

EFFICIENT COMPREHENSIVE TREATMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE EXACERBATION AND POSTCOVIDAL SYNDROME IN ELDERLY PATIENTS

DOI: 10.36740/WLek202206111

Maksym M. Potyazhenko, Tetiana V. Nastroga, Nina L. Sokolyuk, Oksana Ye. Kitura, Nelya M. Motorna, Angelina S. Korpan
POLTAVA STATE MEDICAL UNIVERSITY, POLTAVA, UKRAINE

ABSTRACT

The aim: The purpose of the study is to increase the efficacy of comprehensive treatment in elderly patients with COPD, who have suffered of coronavirus disease-COVID-19 in the last 3-6 months, by using nebulizer therapy with N-acetylcysteine and 3% hypertonic sodium chloride solution (Flu-Acyl broncho) and the drug glycine, to correct psychosomatic disorders.

Materials and methods: Under our supervision there were 60 elderly patients with COPD gr D, who underwent Covid 19 in the last 3-6 months, were under observation. The average age was 66.3 ± 2.1 years. Patients of the main and control groups were prescribed complex basic therapy. However, mucolytic therapy was administered to patients in the main group using combined drug - N-acetylcysteine and 3% hypertonic sodium chloride solution through a 5.0 №10 nebulizer. For the treatment of astheno-neurotic disorders of postcovidal syndrome was prescribed glycine 100 mg 2 times a day for 10 days. Subsequently, Flu-Acyl broncho through a nebulizer at 5.0 No.10, and glycised was used in courses once a day for 10 days per month. Patients in the control group were prescribed acetylcysteine 200 mg 3 times a day N10.

Results: The results of observation for 6 months showed that in patients of the main group, recurrence of the disease was not observed. whereas in patients of the control group in 6 patients (20%).

Conclusions: Comprehensive treatment of elderly patients with comorbid pathology - COPD group D and postcovidal syndrome, with the additional use of nebulizer delivery of the combined drug - N-acetylcysteine and 3% hypertonic sodium chloride solution in combination with the sedative drug glycine, promotes improving the quality of life in patients, reducing the duration of treatment, prevents recurrence and progression of COPD.

KEY WORDS: COPD, frail age, post-covid syndrome, N-acetylcysteine and 3% sodium chloride, glycine, nebulizer therapy

INTRODUCTION

Population aging has become a leading demographic feature of Ukraine. According to the World Health Organization, the number of elderly and senile people will increase to almost 40% in the coming decades [1]. It is known that with age the number of comorbid conditions increases significantly, which is characterized by the presence of additional clinical picture, new mechanisms of disease development,

complications and course that are not specific to the underlying disease, which significantly affect quality of life and expectancy. In this regard, the problem of personalizing a patient with comorbid pathology also acquires special attention [2].

Currently, one of the most important medical and social problems in Ukraine and in the world is chronic obstructive pulmonary disease (COPD) [3], which is complicated by the epidemiological situation associated with the spread of COVID-19. Thus,

according to the WHO, today 0.8 % of the world's population suffers from COPD) [4-8]. At the same time, a very serious problem in connection with the pandemic in the world is the coronavirus disease

Wiad Lek. 2022;75(6):1486-1491

- COVID-19. It is known that the causative agent of coronavirus infection is COVID-19, which, as a rule, severely affects elderly patients over 60 years. There is also an indisputable fact of increasing the severity of functional and morphological disorders that existed before COVID-19, so patients after the acute phase show signs of chronic diseases exacerbation [9]. The urgency of the problem lies in the large-scale spread of this pathology, reduced quality of life in patients, lack of knowledge about the frequency, features and causes of long-term consequences of postcovidal syndrome, uncertain ideas about approaches to diagnosis and therapy [10]. It is known that the rehabilitation needs of patients with COVID-19 are possible in both acute, postacute and long-term periods [11]. Postcovidal syndrome is a set of symptoms that develop during or after COVID-19, last ≥ 12 weeks, and cannot be explained by an alternative diagnosis. Postcovidal syndrome is characterized by complaints of constant fatigue, anxiety, and inactivity. Most frequently postcovidal syndrome manifests itself in the form of lung damage, mental disorders, asthenia [10,11]). Asthenia, or a state of neuropsychological and physical weakness, is manifested by increased fatigue, weakening or loss of ability to prolonged physical or mental stress, but its specific symptoms may vary depending on the form and / or stage of the pathological process, reactive state, age and others [12]. In psychosomatic disorders, according to scientists, a rapid therapeutic effect of glycidised is established. Glycine (aminoacetic acid) has the properties of a metabolism regulator and is a substitute amino acid (natural metabolite), is a neurotransmitter of the inhibitory type of action and a regulator of metabolic processes in the central nervous system. Glycidised has antistress, sedative, nootropic and antitoxic effects [13], which justifies the use of glycidised in the treatment of postcovidal syndrome in elderly patients.

