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GINGER AS A SPICE WITH DIVERSE THERAPEUTIC AND PROPHYLACTIC PROPERTIES: PROSPECTS OF APPLICATION IN MODERN CONDITIONS (REVIEW OF PUBLICATIONS)

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***ABSTRACT. Actuality**. The rapid growth of morbidity, age-related poly- and comorbidity complicate and increase the cost of the treatment process of such patients, leading to the search for prophylactic and therapeutic agents of multisystem and diverse metabolic action.*
***Aim of the Research**. Coverage of modern scientific advances in the studies of therapeutic and prophylactic properties of ginger as a spice and source of drugs, as well as justification for its wider use under different conditions of the human body.*
***Materials and Methods.** Information search in printed and electronic publications, search databases; methods of analysis, comparison and generalization of data.*
Results. The healing properties of ginger have been proven on the basis of historical and modern data. Thus, it posesses hypolipidemic, antisclerous, disaggregating, hypoglycemic, antioxidant, anti-inflammatory, analgesic, vasodilating properties, and the ability to regulate secretory and motor disorders of the digestive system. Gastro-, hepato-, cardio-, neuro-, arthroprotective features of ginger products are indisputable, as well as the effectiveness of their application for the diseases of the digestive, cardiovascular, bronchopulmonary systems, musculoskeletal system and prospects for their use for endocrine diseases, in neurology, oncology , immunology.
***Conclusions.** Ginger as a universal spice and a source of drugs of prophylactic and therapeutic action with multisystem and diverse metabolic properties should be used more widely in patients with age related poly- and comorbidity, which can improve their rehabilitation outcomes and increase economic efficiency.*
***Key Words:** ginger, properties, poly- and comorbidity, application, prophylaxis.*

Introduction. The end of the XX and the beginning of the XXI century for the mankind are marked with the increase in non-infectious morbidity, and in different variants of poly- and comorbidity in particular, with complications affecting the cause of other diseases, which are difficult and expensive to treat even under the undeniable success of modern medicine and pharmacy [3, 4]. To date, no effective treatment protocols have been developed for such patients, despite numerous attempts to do so [3]. One of the most common diseases of modern people is obesity, recognized as the "cradle" for the ten most socially significant diseases: hypertensis, various forms of coronary heart disease, including myocardial infarction, stroke, type 2 diabetes, fatty liver disease, calculous cholecystitis, pancreatitis, osteoarthritis and even cancer – in men, prostate or sigmoid colon cancer, in women – mammary gland cancer or gynaecological oncology [4, 7]. With varying consistency and severity throughout a person's life, these diseases worsen the state of health, efficiency and life quality and expectancy of an individual; become an unbearable burden for him, his family, the medical industry and society of any country in the world [2, 7]. It should be noted that currently the prevalence of obesity in Ukraine is 20.5%, in the US – 33.0%, and in the next two decades in Ukraine it is expected to reach 30%, in the US – 2/3 of the population will have morbid obesity [4]. It is now recognized that one of the

most important factors of this phenomenon is the progressive deterioration of the environment, intensifying pace of life, psychological stress, depletion of humus content in soil and forced, often incorrect application of various methods of agrochemical plant protection, modern intensive methods of animal husbandry, poultry raising with the use of antibiotics and growth stimulants, food processing technologies with the use of numerous food additives (over 1000). Improper lifestyle and nutrition patterns also play an important role [2, 7]. All these factors weaken the human body; facilitate the development of the above-mentioned diseases [4, 5, 6].

The range of these diseases is quite wide, each has its own pathogenesis, but at the same time they have much in common, in particular, for today the general pathological non-specific links of their formation have been studied. Oxidative stress, endothelial dysfunction and nitrosative stress, systemic inflammation of low-intensity, immune dysfunction and intestinal microbiome disorders have been recognised as such links [3, 7, 22, 37]. Leading domestic and foreign scientists direct clinicians' attention to the importance of the search for the forms and means of influencing these nonspecific general pathological phenomena that are the basis for the formation and progression of comorbidity; as well as to the improvement of the effectiveness of treatment and prevention measures [3, 7]. However, in medical complexes taking into account all these general pathological conditions will inevitably lead to compelled polypragmasy, threat of side effects and complications from the drugs used; the increase of the cost of medical care [4, 7]. Given the growth of these trends in the nearest future, prophylactic measures to prevent such developments are becoming increasingly important. Therefore, based on the mentioned above, it is important to find appropriate methods for the prophylaxis and prevention of such conditions. In particular, we are talking about the experience gained by the mankind in the course of its historical development – use of various tools available from generation to generation, which had healing properties and would significantly eliminate/reduce the aforesaid non-specific pathological phenomena underlying poly- and comorbidity [16, 38, 40, 43].

