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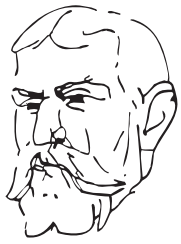

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REVIEW ARTICLE

SPICES: MODERN VIEWS ON THE APPLICATION THROUGH THE PRISM OF POLY- AND COMORBIDITY OF PATIENTS AND INFECTIOUS PANDEMICS (LITERATURE REVIEW AND DISCUSSION)

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ABSTRACT

The aim: To substantiate the need of wider use of species in dietician rehabilitation of patients with poly- and comorbidity, postcovid syndrome based on the analysis of the latest scientific achievements with the study of their pharmacological properties.

Materials and methods: The information search in printed and electronic editions, search scientific bases with application of methods of the analysis, comparison and generalization of information data is carried out.

Conclusions: New scientific data on the pharmacological properties of spices give grounds to use them more widely in the rehabilitation of patients with poly- and comorbidities and infectious processes.

KEY WORDS: spices, pharmacological properties, polymorbidity, comorbidity, application

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INTRODUCTION

The second half of the twentieth century and the beginning of the XXI century are marked by a certain change in the spectrum of diseases of the peoples of the planet: mainly infectious diseases of the last century are replaced by metabolic diseases [1]. Among the latter, obesity has been recognized as the main non-infectious pandemic of recent decades, affecting 20-25% of the population of European countries and up to 35% of the adult population of the United States [2] and has a tendency to increase further. It is considered the «cradle» of the ten most socially significant diseases: hypertension, various forms of coronary heart disease, including myocardial infarction; strokes, type 2 diabetes, fatty liver disease, calculous cholecystitis, pancreatitis, osteoarthritis and various forms of cancer [3]. Several of these diseases are often found in patients in the form of pathogenetic combinations (comorbidity) or against the background of other diseases, including digestive, respiratory, renal, etc. (polymorbidity).

Poly- and comorbidity are considered one of the key problems of modern medicine, which significantly complicates the strategy of treatment of such patients and increases the cost of their medical care [1, 4, 5].

Recent studies have shown that nonspecific pathogenetic basis for the development of comorbidity is oxidative stress, endothelial dysfunction and associated vascular and metabolic disorders, cytokine imbalance, systemic low-intensity inflammation and immune dysfunction [1]. A number of scientists believe that the search and additional inclusion in the treatment of such patients of various means of metabolically diverse and polysystemic effects on these nonspecific links of comorbid phenomena can improve overall treatment outcomes and reduce the progression of comorbid dependencies [6]. In this direction, a significant number of studies are currently conducted using various drugs, dietary supplements, as well as increased attention is paid to the development and application of various options for health nutrition. [2, 3, 6].

In addition to traditional approaches to the balance of basic dietary ingredients, vitamins, amino acid-micro-macroelement composition, in recent years much attention has been paid to the use of various spices [6-11]. This has been facilitated by numerous modern studies of the mechanisms of their positive effect on metabolic processes, functions of a number of organs and systems, testing in various diseases of internal organs and established very interesting facts that expand the horizons of their use. poly- and comorbidity. And another interesting fact. The COVID-19 infection pandemic and one of its lessons, the so-called postcovid syndrome, has been particularly frequent, severe, longer, and more difficult to treat in patients with poly- and comorbidities [8]. This problem is also subject to in-depth study and improvement of complex treatment and the use of various spices looks promising. [9, 10].

THE AIM

The aim of the work is to substantiate the need of wider use of species in dietician rehabilitation of patients with poly- and comorbidity, postcovid syndrome based on the analysis of the latest scientific achievements with the study of their pharmacological properties.

MATERIALS AND METHODS

An information search was carried out in printed and electronic publications, scientific search databases using methods of analysis, comparison and generalization of information data. More than 100 scientific sources that correspond to the research topic are analyzed; 42 sources were selected from them, which provide the most complete information about the most popular spices in Europe and the world.