Elderly patients with COPD are characterized by age-related changes in lung function that worsen the course of the disease. In this category of patients a significant place in the formation of respiratory diseases is given to the violation of the transport of tracheobronchial secretions. Therefore, one of the main tasks of therapy is to thin the sputum, reduce its adhesiveness and improve the drainage properties of the respiratory tract. It is known that in the treatment

of COPD, preference is given to the inhalation route of drugs administration.

Today, the modern means of drug delivery to the respiratory tract is nebulizer therapy, the efficacy and safety of which is scientifically and practically justified, including in people with severe somatic pathology, the elderly and children [14]. Although COPD is a progressive disease, personalized and adequately selected and timely pathogenetic therapy with subsequent rehabilitation can significantly slow the progression of bronchial obstruction, reduce the frequency and severity of exacerbations, prevent complications with systemic consequences, and, above all, improve the quality of life in patients. Among the drugs with the possibility of inhalation, mucolytics occupy an important place. One of the means of mucolytic action is a combined drug Flu-Acyl Broncho in nebulizer solution. It consists of N-acetylcysteine, which has a mucolytic effect in direct contact with mucus, and 3% hypertonic sodium chloride solution, which increases the proportion of water in the bronchial secretion, dilutes it and facilitates its removal. [15].

THE AIM

The purpose of the study is to increase the efficacy of treatment in elderly patients with moderate-grade COPD with exacerbation of moderate severity, who have suffered of coronavirus disease-COVID-19 in the last 3-6 months, by using nebulizer therapy in the complex treatment with Flu-Acyl Broncho and with glycidised to correct psychosomatic disorders.

MATERIALS AND METHODS

Under our supervision there were 60 elderly patients with COPD in group D, with exacerbations of moderate severity, who suffered from COVID-19 for the latest 3-6 months. The mean age of patients was 66.3 ± 2.1 years. The observation period was 6 months. The diagnosis was verified on the basis of complaints, anamnesis data (number of exacerbations per year, COVID-19 coronavirus disease transferred for the latest 3-6 months), physical examination, general clinical and laboratory-instrumental methods (general blood test, sputum analysis, chest radiography, spirometry, tests with a bronchodilator, CRP, coagulograms). All patients underwent a preliminary screening test for SARS-CoV-2 antigen using rapid tests for SARSCoV-2 antigen, a negative result was obtained, which ruled out recurrence of COVID-19. Pulse oximetry was used to determine blood oxygen saturation and assess the need for additional oxygen therapy [16]. Assessment of exercise tolerance was performed using a 6-minute exercise test (6 minute

walking test - 6MWT) according to a standard protocol [3]. The diagnosis of COPD was made according to the adapted clinical guideline “Chronic obstructive pulmonary disease” in 2020 [3]. Patients’ quality of life was assessed using the COPD Symptom Assessment (TOC) test, and the severity of dyspnea was assessed using the Medical Research Council’s modified mMDR questionnaire – modified scale of Medical Research Council’. The psychological state of elderly patients with COPD included in the study was assessed using a questionnaire of Ch.D. Spielberger - Yu.L. Hanin [17]. The applied methods are approved by the ethics commission.

The probability of the obtained results was determined using the reliability t-test by Student. Differences were considered probable in the generally accepted in biobiological studies, the probability of error $p < 0.05$. Patients were divided into groups - basic (n=30) and control (n=30). The groups of patients were comparable in age and gender, as well as the degree of respiratory failure. Patients in the main and control groups were prescribed antibacterial, anti-inflammatory, anticoagulant therapy, combination bronchodilator therapy. However, mucolytic therapy was administered to patients in the main group using Flu-Acyl broncho through a 5.0 №10 nebulizer. For the treatment of astheno-neurotic disorders of Maksym M. Potyazhenko et al.

postcovidal syndrome was prescribed glycised 100 mg 2 times a day for 10 days. Subsequently, Flu-Acyl broncho through a nebulizer at 5.0 No.10, and glycised was used in courses once a day for 10 days per month.