In this context, in recent decades, ginger has entered the field of scientific interests of world scientists of medical and biological profile.

Aim of the Research is to highlight the current achievements of medical and biological scientists in the study of therapeutic and prophylactic properties of ginger as a spice and source of drugs, dietary supplements, as well as justification for its wider use in health improving diets in modern conditions.

Materials and Methods. An information search was carried out in printed and electronic publications, search scientific databases, the State Register of Medicines of Ukraine, with the use of methods of analysis, comparison and generalization of information obtained.

Results and Discussion. It is known that ginger (Zingiber) belongs to the family of perennial herbaceous ginger plants (Zingiberaceae). It is believed that the Latin name Zingiber should be translated from Sanskrit as "horned root". Homeland of ginger is West India, the countries of Southeast Asia, the islands of Java and Sumatra. Currently, it is also grown in subtropical regions of Japan, China, West Africa, Brazil, Argentina, Indonesia, Australia and Central America [1, 5, 15, 20].

Historical aspect. Information about ginger dates back to ancient times, at least to the 4th millennium BC [15, 20]. The peoples of China and India highly valued ginger not only as a spice, but above all as a medicine. In folk and Ayurvedic medicine of these countries ginger root has been used for digestive disorders, colds, pains of various localizations for thousands of years [15, 20]. In the treatises of the healers of that time, ginger remedies were called "universal medicines". Ginger is mentioned in the Bible, Talmud, Koran. One gram of dried ginger root was valued above one gram of gold in India in the Middle Ages. Ginger came to Greece, Egypt, Rome and Europe as a spice and medicine via trade routes at that time. Well-known doctors Avicenna, Dioscorides, Paracelsus and Lonitzer deepened the study of healing properties and expanded the range of applications of ginger (tinctures, powders) for various human diseases [15]. In Europe the use of ginger caused a real "culinary revolution" in the XVIII - XIX centuries. By the end of the twentieth century, the healing properties of ginger attracted the attention and interest of scientists and doctors again, which may be viewed as a renaissance. Confirmation of this fact is the publication in Germany by Commission E of a monograph on the healing properties of ginger, as well as new therapeutic data on this product [15]. So, now ginger is one of the most popular

spices in the world and is considered to be a source of medicines and dietary supplements.

What is the reason for such interest in this plant today?

To some extend the answer to this question is given by studies of the chemical composition of ginger root, which explain its diverse effect on the human body. In particular, roots of ginger are a source of numerous active substances, the main of which are: essential oil (1-4.3%), linoleic, palmitic, oleic, arachidonic, lauric, myristic, phosphatidic and nicotinic acids, sesquiterpene compounds (gingerol, gingerolen, gingirenone A, B, zingerol, zingiberen, β-bisabolone, shagaol, curcumene), flavonoids that improve the secretory processes in all digestive glands, including pancreas, and bile secretion. Ginger also contains all essential amino acids, especially arginine, cysteine, glycine, tryptophan, methionine, phenylalanine, valine, threonine. It contains asparagine, Ca, Mg, Mn, Fe, P, K, Na; C, A, B1 , B2 vitamins, numerous monoterpene hydrocarbons, cardiac glycosides, steroids, alcohols and phytosterols, aldehydes (camphene, geraniol, neral, linalool, phellandrene), diterpenes, tannins [8, 15, 20, 33, 39, 40].

It is therefore not surprising that in recent years such a rich spectrum of active biological factors of ginger has prompted scientists of medical and biological profile to perform numerous experimental and clinical studies of its phytopharmaceutical properties. In particular, in various models of experimental studies it was established that ginger products have hypolipidemic and antisclerotic effects [27], exhibit antidiabetic, antioxidant, antitumor properties [9, 17, 22, 25, 27, 36]. Ginger root and its components can prevent the activation of NF-kB caused by various agents and reduce the regulation of NF-kB gene products involved in enhancing cell division and angiogenesis [10]. The anti-inflammatory properties of ginger are realized through increased expression of lipopolysaccharide compounds induced by interferon γ and interleukin 6, which are on increase in inflammatory processes [18]. Ginger inhibits prostaglandin production by inhibiting cyclooxygenase 1 and 2, and inhibits leukotriene biosynthesis by inhibiting 5-lipoxygenase, resulting in a better therapeutic profile and fewer side effects than nonsteroidal anti-inflammatory drugs [47].