REVIEW AND DISCUSSION

According to the literature analysis, the following the most valuable thing for health and primary or secondary prophylaxis of diseases are considered: ginger (*Zingiber* officinalis) [11-13], turmeric (*Curcuma longa*) [11, 14-16], garlic (*Allium sativum*) [11, 17], onion (*Allium cepa*) [11], parsley (*Petroselinum sativum*) [11, 18, 19], cinnamon (*Cinnamonum zeylanicum*) [11, 20, 21], basil (*Ocinum basilicum*) [11, 22, 23], rosemary (*Rosmarinum officinalis*) [11, 24], oregano (*Origanum vulgare*) [11, 25], peppers (black, paprika, cayenne – *Piper nigrum, annuum, frutescens*) [11, 26- 29], cloves (*Sizgium aromaticum*) [11, 30], dill (*Anethum graveolens*) [11], cumin (*Carum carvi*) [11, 32, 33], coriander (*Coriandrum sativum*) [11, 33, 34], anise (*Anisum vulgare*) [11, 35], cardamom (*Elatteria cardamonum*) [11, 36], black sowing (*Nigella sativa*)) [11, 37, 38], nutmeg (*Myristica fragrans*) [11, 39, 40].

Without going into the characteristics of the chemical composition of these spices, they preferred to highlight the features of the pharmacological effects on the disturbed metabolic processes or infectious agents, affected organs and systems. By analyzing and comparing this information, we looked for common or similar effects on the above phenomena that occur in patients with manifestations of poly- and comorbidity, as well as certain differences in these effects, which gave grounds for grouping spices by dominant mechanisms of their action on such processes. New information in the aspect of positive influence of spices on such actual diseases as oncological, diabetes mellitus, immune disorders, acute infectious processes as COVID-19 infection was especially important to us. Such an approach would allow the doctor to purposefully and differentiated selection of several spices with multifaceted and polysystemic actions for long-term or permanent use in dietary rehabilitation of patients with various diseases according to known pathogenetic disorders, taking into account the intensity and direction of pharmacological effects. According to the literature, common or similar properties of the above spices are: anti-inflammatory, antibacterial, antiviral, antifungal, antioxidant, antispasmodic, analgesic, hypocholesterolemic, hypotensive, immunomodulatory [6, 11, 26-30]. Some of them have antitumor, hypoglycemic, anticoagulant, antidepressant, diuretic, nootropic qualities [11, 16, 19, 22, 31, 36, 38].

In recent years, scientific papers have appeared in which groups of spices are outlined according to the dominant properties of their positive effect on certain metabolic disorders or diseases, etc. [6]. In our opinion, this approach is practically focused on optimizing the use of spices by doctors in the dietary rehabilitation of patients with various diseases. Based on the information from the analyzed scientific sources, we have made some additions and expanded the range of applications of spices in different areas of their positive impact (table I).

The table below lists the groups of spices that affect various pathological phenomena and human diseases and their ranking by potency.

As can be seen from the summary table on the mechanisms of dominant action on various metabolic, hemorheological disorders, inflammatory processes, infectious factors, affected organs and systems, as well as certain age-related manifestations of the CNS, etc., most of them have diverse metabolic and multiorgan effects. moderately important for patients with manifestations of poly- and comorbidity.

For example, consider spices that have a beneficial effect on the manifestations and course of diseases of the cardiovascular system of hypertensive, atherosclerotic origin or as a consequence of other metabolic diseases. According to the cited sources of literature in these cases are appropriate: parsley, garlic, coriander, cinnamon, onion, cloves, basil, oregano. They act as systemic regulators of metabolism, have a positive effect on lipid metabolism, kidney function, moderately lower blood pressure (cinnamon, cardamom, parsley, garlic - [11, 18-20, 36]), п improve microcirculation in tissues and organs. Clove, turmeric, cinnamon, ginger, chili pepper have antiplatelet properties from them. [12, 14, 15, 20, 28, 30].

