

UDC 615.322:582.652.3

**Alexander VOLOSHYN**

PhD, Professor at Propedeutics and Internal Diseases Department, Bukovynian State Medical University, Teatralna Square, 2, Chernivtsi, 58000, Ukraine (voloska03@ukr.net)

ORCID: 0000-0003-2500-4705

**Larissa VOLOSHYNA**

PhD, Associate Professor at Internal Diseases Department, Bukovynian State Medical University, Teatralna Square, 2, Chernivtsi, 58000, Ukraine (voloska03@ukr.net)

ORCID: 0000-0003-2006-2914

**Nataliia BACHUK-PONYCH**

Candidate of Medical Sciences, Associate Professor at Propedeutics and Internal Diseases Department, Bukovynian State Medical University, Teatralna Square, 2, Chernivtsi, 58000, Ukraine (nataliya.ponych@gmail.com)

ORCID: 0000-0002-3875-5359

**Valentyna VASYUK**

PhD in Medicine, Associate Professor at Propedeutics and Internal Diseases Department, Bukovynian State Medical University, Teatralna Square, 2, Chernivtsi, 58000, Ukraine (helenium@ukr.net)

ORCID: 0000-0003-2037-2162

**Bohdan BOIKO**

Doctor of Therapeutic Department, Central City Clinical Hospital, Chernivtsi, Ukraine (bodiabv@gmail.com)

ORCID: 0000-0002-9151-6955

DOI: 10.33617/2522-9680-2022-1-15

**To cite this article:** Voloshyn O., Voloshyna L., Bachuk-Ponych N., Vasyuk V., Boiko B. (2022). Chornushka posivna (Nigella Sativa) – novitni naukovi dosiahnennia, novi perspektyvy vykorystannia (ohliad literatury) [Black Caraway (Nigella Sativa) – the latest scientific achievements, new perspectives of use (literature review)]. *Fitoterapiia. Chasopys – Phytotherapy. Journal*, 1, 15–20, doi: 10.33617/2522-9680-2022-1-15

**BLACK CARAWAY (NIGELLA SATIVA) – THE LATEST SCIENTIFIC ACHIEVEMENTS,  
NEW PERSPECTIVES OF USE (LITERATURE REVIEW)**

**Actuality.** The current state of Earth population health is characterized by progressive growth of poly- and comorbidity in recent decades. Comprehensive treatment of such economic and preventive patients causes significant pathogenetic difficulties and requires additional use of natural therapeutic and preventive means, multifaced action. One of which can be considered *Nigella sativa*.

**Material and methods.** A search was carried through modern electronic sources, printed sources and scientific databases by using methods of analysis and generalization of the obtained data.

**Research results.** According to studies of the therapeutic and prophylactic properties of black caraway drugs, it was ascertained, that they have diversified metabolic properties, especially important: antitumor, immunomodulatory, antimicrobial, antidiabetic, antihypertensive, as well as pulmo-, cardio-, nephro-, gastro-, hepato-, neuroprotective properties. To date, the effectiveness of black caraway seeds has been revealed in a wide range of diseases: from CNS, organo-, oncopathology to various dermal diseases. In this spectrum, the authors emphasize the latest achievements of world scientists in the use of *Nigella sativa* in the complex treatment of patients with diabetes, malignant tumors, immunodeficiency, metabolic syndrome, obesity, antibiotic-resistant infections. The authors emphasize the need for wider use of drugs from this medicinal plant for therapeutic and prophylactic purposes on patients with poly- and comorbidity and people with high risk rate.

**Conclusion.** Black caraway is a valuable sanative remedy with diversified metabolic properties and poly-organ action. It is expedient to be used more widely in dietary rehabilitation of patients with poly- and comorbid diseases.

