancer/treatment/side-effects/mouth-throat/oral-complications-hp-pdq#_1.

7. Chaveli-Lopez B. Treatment of oral mucositis due to chemotherapy [Electronic resource] / B. Chaveli-Lopez, J. V. Bagan-Sebastian // Journal of Clinical and Experimental Dentistry. – 2016. – Vol. 8 (2). – P. e201–e209. DOI: 10.4317/jced.52917.

8. Prevention and Treatment of Chemotherapy and Radiotherapy Induced Oral Mucositis / G. Daugėlaitė, K. Užkuraitytė, E. Jagelavičienė, A. Filipauskas // Medicina (Kaunas, Lithuania). – 2019. – Vol. 55, Iss. 2. – P. 25. DOI: 10.3390/medicina55020025.

REFERENCES

1. Rositch, Anne F., Unger-Saldaña, Karla, DeBoer, Rebecca J., Ng'ang'a, Anne, & Weiner, Bryan J. (2020). The role of dissemination and implementation science in global breast cancer control programs: Frameworks, methods, and examples. *Cancer*, 126, (S10), 2394-2404.

2. DeSantis, Carol E., Bray, Freddie, Ferlay, Jacques, Lortet-Tieulent, Joannie, Anderson, Benjamin O., & Jemal, Ahmedin (2015). International Variation in Female Breast Cancer Incidence and Mortality Rates. *Cancer Epidemiol. Biomarkers Prev.,* 24(10), 1495-1506.

3. (2021). Rak v Ukraini. 2019–2020. Zakhvoriuvanist, smertnist, pokaznyky diialnosti onkolohichnoi sluzhby [Cancer in Ukraine, 2019–2020. Occupation, death, demonstration of oncological service]. *Biuleten Natsionalnoho kantser-*

reestru Ukrainy – Bulletin of National Cancer Registry of Ukraine, 22 [in Ukrainian].

4. Pereira, L.J., Braga Caputo, J., Midori Castelo, P., Francelino Andrade, E., Silva Marques, L., Martins de Paiva, S., Márcia Pereira, S., & Vicente Pereira, C. (2015). Oral physiology and quality of life in cancer patients. *Nutricion Hospitalaria,* 31(5), 2161-2166. DOI: 10.3305/nh.2015.31. 5.8565.

5. Hong, C., Gueiros, L.A., Fulton, J S., Cheng, K., Kandwal, A., Galiti, D., ... & Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology (MASCC/ISOO) (2019). Systematic review of basic oral care for the management of oral mucositis in cancer patients and clinical practice guidelines. *Supportive Care in Cancer,* 27(10), 3949-3967. DOI: 10.1007/s00520-019-04848-4.

6. PDQ Supportive and Palliative Care Editorial Board (2021). Oral Complications of Chemotherapy and Head/Neck Radiation (PDQ®): Health Professional Version. In *PDQ Cancer Information Summaries.* National Cancer Institute (US). Retrieved from: https://www.cancer.gov/about-cancer/treatment/side-effects/mouth-throat/oral-complications-hp-pdq#_1.

7. Chaveli-López, B., & Bagán-Sebastián, J.V. (2016). Treatment of oral mucositis due to chemotherapy. *Journal of Clinical and Experimental Dentistry,* 8(2), e201-e209. DOI: 10.4317/jced.52917.

8. Chaveli-López, B., & Bagán-Sebastián, J.V. (2016). Treatment of oral mucositis due to chemotherapy. *Journal of Clinical and Experimental Dentistry,* 8(2), e201-e209. DOI: 10.4317/jced.52917.

ОЦІНКА ЕФЕКТИВНОСТІ ПРОФІЛАКТИКИ СТОМАТОЛОГІЧНИХ УСКЛАДНЕНЬ НА ТЛІ ХІМІОТЕРАПІЇ В ОНКОЛОГІЧНИХ ХВОРИХ У ЗАПОРІЖЖІ

©А. М. Філон

Запорізький державний медичний університет

РЕЗЮМЕ. Мета роботи – дослідити стан здоров'я ротової порожнини пацієнтів зі злоякісними новоутвореннями молочної залози та легень до та після хіміотерапевтичного лікування, проаналізувати ефективність проведеної стоматологічної профілактики.

Матеріали і методи. Обстежили 60 хворих на рак чоловіків і жінок, які перебували на хіміотерапевтичному лікуванні в медичному центрі ONCOLIFE (м. Запоріжжя). Всі респонденти були поділені на групи за онкологічними захворюваннями: першу групу склали 30 хворих на рак легень, другу – 30 хворих на рак молочної залози, третю, контрольну групу, – 30 осіб, які не страждають на онкологічне захворювання. Результати досліджень оброблені сучасними статистичними методами аналізу на персональному комп'ютері з використанням пакету програм Statistica 13.

Результати. Проведено перевірку даних на нормальність розподілу, обрано форму представлення даних медіана і міжквартильний інтервал (Me(Q25; Q75)). Порівняння показників у трьох незалежних групах проводили за критерієм Краскела – Уоліса, в двох незалежних групах – за критерієм Манна – Уітні, для визначення ефекту профілактичного лікування використовували непараметричний критерій Вілкоксона. Для порівняння якісних даних використовували критерій Хі-квадрат. Відмінності вважали статистично достовірними при рівні значущості $p<0,05$. У всіх групах за результатами профілактики спостерігалось покращення, яке було статистично значущим за критерієм Вілкоксона. Практично зрівнялись показники в групі хворих на рак молочної залози та групі без онкологічних захворювань ($p>0,05$), що свідчить про ефективність проведеної стоматологічної профілактики.

Висновки. Пацієнти, що страждають на злоякісні новоутворення та з незадовільною гігієною порожнини рота, наявністю карієсу та його ускладнень з більшою імовірністю можуть отримати стоматологічні ускладнення під час хіміотерапевтичного лікування. Онкохворі з діагнозом «рак легень» та «рак молочної залози», мали відносно однакові стоматологічні ускладнення, що підтверджує негативну дію саме хіміотерапевтичного лікування.

КЛЮЧОВІ СЛОВА: рак молочної залози; рак легень; стоматологічні ускладнення; хіміотерапія.