Patients in the control group, were prescribed acetylcysteine (ACC) as mucolytic therapy: 200 mg 3 times a day №10. Subsequently, acetylcysteine was recommended in courses of 200 mg 2 times a day for 10 days per month.

However, patients did not adhere to compliance.

RESULTS

All elderly patients with COPD in group D, included in the study, noted cough with purulent sputum discharge - 60 patients (100%), increased shortness of breath when walking -25 (41.6) patients, shortness of breath at rest in 35 - (58.4%), poor sleep - 59 (98.3%), general weakness – 60 (100%), increase in body temperature to subfebrile figures in 49 (82%). According to the results of general clinical and biochemical analysis of blood, leukocytosis was noted - $9.8 \pm 0.81 \times 10^9$, and an increase in ESR - 32 ± 3.6 mm/h, which indicated an exacerbation of COPD.

The study of the coagulograms in the patients included to the study showed an increase in fibrinogen and a decrease in APTT. Thus, the average values of

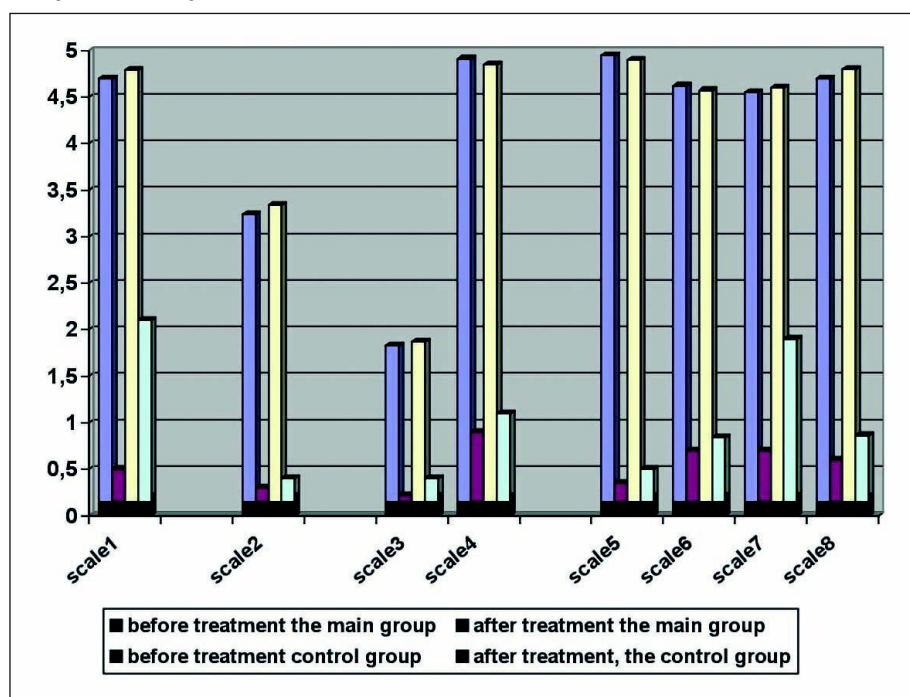


Fig. Evaluation of COPD symptoms in elderly patients with postcovidal syndrome according to the results of the test for the COPD (TOC) by scales

Table I. Biochemical parameters and SpO2 in elderly COPD patients during treatment

Index	Main group		Control group	
	Before treatment	After treatment	Before treatment	After treatment
Fibrinogen, g/l	5.3±0.23*	4.1±0.16	5.1±0.21*	3.8 ±0.3
APTT	24.7±0.81*	31.3±1.14	25.1±1.3*	30.7±0.79
SpO2%	92.08±0.3*	93.2±0.12	92.42±0.24	92.9±0.33

* - ($p < 0.05$) differences significant between patients before treatment and after treatment

fibrinogen were 5.2 ± 0.8 g/l, the level of APTT - 19.8 ± 1.4 , which indicated a tendency to hypercoagulation in this category of patients and the activity of the inflammatory process [18]. The results of chest radiography revealed changes that indicated pulmonary emphysema in 60 patients (100 %), and a characteristic radiological picture of pneumosclerosis, pneumofibrosis in 24 patients (40 %), increased pulmonary pattern in 58 (96.6 %) patients.