**Key words:** black caraway, therapeutic and prophylactic properties, poly- and comorbidity, application.

## **Олександр ВОЛОШИН**

доктор медичних наук, професор кафедри пропедевтики внутрішніх хвороб, Буковинський державний медичний університет, пл. Театральна, 2, 58000, м. Чернівці, Україна (voloska03@ukr.net)  
**ORCID:** 0000-0003-2500-4705

## **Лариса ВОЛОШИНА**

доктор медичних наук, професор кафедри внутрішньої медицини та інфекційних хвороб, Буковинський державний медичний університет, пл. Театральна, 2, 58000, м. Чернівці, Україна (voloska03@ukr.net)  
**ORCID:** 0000-0003-2006-2914

## **Наталія БАЧУК-ПОНИЧ**

кандидат медичних наук, доцент кафедри пропедевтики внутрішніх хвороб, Буковинський державний медичний університет, пл. Театральна, 2, 58000, м. Чернівці, Україна (nataliya.ponuch@gmail.com)  
**ORCID:** 0000-0002-3875-5359

## **Валентина ВАСЮК**

доктор медичних наук, доцент кафедри пропедевтики внутрішніх хвороб, Буковинський державний медичний університет, пл. Театральна, 2, 58000, м. Чернівці, Україна (helenium@ukr.net)  
**ORCID:** 0000-0003-2037-2162

## **Богдан БОЙКО**

лікар терапевтичного відділення, КНП Центральна міська клінічна лікарня, м. Чернівці, Україна (bodiabv@gmail.com)  
**ORCID:** 0000-0002-9151-6955

**Бібліографічний опис статті:** Волошин О., Волошина Л., Бачук-Понич Н., Васюк В., Бойко Б. (2022). Чорнушка посівна (*Nigella Sativa*) – новітні наукові досягнення, нові перспективи використання (огляд літератури). *Фітотерапія. Часопис*, 1, 15–20, doi: 10.33617/2522-9680-2022-1-15

## **ЧОРНУШКА ПОСІВНА (NIGELLA SATIVA) – НОВІТНІ НАУКОВІ ДОСЯГНЕННЯ, НОВІ ПЕРСПЕКТИВИ ВИКОРИСТАННЯ (ОГЛЯД ЛІТЕРАТУРИ)**

**Актуальність.** Стан популяційного здоров'я населення Планети за останні десятиріччя характеризується прогресуючим зростанням явищ полі- і коморбідності. Комплексне лікування таких пацієнтів зумовлює значні труднощі патогенетичного, економічного характеру і вимагає додаткового застосування природних лікувально-профілактичних засобів багатогранної метаболічної, поліорганної дії, одним з яких може вважатися чорнушка посівна.

**Мета дослідження** – аналіз новітніх наукових досягнень цілющих властивостей чорнушки посівної та висвітлення перспектив використання у пацієнтів із явищами найбільш поширеної полі- і коморбідної патології.

**Матеріал і методи.** Проведений пошук в сучасних електронних і друкованих джерелах інформації, пошукових наукових базах із використанням методів аналізу та узагальнення отриманих даних.

**Результати дослідження.** Згідно з даними досліджень лікувально-профілактичних властивостей препаратів чорнушки посівної встановлено, що їм притаманні багатогранні метаболічні властивості, особливо важливі: протипухлинні, імуномодуляторні, протимікробні, антидіабетичні, гіпотензивні, а також пульмо-, кардіо-, нефро-, гастро-, гепато-, нейропротективні властивості. Донині виявлено ефективність насіння чорнушки посівної при широкому спектрі захворювань: від ЦНС, органо-, онкопатології до різних захворювань шкіри. В цьому спектрі автори акцентують увагу на новітні досягнення вчених світу в застосуванні засобів із чорнушки посівної в комплексному лікуванні хворих на цукровий діабет, злоякісні пухлини, імунодефіцитні стани, метаболічний синдром, ожиріння, антибіотикорезистентні інфекції. Автори вбачають, що необхідно ширше застосування засобів із цієї лікарської рослини з лікувально-профілактичною метою у пацієнтів із полі- і коморбідністю та осіб підвищеним рівнем ризиків.

**Висновок.** Чорнушка посівна – цінний оздоровчий засіб із багатогранними метаболічними властивостями та поліорганною дією. Її доцільно ширше використовувати в дієтичній реабілітації хворих із полі- та коморбідним захворюваннями.

**Ключові слова:** чорнушка посівна, лікувально-профілактичні властивості, полі-і коморбідність, застосування.

**The relevance.** In the second half of the XX century and to nowadays there is a clear trend to change the spectrum of diseases: infectious diseases are occurring less common, the frequency of metabolic diseases and oncopathology of various localizations are increasing.