Hepatoprotective, radioprotective, antitumor and immunomodulatory properties of the root of this plant have also been proven [22, 23, 26, 35, 41], as well as its cytotoxic, cytostatic and anti-apoptotic effects [46]; antimicrobial effects on E. coli, Salmonella typhi, Bacillus subtilisi, Pseudomonas aeruginosae [13, 14, 28], H. pylori [32, 42] cultures have also been detected.

However, more importantly, the experimentally discovered properties of ginger have been confirmed in clinical trials. Navaei et. al. [31] in a double-blind controlled study proved lipid-lowering properties of ginger, Braun L. Cohen [16] in a randomized double-blind placebo-controlled study ascertained a fairly good efficacy of ginger extract for osteoarthritis of knee joints and pain syndromes of other origins (migraine, headache). Similar results for osteoarthritis were obtained by Altman et. al. [11], Highighi [24]. In the fundamental edition by S. Baumler [15] some other clinically proven properties of ginger are summarized: hepatoprotective, cholagogic and diuretic properties; positive effects for irritable bowel syndrome, dysbiosis after antibiotic therapy, colds (expectorant, bronchodilatory effect), the ability to improve metabolism and normalize the intestine microflora; facilitate weight normalization; dilate peripheral blood vessels, lower blood pressure, platelet aggregation properties and improve blood rheological properties; anti-inflammatory, analgesic, inotropic properties [21]. It is noted that ginger remedies are effective for functional dyspepsia in all ages from childhood to old age; gastritis with reduced secretory activity, loss of appetite of any origin, nausea caused by intracerebral disorders, chemotherapy, anaesthesia, “traveller’s disease”, osteochondrosis, gout [2, 9, 12, 19]. In all scientific publications it is pointed out that the use of ginger as a spice is well tolerated, it can be used in various dishes (soups, garnishes, meat dishes, salads, jams, with tea, wine, beer) in the form of powder or raw root. Ginger spices are characterized by a special aroma, light sharpness and bitterness. Adults are recommended to take 2-4 grams of ginger powder in any dish as a health-improving spice; it is recommended even for children with loss of appetite and dyspepsia: for 1-4 years – 0.5-1 grams per day, 4-10 years –1-2 grams, 10-16 years – 2-3 grams per day [15, 38, 43, 44]. Contraindications to the use of ginger include only vomiting in pregnant women and gallstone disease [15, 44].

Taken such properties of ginger, domestic and world pharmacy produce a number of effective

drugs and biologically active additives (“Verta”, “Osteoarthreaze Active Plus”, “Zinaxin”, “Actis”, “Lifegard”, “Florocyte”, etc.), which can be found at the pharmaceutical market of Ukraine.

So, to sum up: ginger has been scientifically proven to possess anti-inflammatory, analgesic, antidiabetic, antiplatelet, antidepressant, gastro-, hepato-, cardio-, neuroprotective properties; the ability to normalize secretory and regulatory processes [30]. Since ancient times and nowadays, its effectiveness for gastrointestinal diseases, disorders of bronchopulmonary, cardiovascular and musculoskeletal system has been established and proven [32, 47, 48]. Prerequisites for research in endocrinology, neurology, immunology, oncology have been set [34, 35, 41, 45, 46]. Ginger is a universal spice that has a variety of therapeutic and prophylactic properties, which are realized through metabolic, regulatory and organotropic processes.

Given the global features of the morbidity of the world population, including Ukraine, – poly-, comorbidity, age-related systemic lesions increase; desire to prolong life expectancy; complexity of health care and increasing cost of medical services, the role of preventive approaches and their implementation, one of which may be a wider use of ginger as a food spice and various options for dietary supplements, especially in the elderly, becomes more and more important.

Conclusions

1.The state of global public health has certain distinctive features – age-related growth of comorbid diseases of the cardiovascular, digestive, endocrine systems, musculoskeletal disorders, oncopathology, common nonspecific pathogenetic links, caused by oxidative, nitrosative stress, systemic inflammation of low-intensity, immune suppression, endothelial dysfunction.

2.The complexity of treatment and prevention approaches to this group of patients is in compelled polypragmasy, the threat of side effects and complications from the drugs used; the increase of the cost of medical care. This is what encourages the search for preventive measures for multiorgan and multidirectional metabolic action.