The analysis of external function indices convincingly showed severe ventilation disorders of the mixed type (VC - 33.2 ± 0.8 ; FEV1 - $30.1 \pm 1.35\%$, FEV1/FVC - $42.3 \pm 1.1\%$). The mean SaO₂ saturation was 92.8%, indicating the presence of respiratory failure in the patients included in the study.

In the analysis of the patients' psychological state with the help of a questionnaire - Ch.D. Spielberger - Yu.L. Hanin, the mean level of RT was 58.8 ± 3.1 points, which indicates a high level. Clinically, this was manifested by anxiety, worry, nervousness, poor sleep. The mean level of PT was 47.8 ± 2.4 points, which also indicated a high level. PT is a characteristic feature of a personality and is determined by the type of higher nervous activity, temperament [1].

When interviewing patients by the MMDR scale, it was found that the mean total score before treatment in patients was 3.3 ± 0.6 points, indicating severe shortness of breath in patients at the time of examination.

In determining the effect of infectious exacerbation of COPD in group D in elderly patients who underwent COVID-19 for quality of life for the latest 3-6 months using the TOX questionnaire, the mean index was 25.9 ± 1.4 , indicating a significant effect of disease symptoms on the quality of patients' life.

After the therapy, positive clinical dynamics were observed in patients of both groups, but significant differences were observed in terms of regression of the main symptoms of the disease - cough, shortness of breath. Thus, the mean time of cough fadeaway in patients of the main group was 7.6 ± 0.52 days, while in patients of the control group 9.4 ± 0.7 days ($p < 0.05$). The mean time of shortness of breath fadeaway in patients of the main group was 6.8 ± 0.6 , while in patients of the control group it was 8.3 ± 0.41 ($p < 0.05$).

Analysis of external respiratory function shows that 10 days after therapy in patients of the main group receiving comprehensive treatment there was a significant improvement in bronchial patency compared to patients in the control group ($p < 0.05$), as evidenced by FEV₁. Thus, FEV₁ in patients of the main group increased by 24.8%, amounted to 29.8 ± 1.3 % before treatment, after therapy - $37.2 \pm 1.17\%$ ($p < 0.05$). In patients of the control group, the corresponding indices increased by 12.2 % (were 30.4 ± 1.05 %, and 34.1 ± 1.23 %) ($p < 0.05$).

When interviewing patients by the MMDR scale, it was found that the mean total score before treatment in patients of the main group was 3.34 ± 0.6 points, after treatment - 1.2 ± 0.32 points, i.e. decreased by 65 % ($p < 0.05$), which indicated a significant reduction in the impact of disease symptoms on the quality of patients' ($p > 0.05$). Whereas in patients of the control group after treatment the indices did not improve significantly, decreased by 48 % (before treatment - 3.26 ± 0.73 points, after treatment 1.7 ± 0.57 points) ($p > 0.05$).

In determining the effect of infectious exacerbation of COPD group D in patients who have undergone COVID-19 during the latest 3-6 months, the quality of life with the help of TOC questionnaire (test of COPD assessment) showed a significant improvement in the efficacy of therapy in patients of both groups, but between patients in the main and control groups there were significant differences after treatment ($p < 0.05$). Thus, in patients of the main group, the total TOC index improved by 75.6%. (before treatment was 26.2 ± 1.3 after treatment - 6.4 ± 0.7 points) ($p < 0.05$). While in patients of the control group, the total TOC improved after treatment by 63.7% (before treatment was 25.6 ± 1.5 points, after treatment - 9.3 ± 0.92 points) ($p < 0.05$).