Atherosclerotic lesions of the cardiovascular and central nervous systems, especially heart attacks and strokes, obesity, type 2 diabetes and other metabolic syndrome, musculoskeletal disorders and immunodeficiency states are becoming more common (Kempbell 2019;

Fadieienko, 2013). As the population ages, the frequency of combined, interdependent (comorbid) diseases increases, their existence against the background of other diseases (polymorbidity). Medical care of such patients is becoming more complex and expensive. Currently, the problem of poly- and comorbidity is recognized as one of the leading in world medicine (Fadieienko, 2013). Among the most common and socially significant diseases are hypertension, various forms of coronary heart disease, diabetes, obesity, oncopathology, most of which coexist as comorbid processes. It is recognized that in the rehabilitation of patients with poly- and comorbidities an important role should belong to the proper nutrition, in which proper place is given to various spices (Voloshyn, 2014; Fadieienko, 2013). Among the spices more and more attention of medical and biological scientists is put on *Nigella sativa*.

**The purpose of the study** is to analyze the latest scientific achievements in the healing properties of *Nigella sativa* and highlight the prospects of using in patients with the most common poly- and comorbid pathology.

**Material and methods.** A search was conducted in modern electronic and printed sources of information, search scientific databases using methods of analysis and generalization of the obtained data.

**Results.** It is established that *Nigella sativa*, also known as “black cumin”, “kilinji”, “Russian coriander”, “Roman coriander” (Voloshyn, 2014, Achmad, 2013; Bäumlner, 2007; Belgaumi, 2020) – it is an annual plant of the buttercup family, originally from Southeast Asia, North Africa and the Mediterranean (Bäumlner, 2007; Mohammed, 2016). Its healing properties were known to Egyptian, Indian and Arab civilizations (Bäumlner, 2007; Temphurne, 2014). It was used by famous doctors of that time Hippocrates, Dioscorides, Galen, Gaius Pliny, but only in the XVI century it was brought to Europe and began to be cultivated and used for health and therapeutic purposes. In particular, there is information that French and German doctors of the Middle Ages used remedies with *Nigella sativa* for fevers, abdominal diseases, tumors, skin, eyes and mouth diseases (Bäumlner, 2007).

Currently, *Nigella sativa* is cultivated in Ukraine and used as a spice plant, even new locally adapted varieties have been bred. However, the population and the medical community of our country are still not sufficiently aware of the healing properties of this plant and, of course, use it little in recovery. For therapeutic and prophylactic purposes, the seeds of the plant are used, which turn black when ripe, hence the name “black *Nigella*”, and a certain similarity in the shape of cumin seeds gave another name – “black

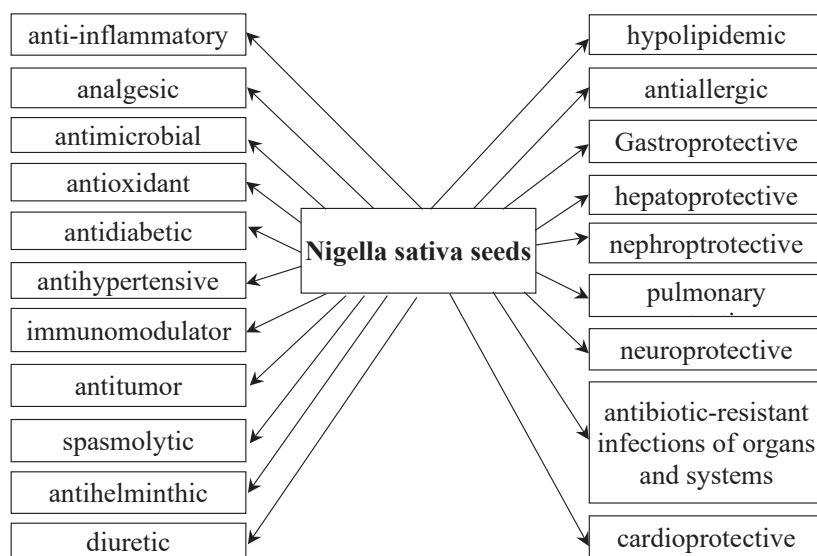
cumin”. And what is new known about the therapeutic and prophylactic properties of this plant? Do they correspond to the possibilities of correcting the health of patients with poly- and comorbidities, their specifics (endocrinopathy, cancer, immunodeficiency)? For a deeper understanding of the pharmacological properties of *Nigella*, consider information about the chemical composition of seeds. Seeds of *Nigella* consist of essential oil (0.46-1.4%), fatty oils (up to 49%) containing oleic (up to 48.7%), linoleic (up to 37.5%) acids and less amounts of myristic, linolenic, palmitic, petroselinic acid. Important are enzymes – nigedase and lipase, as well as coumarins, nigelin, thymoquinone; steroids: kemisterine, phytosterol, stigmosterol, alpha-saponins; monoterpenes – thymoquinone, alpha-pinene, carvacrol; tannins and bitters; salts K, Mg, P, Ca, Ln (Achmad, 2013; Ashraf, 2018; Bäumlner, 2007). But in recent years, the greatest attention of scientists has been paid to the study of the properties of the alkaloid of *Nigella* – thymoquinone (Amin, 2016).