3.Ginger as a food spice of universal action with its hypolipidemic, antioxidant, anti-inflammatory, hypoglycemic, antiplatelet, analgesic properties, and gastro-, hepato-, cardio-, neuro-, arthroprotective properties, may be considered as an effective preventive mean with multiorgan action for poly- and comorbidity. Its wider use in food as a spice and in the form of various biologically active additives will bring about significant medical, social and economic effects.

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ІМБИР ЯК СПЕЦІЯ В ХАРЧУВАННІ З БАГАТОГРАННИМИ ЛІКУВАЛЬНО-ПРОФІЛАКТИЧНИМИ ВЛАСТИВОСТЯМИ: ПЕРСПЕКТИВИ ЗАСТОСУВАННЯ В СУЧАСНИХ УМОВАХ (ОГЛЯД ЛІТЕРАТУРИ)

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РЕЗЮМЕ. Актуальність. *Стрімке зростання захворюваності, вікова полі- і коморбідність ускладнюють, здорожчують лікувальний процес таких хворих, зумовлюючи пошук профілактично-лікувальних засобів поліорганної та різнопланової метаболічної дії.*
Мета. *Висвітлення сучасних наукових досягнень щодо лікувально-профілактичних властивостей імбиру як спеції та джерела ліків, а також обґрунтування більш широкого його застосування за різних станів організму людини.*
Матеріали і методи. *Джерела інформаційного пошуку в друкованих і електронних виданнях, пошукових базах, методи аналізу, порівняння і узагальнення інформаційних даних.*
Результати. *За історичними і сучасними даними доведено цілющі властивості імбиру. Так, він володіє гіполіпідемічними, протисклеротичними, дезагрегантними, гіпоглікемічними, антиоксидантними, протизапальними, болетамувальними, судиннорозширювальними властивостями, здатністю регулювати секреторно-моторні розлади системи травлення. Гастро-, гепато-, кардіо-, нейро-, артропротективні якості засобів з імбиру безперечні, а також ефективність їхнього застосування при захворюваннях трав-*

ної, серцево-судинної, бронхолегеневої систем, опорно-рухового апарату та перспективи використання при ендокринних захворюваннях, в неврології, онкології, імунології.
Висновок. *Імбир як універсальну спецію і джерело ліків профілактично-лікувального спрямування поліорганної та різнопланової метаболічної дії необхідно ширше застосовувати у пацієнтів із вікозалежною полі- і коморбідністю, що може сприяти покращенню результатів їхньої реабілітації.*
Ключові слова: *імбир, властивості, полі- та коморбідність, застосування, профілактика.*

ИМБИРЬ КАК СПЕЦИЯ В ПИТАНИИ С МНОГОГРАННЫМИ ЛЕЧЕБНО-ПРОФИЛАКТИЧЕСКИМИ СВОЙСТВАМИ: ПЕРСПЕКТИВЫ ПРИМЕНЕНИЯ В СОВРЕМЕННЫХ УСЛОВИЯХ
(ОБЗОР ЛИТЕРАТУРЫ)

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РЕЗЮМЕ. Актуальность*. Глобальный рост заболеваемости, возрастная поли- и коморбидность затрудняют, удорожают лечебный процесс такого контингента больных и обусловливают поиск профилактических и лечебных способов полиорганного и разнопланового метаболического действия*
Цель*. Освещение современных научных достижений по изучению лечебно-профилактических свойств имбиря как специи и источника лекарств, а также обоснование более широкого его применения при разных состояниях здоровья.*
Материалы и методы. *Источники информационного поиска в печатных и электронных изданиях, поисковых базах, методы анализа, сравнения и обобщения информационных данных.*
Результаты. *По историческим и современным данным приведены факты наличия в имбире гиполипидемических, противосклеротических, дезагрегантных, гипогликемических, антиоксидантных, противовоспалительных, болеутоляющих, сосудорасширяющих свойств, способности регулировать секреторно-моторные расстройства системы пищеварения. Доказанные гастро-, гепато-, кардио-, нейро-, артропротекторные качества препаратов из имбиря, эффективность их применения при заболеваниях пищеварительной, сердечно-сосудистой, бронхолегочной систем, опорно-двигательного аппарата, а также определены перспективы использования при эндокринных заболеваниях, в неврологии, онкологии, иммунологии.*
Выводы. *Имбирь как универсальную специю и источник лекарств профилактически-лечебного направления полиорганного и разнопланового метаболического действия необходимо шире применять у пациентов с возрастзависимой поли- и коморбидностью, что будет способствовать улучшению результатов их реабилитации.*
Ключевые слова: *имбирь, свойства, поли- и коморбидность, применение, профилактика.*

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