1. I cough constantly
2. My chest is completely filled with sputum (mucus)
3. I have a lot of pressure in my chest
4. When I go down a mountain or climb a flight of stairs,
I feel very short of breath
5. I do housework with great restrictions
6. Leaving home, I feel insecure because of lung disease
7. I sleep poorly due to lung disease
8. I have no energy at all

Results of the test indicate significant differences ($p < 0.05$) after treatment between patients in the main and control groups by scale of point 1- (I cough constantly), 7- (I sleep poorly due to lung disease). The mean score by scale of point 1 - (I cough) before treatment in patients of the main group - 4.7 ± 0.6 points; after treatment in patients of the main group - 0.5 ± 0.32 ; before treatment in patients of the control group - 4.78 ± 0.42 points, after treatment of the control group - 2.1 ± 0.54 ($p < 0.05$). By scale of point 7- (I sleep poorly due to lung disease) before treatment in patients of the main group - 4.62 ± 0.47 points, after treatment in patients of the main group - 0.45 ± 0.21 ; before treatment in patients of the control group - 4.57 ± 0.42 , after treatment - 1.9 ± 0.38 points ($p < 0.05$).

When assessing the 6-minute test, significant differences were noted between patients in the main and the control groups ($p < 0.05$). Thus, the mean distance traveled by patients of the main group was

312.4±7.2 m, while in patients of the control group, the distance traveled was 278.2±9.1 m, which is by 10.9 % less ($p<0.05$).

When studying the psychological state of elderly patients with COPD with the help of a questionnaire, by Ch.D. Spielberger –Yu.L. Khanin, the results obtained shows that in patients of the main group after treatment, the level of RA decreased significantly by 24.7% (before treatment was 57.2±2.33 points, after treatment - 43.1±1.62) ($p<0.05$). Whereas in patients of the control group the level of RA after treatment decreased by 18.5% (before treatment 58.4±3.1 points and 47.5±2.1 points) ($p<0.05$). The level of PA in patients of the main group ($n=30$) after treatment decreased significantly by 13.1% (before treatment was 47.5±2.31 points, after treatment - 41.1±2.12 points) ($p<0.05$). Whereas in patients of the control group ($n=30$) the level of PA decreased not significantly, by 12%. before treatment was 48.34±2.5 points, after treatment - 42.6±2.2 points ($p>0.05$). In addition, normalization of sleep was noted in 24 patients of the main group (80%), whereas among patients of the control group, sleep improvement was noted in 7 patients (23.3%) ($p<0.05$).

After a course of therapy, after 10 days there was a significant decrease in fibrinogen, an increase in APTT, which indicated a decrease in coagulation potential and improved rheological properties of blood

The obtained results are presented in the table I.

In the analysis of blood oxygen saturation, there was a significant increase in the level of SpO₂% after treatment in patients of the main group ($p<0.05$). Thus, in patients of the main group SpO₂% before treatment was 92.08±0.3%, after treatment - 93.2±0.12% ($p<0.05$), i.e. improved by 1.2%. Whereas in patients of the control group the level of oxygen saturation improved not significantly, by 0.51% (was before treatment 92.42±0.24%, after treatment - 92.9±0.33) ($p>0.05$).

DISCUSSION

The results obtained show that the complex treatment of elderly patients with comorbid pathology - COPD group D, who underwent COVID-19 during the latest 3-6 months with the use of nebulizer therapy with the combination drug - Flu-Acyl Broncho and the sedative drug - glycised, promotes faster regression of the main COPD symptoms and manifestations of postcovidal syndrome - cough, shortness of breath, improved bronchial patency (as evidenced by increased FEV₁); reducing anxiety, normalizing sleep, improving the quality of life in patients, increasing tolerance to exercise. Thus, in addition to the etiological and pathogenetic factors affecting the quality of life (LQ)

of the patients with COPD, the presence of a concomitant clinically significant syndrome the RA increases the negative effect on all components of LQ of these patients, which coincides with the authors' opinion [1,6,19]

Observations for 6 months showed that in patients of the main group who received complex therapy with nebulizer therapy and glycised, no recurrence of the disease was observed. While in patients of the control group, recurrences

Maksym M. Potyazhenko et al.

of the disease were observed in 6 patients (20%). The results show that the use of nebulizer therapy with a solution of Flu-Acyl Broncho and the drug glycised, in the complex treatment of elderly patients with COPD group D, who underwent COVID-19 during the latest 3-6 months, promotes longer remission of COPD, prevention of relapses.

CONCLUSIONS

Comprehensive treatment of elderly patients with comorbid pathology - COPD group D and postcovidal syndrome, with the additional use of nebulizer delivery of the combined drug - N-acetylcysteine and 3% hypertonic sodium chloride solution in combination with the sedative drug glycine, promotes improving the quality of life in patients, reducing the duration of treatment, prevents recurrence and progression of COPD.