Over the past three decades, the results of intensive research by scientists have established numerous pharmacological properties of factors of *Nigella* seeds (Abireza, 2016; Aisa, 2019; Amin, 2016; Bamasa, 2015; Belgaumi, 2020; Hassan, 2012; Jmran, 2011; Koshak, 2017), summarized in Fig.

The importance of the obtained data is evidenced by a number of review publications, which in addition to the pharmacological properties listed in the table highlights such important features as antimicrobial action on multi-antibiotic-resistant bacteria, antitumor, hypoglycemic, immunomodulatory properties and polynomial-modulating properties (Abireza, 2016; Ashraf, 2018; Bakal, 2017; Majdalawieh, 2016; Shafiq, 2014). In particular, numerous experiments have proven the antitumor effect of *Nigella* in cancerous lesions of the lungs, esophagus, stomach and colon (Elsavel, 2010; Hassan, 2012; Majdala wieh, 2016), as well as chemoprotective properties due to the component thymoquinone. There is also a positive effect of thymoquinone in depressive states, memory impairment, predisposition to convulsive reactions, male infertility (Amin, 2016).

The properties of *Nigella* seeds to normalize the menstrual cycle, positive laxative effect in hypogalactia, non-ulcer dyspepsia in children and adults (Merve, 2017; Salem, 2010), itchy dermatoses have long been known. The effect of *Nigella* remedies on obesity is being discussed and continued to be studied (Mahdavi, 2015; Ramalingman, 2017; Razavi, 2014).

According to information from the Middle Ages and the latest data, *Nigella* seed remedies are useful in the treatment of many diseases (Barakat, 2013; Boskabady,



**Fig. Pharmacological and organoprotective properties of seeds *Nigella sativa***

2010; Heshmati, 2015; Hesmati, 2015; Koshak, 2018; Krishnapura, 2018; Rogozhin, 2011), in particular:

- bronchial asthma, chronic bronchitis, COPD;
- hypertension, mild coronary heart disease;
- non-alcoholic fatty liver disease, chronic hepatitis, including viral, cholecystitis, pancreatitis, non-ulcer dyspepsia, irritable bowel syndrome, intestinal dysbiosis, helminthic-protozoan invasions;
- chronic pyelonephritis, uric acid diathesis, urolithiasis;
- metabolic syndrome, diabetes, obesity;
- atherosclerotic lesions of cerebral vessels with manifestations of depression, encephalopathy;
- secondary immunodeficiency states;
- inflammatory diseases of internal organs caused by antibiotic-resistant bacteria;
- malignant tumors of different localization;
- algo-dysmenorrhea, hypogalactia;
- dermatological: eczema, dermatitis, pyoderma, fungal infections – local application;
- multiorgan pathology.

It is clear that the remedies of *Nigella* seeds are used in these diseases as additional factors to treatment complexes that improve overall treatment outcomes. Please note, that the main publications about this plant are provided by scientists from countries with hot climates, where infections, worm-protozoan invasions, other diseases of internal organs and skin are very spread, and life has prompted the search for various ways to save, including medicinal plants, one of these they chose black sowing. These circumstances motivate European

scholars to thoughts and confidence the publications of colleagues from these countries and regions..

But we intend to pay the attention of the therapeutic community of Ukraine to the deteriorating health of modern patients with poly- and comorbidities, including the growing prevalence of atherosclerotic lesions of the cardiovascular system, CNS, diabetes, obesity and other metabolic disorders, immunodeficiency. Comprehensive treatment of such patients is complex, requires a variety of improvements, is expensive and requires the use of unifying means of multiorgan and multifaceted metabolic action. Such are traditionally medicinal plants, in particular, *Nigella sativa*.

It should be noted that the use of this plant for therapeutic and prophylactic purposes is safe, there are no reports of side effects. The average single dose for adults is 1.0 g of seeds, which is consumed with food (as a spice), and the daily – 3-4 g. You can use it in a form of tea: 1.0 g of seeds per 200 ml of boiling water – take 2 / 3 glasses three times a day for 30 minutes before eating (Bäumler, 2007; Mona, 2016).

Other options are available (Achmad, 2013; Bäumler, 2007):

- for tumors: 1 tablespoon of *Nigella* seed oil mixed with 1 teaspoon of liquid honey, take 30 minutes before breakfast;
- for cough: 0.5 teaspoon of *Nigella* seed oil mixed in a cup of yogurt, drink twice a day;
- general recovery: 1 tablespoon of honey and 1 teaspoon of *Nigella* seeds to mix, drink once a day;

– for hypertension, other cardiovascular diseases, immunodeficiencies: 1 teaspoon of *Nigella* seeds or oil mixed with hot water, drink daily in the morning, 2-3 months;

– to improve memory: 0.5 teaspoon of *Nigella* seeds mixed with one teaspoon of honey three times daily before meals, 2-3 months.

*Nigella* seed oil is very popular as a health remedy among the peoples of Indochina, the Arab world and the Mediterranean, and in recent years – and European countries, including Ukraine. Thus, the above information about the latest achievements in the healing properties of *Nigella* indicates its multifaceted metabolic, multiorgan, polysystemic action in various pathologies, which a priori indicates the feasibility of its use as an adjunct treatment and prevention tool in dietary rehabilitation of patients. in a wide morbid range: from CNS lesions to endocrine, oncopathology and immunodeficiency conditions, antibiotic-resistant infections.

In our work, we were guided by efforts to attract the attention of the general public, especially family physicians, phytotherapists to this wonderful medicinal plant, which has healed people since Egyptian civilization and to this day, and the renaissance of modern scientific research. of the present epoch with a complex field of organ pathology. It is important that *Nigella* is cultivated in Ukraine as well, even its special, valuable varieties

have been bred, but not only the population, but also we, medical workers, do not know enough about it and, accordingly, rarely use it. Expanding its cultivation, sale through the trade network as a valuable spice and use in human nutrition, especially older age groups and high-risk categories will undoubtedly bring significant benefits to the population of Ukraine in the current difficult environmental conditions.

**Conclusions. Due to the complex spectrum of adverse effects of environmental, economic factors, lifestyle and malnutrition, there is a tendency to progressive deterioration of public health in the form of poly- and comorbidity, increasing incidence of endocrine, oncopathology, secondary immunodeficiency. According to WHO experts, modern medicine and pharmacy are not able to properly help such patients, even at the highest cost of GDP in any country. It is seen that one of the effective ways out of this situation can be a broad and long educational work of scientists and doctors – practitioners of healthy lifestyles, the fundamental basis of which is a healthy diet with skillful use of spices according to new knowledge. *Nigella* can be considered as one of the remedies with multifaceted metabolic and multiorgan effects, especially in patients with poly – and comorbidity, including diseases such as type 2 diabetes, malignant tumors and immunodeficiency, metabolic syndrome, obesity, antibiotic resistance.**