REFERENCES

1. Nastroga T.V. Osoblyvosti terapii khvorykh pokhyloho viku z komorbidnoiu patolohiyeyu - na arterialnu hipertenziyu u poyednanni iz suputnim khronichnym obstruktyvnym zakhvoriuvannyam lehen. [Features of therapy of elderly patients with comorbidity - arterial hypertension and concomitant chronic obstructive pulmonary disease]. Problemy ekolohiyi ta medytsyny. 2017; 21(1-2):14-17. (in Ukrainian)
2. Kovalenko V.M. Bortkevych O.P Komorbidnist: vyznachennya, mozhlyvi napriamky diahnostyky ta likuvannya [Comorbidity: definition, possible directions of diagnosis and treatment]. Ukrainskyi revmatolohichnyi zhurnal. 2019;77(3).
3. Global Initiative for Chronic Obstructive Lung Disease (GOLD) The Global Strategy for tre Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. 2019.

- www.goldcopd.org. [date access 29.11.2021] (in Ukrainian)
4. Zhdan V.M., Khaimenova H.S., Ivanytskyi I.V. et al. Otsinka dynamiky klinikolaboratornykh pokaznykiv u likuvanni khvorykh na khronichne obstruktyvne zakhvoriuvannya lehen u poyednanni z osteoartrytom. [Assessment of dynamics of clinical and laboratory parameters through the treatment of patients with chronic obstructive pulmonary disease and comorbid osteoarthritis] Aktualni problemy suchasnoyi medytsyny. 2017;17(58):129-131. (in Ukrainian)
 5. Potyazhenko M.M., Ishcheikin K.Ie., Nastroga T.V. et al. Otsinka rivnia zdorovoho sposobu zhyttia u khvorykh na khronichne obstruktyvne zakhvoriuvannya lehen. [Evaluation of healthy lifestyling level in patients with chronic obstructive pulmonary disease] Svit medytsyny ta biolohiyi. 2020;1(71):99-104. (in Ukrainian)
 6. Potyazhenko M.M., Ishcheiki K.Ye., Nastroga T.V. et al. Optimization of pathogenetic therapy in patients with chronic obstructive lung disease. Wiad Lek. 2020; 73(4): 773-776.
 7. Potyazhenko M.M., Nastroga T.V., Sokolyuk N.L. et al. The influence of rational combination therapy on the quality of life of patients with chronic obstructive pulmonary disease. Medical and Ecological Problems.2020;24(3-4):11-14. (in Ukrainian)
 8. Savchenko L.V. Pokaznyky yakosti zhyttia ta faktychnoho kharchuvannya u khvorykh na khronichne obstruktyvne zakhvoriuvannya lehen v poyednanni z alimentarno-konstytutsiynym ozhyrinniam. [Indicators of quality of life and actual nutrition in patients with chronic obstructive pulmonary disease in combination with alimentary-constitutional obesity] Aktualni problemy suchasnoyi medytsyny. 2018;18(2(23)):99-104. (in Ukrainian)
 9. Horpynchenko I.I., Hurzhenko Yu.M., Spyrudonenko V.V. Postkovidnyi syndrom v androlohiyi. [Postcovidal syndrome in andrology] Spetsializovanyi medychnyi kvartal. 2021;2(23). (in Ukrainian)
 10. Holubovska O.A., Dubrov S.O., Nehrych T.I. et al. Postkovidnyi syndrom: multydstyplinaryni pidkhid do vedennia khvorykh.[Postcovidal syndrome: a multidisciplinary approach to patient management] Zdorovya Ukrainy. 2021;5(498):15-16. (in Ukrainian)
 11. Nakaz MOZ Ukrainy vid 20.04.2021 № 771 «Pro zatverdzhennia Protokolu nadannia reabilitatsiynoyi dopomohy patsiyentam z koronavirusnoyu khvoroboyu (COVID-19) ta rekonvalescentamy. [Order of the Ministry of Health of Ukraine dated 20.04.2021 № 771 “On approval of the Protocol for the provision of rehabilitation care to patients with coronavirus disease (COVID-19) and convalescents] <https://moz.gov.ua/article/ministry-mandates/nakaz-moz-ukrainivid-20042021--771-pro-zatverdzhennja-protokolu-nadannjareabilitacijnoi-dopomogi-pacientam-z-koronavirusnoju-hvoroboju-covid-19-ta-rekonvalescentam> [date access 29.11.2021] (in Ukrainian)
 12. Burchynskyi S.H. Novyye podkhody k farmakoterapii i farmakoprofilaktike asteno-nevroticheskikh sostoyaniy [New approaches to pharmacotherapy and pharmacoprophylaxis of asthenoneurotic conditions] Praktykuyuchy likar. 2015;4: 45-48. (in Ukrainian)
 13. Syrovaya A.O., Shapoval L.H., Makarov V.A. et al. Aminokisloty glazamy khimikov, farmatsevtov, biologov: [Amino acids through the eyes of chemists, pharmacists, biologists]. 2014;1:228. (in Ukrainian)
 14. Dobrianskyi D. V., Humeniuk H. L., Dudka P. F., et al. Nebulaizerna terapiya: praktychni aspekty.[Nebulizer therapy: practical aspects] Astma ta alerhiya. 2018;3:54-62. (in Ukrainian)
 15. Kochuieva M.M., Hrek I.I., Rohozhyn A.V., Kochuiev H.I. Zastosuvannya inhaliatsiinykh zasobiv dlia znyzhennia chastoty zahostren khronichnoho bronkhitu. [The use of inhalation agents to reduce the frequency of exacerbations of chronic bronchitis] Ukrainskyi medychnyi chasopys. 2021;4. (144(VII/VIII)) <https://www.umj.com.ua/article/209889/zastosuvannya-ingalyatsijnih-zasobiv-dlya-znizhennya-chastotizagostren-hronichnogo-bronhitu>. [date access 29.11.2021] (in Ukrainian)