#### REFERENCES

- Fadiejenko, H.D., Hridniev, O.I., & Nesen, A.O. (2013). Komorbidnist i vysokiy kardiovaskularniy rizyk – kluchovi pytania suchasnoi medytsyny *Ukr.terapevt.zhurn.*, 1, 102–107. [Comorbidity and high cardiovascular risk are key issues in modern medicine] [in Ukrainian].
- Kempbell, K., & Kempbell, T. (2019). *Kytayske doslidzhennia: Klasychna knyha pro zviazok zdorovia ta yizhi (pereklad z anhl.)*. Kharkiv: Hlobus. [Chinese Study: A Classic Book on the Relationship between Health and Food] [in Ukrainian].
- Voloshyn, O.I., & Vasiuk, V.L. (2014). Chornushka posivna (*Nigella sativa*)– perspektyvy vykorystannia. *Fitoterapiia. Chasopys*, 4, 39–42. [*Nigella sativa* – prospects for use] [in Ukrainian].
- Abireza, Mothashami, & Mochammad, Hassan Entezari. (2016). Effect of *Nigella sativa* supplementation on blood parameters and anthropometric indices in adults: A systematic review on clinical trials. *J. Res. Sci.*, 3. Doi.10.4103/1735-1995.175174.
- Achmad, A., Husain, A., & Mujeeb, M. (2013). A review on therapeutic potential of *Nigella sativa*. A miracle herb. *Asian Pacific J. of Tropical Medicine*, 3, 337–352.
- Aisa, H.A., Xin, X.L., & Tang, D. (2019). *Nigella sativa*: a medicinal and edible plant that ameliorates diabetes. In: Watson R.R., Preedy V.R. eds. Bioactive food and dietary interventions for diabetes. *Academic Press.*, 629–640.
- Amin, B., & Hosseinzadeh, H. (2016). Black Cumin (*Nigella sativa*) and its Active Constituents Thymoquinone: An Overview on the Analgesic and Antiinflammatory Effects. *Planta Med.*, 82, 8–16.
- Arroo, R.R.J., & Alfa, H.H. (2018). Chemical properties of thymoquinone, a monoterpene isolated from the seeds of *Nigella sativa* Linn. *Pharmacol. Res.*, 1, 133–151.
- Ashraf, S., Anjum, A.A., & Ahmad, A. (2018). In vitro activity of *Nigella sativa* against antibiotic resistant *Salmonella enteric*. *Environ.Toxicol. Pharmacol.*, 58, 54–58.
- Bakal, S.N., Bereswill, S., & Haimesaat, M.M. (2017). Finding novel antibiotic substances from medicinal plants-antimicrobial properties of *Nigella sativa* directed against multidrug resistant bacteria. *Eur. J. Microbiol. Immunol.*, 7(1), 92–98.
- Bamosa, A.O. (2015). A review on the hypoglycemic effect on *Nigella sativa* and thymoquinone. *Saudi J. Med. Med Sci.*, 3(1), 20–28.
- Barakat, E.M., Wakeel, L.M., & Hagag, R.S. (2013). Effect of *Nigella sativa* on outcome of hepatitis C in Egypt. *World J. Gastroenterol.*, 19, 2529–2536.
- Bäumler, S. (2007). *Heilpflanzen Praxis Heute*. Urban E. Fischer. München, 372–373.
- Belgaumi, U.I., Patil, S., Gandhir, J.M., & Shete, A.S. (2020). The Many Therapeutic Applications of *Nigella sativa* – A Review of Literature. *J. Evolution Med. Dent. Sci.*, 9(30), 2151–2157.

- Boskabady, M.N., Mohsenpoor, & N., Tokaloo, L. (2010). Antasthmatic effect of *Nigella sativa* in airways of asthmatic patients. *Phytotherapy*, 10(17), 707–713.
- Elsavel, I. Salim. (2010). Cancer chemoprotective potential of volatile oil from black cumin seeds, *Nigella sativa* L. in a rat multi-organ carcinogenesis bioassay. *Oncology letters*, 1, 913–924.
- Hassan, M.I., Mabrouk, G.M., & Shehata, H.H., Aboelhussein, M.M. (2012). Antineoplastic effect of Bee Honey and *Nigella sativa* on Hepatocellular Carcinoma Cells. *Integrative Cancer Therapies*, 11(4), 354–363.
- Heshmati, J., Namazi, N. (2015). Effect of black seed (*Nigella sativa*) on metabolic parameters in diabetes mellitus: A systematic review. *Complementary Therapies in Medicines*, 23(3), 275–282.
- Hesmati, J., Namazi, N., & Memarzadeh, M.-R. (2015). *Nigella sativa* oil effects glucose metabolism and lipid concentrations in patients with type 2 diabetes: A randomized, double-blind, placebo-controlled trial. *Food Res. Internal*, 70, 87–93.
- Jmran, M., Rauf, A., Khan, I.A. (2011). Novel antifungal defensins from *Nigella sativa* seeds. *Plant Physiol. Biol. Biochem.*, 49(2), 131–137.
- Koshak, A., Koshak, E., & Heinrich, M. (2017). Medicinal benefits of *Nigella sativa* in bronchial asthma: a literature review. *Saudi Pharm. J.*, 25(8), 1130–1136.
- Krishnapura, Svinivasan. (2018). Cumin (*Cuminum cyminum*) and black cumin (*Nigella sativa*) seeds: traditional uses, chemical constituents and nutraceutical effects. *Food Quality and Safety*, 2, 1–16. Doi:10.1093/fqsafe/fyx031.
- Mahdavi, R., Namazi, N., Alizadeh M., & Farajnia S. (2015). Effects of *Nigella sativa* oil with low-calorie diet on cardiometabolic risk factors in obese women: a randomized controlled clinical trial. *Food & Function*, 6(6), 2041–2048.
- Majdalawieh, A.F., Fayyad, M.W. (2016). Recent advances on the anti-cancer properties of *Nigella sativa*, a widely used food additive. *J.Aurvede Integr. Med.*, 7 (3), 173–180.
- Merve, Seyda, Karacil, Ermumcu, & Nevin, Sanlier. (2017). Black cumin (*Nigella sativa*) and its active component of Thimoquinone: effect on health. *J. Food a Health Sci.*, 3(4), 170–183. Doi:10.3153/YFHS17020.
- Mohammed Abdulrazzad Assi, Mohd Hezmee Mohd Noor, & Noor Farhana Bachek. (2016). The Various Effects of *Nigella sativa* on Multy Body Systems in Human and animals. *PYSRR*, 2(3), 1–9.
- Mona, M. Hussein, Amal S., Abdel-Azeem, & Saraya T. El-Damhougy. (2016). The Heatt Benefits of Black Seed ( *Nigella sativa*). *RYPBCS*, 6, 7(1), 1009–1013.
- Ramalingman, P.S., & Raj, M.A.S., Ravichandran P. (2017). Lipid peroxidation and anti-obesity activity of *Nigella sativa* seeds. *World J. Pharma Res.*, 6(10), 882–892.
- Razavi, B., & Hosseinsadeh, H. A. (2014). Review of the effect of *Nigella sativa* L. and its constituent, thimoquinone, in metabolic syndrome. *J. Endocrinal. Invest.*, 37(11), 1031–1040.
- Rogozhin, E.A., Oshchepkova, Y.I., & Odintsova, T.I. (2011). Novel antifungal defensins from *Nigella sativa* seeds. *Plant Physiol. Biochem.*, 49(2), 131–137.
- Salem, E.M., Yar, T., & Bamosa A.O. (2010). Comparative study of *Nigella sativa* and triole therapy in eradication of *Helicobacter pylori* in patients with non-ulcer dyspepsia. *Saudi J. gastroenterol.*, 16(3), 207–214.
- Shafiq, H., Ahmad, A., Masud, T., & Keleem M. (2014). Cardio-protective an anticancer therapeutic potential of *Nigella sativa*. *Iran J. Basic Med. Sci.*, 17(2), 967.
- Temphurne, S., Feroz, S., & Sakarkar, D. (2014). A review on therapeutic potential of *Nigella sativa* (kalonji) seeds. *J. Med. Plants Res.*, 8(3), 167–177.

Надійшла до редакції 18.11.2021.  
Прийнято до друку 27.12.2021.

**The authors declare no conflict of interest.**

**Voloshyn O.I.** – idea, research design, correction of the article;  
**Voloshyna L.O.** – collection and analysis of literature; annotations, conclusions, summaries;  
**Bachuk-Ponych N.V.** – involved in writing the article;  
**Vasyuk V.L.** – annotations, conclusions, summaries;  
**Boiko B.V.** – involved in writing the article.

**Email address for correspondence with authors:**  
[voloshka03@ukr.net](mailto:voloshka03@ukr.net)