16. Opimakh S.H. Otsinka porushen obminu kysniu u khvorykh na khronichne obstruktyvne zakhvoriuvannia lehen [Evaluation of oxygen metabolism disorders in patients with chronic obstructive pulmonary disease]. *Astma ta alerhiia*. 2013;4:34-39. (in Ukrainian)
17. Potiazhenko M.M., Nastroga T.V., Sokoliuk N.L. et al. Personifikovanyi kompleksnyi pidkhid pry menezhmenti poyednanoyi patolohiyi: ASTMA/KhOZL perekhrest [Personalized integrated approach in the management of combined pathology: ASTHMA/COPD intersection] Aktualni problemy suchasnoyi medytsyny Visnyk Ukrainiskoyi medychnoyi stomatolohichnoyi akademii. 2021;21,1(73):49-55. (in Ukrainian)
18. Kovalenko S.V., Dorofieiev A.E. Aktyvnist fibrynolitychnoyi ta proteolitychnoyi system krovi u *Initiative SRW № registration 0121U108237 Development of algorithms and technologies for the introduction of a healthy lifestyle in patients with non-communicable diseases based on the study of functional status. 2021-2025 y.*
19. Dovhan A.O., Konstanynovych T.V. Otsinka yakosti zhyttia khvorykh na khronichne obstruktyvne zakhvoriuvannia lehen za suputnikh rozladiv psykhoemotsiinoi sfery [Assessment of the quality of life of patients with chronic obstructive pulmonary disease in concomitant disorders of the psycho-emotional sphere] *Scientific Journal «ScienceRise: Medical Science»*. 2017; 5(13):36-41. (in Ukrainian)

ORCID and contributionship:

Maksym M. Potyazhenko: 0000-0001-9398-1378 ^F

Tetiana V. Nastroga: 0000-0001-5347-6094 ^D

Nina L. Sokolyuk: 0000-0002-7436-9965 ^B

Oksana Ye. Kitura: 0000-0001-5319-5831 ^A

Nelya M. Motorna: 0000-0002-7162-4940 ^E

Angelina S. Korpan: 0000-0002-2879-3087 ^C

Conflict of interest:

The Authors declare no conflict of interest.

CORRESPONDING AUTHOR

Tetyana V. Nastroga

Poltava State Medical University
24 Shevchenka st., 36024
Poltava, Ukraine tel: + 38
066 425 72 11
e-mail: tatjananastroga66@gmail.com

Received: 10.02.2022

Accepted: 23.05.2022

D - Writing the article, **E** - Critical review, **F** - Final approval of the article