Spices that promote recovery from acute and chronic respiratory diseases. Such properties are shown by ginger, parsley, garlic, oregano, onion, basil, chili pepper, cinnamon, fennel, cumin, coriander [see table]. They can be added to food, make tea (oregano, dill, cumin, coriander), decoctions of the roots (parsley), rubbed into the skin of the chest (water-alcohol solutions or patches of peppers), drink with red wine (cinnamon, peppers), inhale from crushed or finely chopped cloves of garlic, onion, essential oils of oregano, basil [11, 22, 23, 25]. The most effective is the combined use of these spices by different routes of delivery into the body (enterally, by inhalation, application) [11].

Spices that improve the course and prevent complications in diabetes.

Useful are cardamom, coriander, oregano, cinnamon, basil, cloves, onions, garlic, turmeric, parsley. In particular, cinnamon, cardamom, blackberry and basil have hypoglycemic properties. Oregano, coriander and garlic prevent formation of diabetic lesions of the liver and biliary tract;

Table I. Grouping of spices by the dominant mechanisms and ranking by the intensity of action on the body of a sich person

The name of the group of spices with a characteristic effect	Specific names of spices
Spices with anti-inflammatory action	Ginger, garlic, peppers, onions, turmeric, basil, parsley, oregano
Spices with antibacterial activity	Garlic, onion, ginger, oregano, cloves, coriander, parsley, turmeric, oregano, cinnamon, blackberries, basil, nutmeg
Spices with antiviral activity	Ginger, garlic, cinnamon, onion, basil, pepper, turmeric, cloves
Spices with analgesic effect	Ginger, cloves, peppers, oregano, basil
Spices with antioxidant activity	Garlic, onion, ginger, basil, cloves, nutmeg, cinnamon
Spices with hypocholestyrinemic properties	Garlic, coriander, cinnamon, oregano, cardamom, onion, nutmeg
Spices with antihypertensive action	Garlic, parsley, cinnamon, onion, cardamom
Spices with antitumor properties	Garlic, onion, basil, parsley, cinnamon, black sowing, nutmeg
Spices with hypoglycemic properties	Cinnamon, basil, cardamom, oregano, parsley, ginger, garlic, blackberry
Spices with immunomodulatory activity	Garlic, peppers, parsley, basil, cloves
Spices with antidepressant action	Cardamom, chili pepper, oregano, cloves, basil, nutmeg
Spices with anticoagulant activity	Cinnamon, cloves, turmeric, chili peppers, nutmeg
Spices with diuretic action	Parsley, rosemary, cardamom, oregano, basil
Spices-regulators of the digestive system	Dill, cumin, parsley, oregano, blackberry, cloves, basil, onion, cinnamon, ginger
Spices that improve microcirculation and reparative processes	All kinds of peppers, basil, garlic, ginger, oregano, onions
Spices that promote the recovery of the bronchopulmonary system	Ginger, parsley, oregano, basil, turmeric, peppers, onions, cinnamon, blackberries
Spices with antisclerotic orientation	Garlic, onion, oregano, cardamom, turmeric, cinnamon, cloves, basil
Spices that improve memory, concentration	Rosemary, coriander, blackberry, peppers, cloves, cinnamon, garlic, nutmeg
Spices with wind-blowing effect	Dill, cumin, coriander, oregano, basil, cloves
Spices, which have anthelmintic, anti-giardiasis properties	Garlic, peppers, onions, basil
Spices that help reduce body weight	Fennel, nutmeg, cardamom, black sowing
Spices that eliminate bad breath	Parsley (greens), cloves, cardamom, rosemary, cinnamon, ginger, nutmeg, anise

parsley, rosemary, turmeric, coriander - diabetic lesions of the genitourinary system; cardamom, garlic, cloves, oregano and coriander also prevent the occurrence and progression of dyslipidemia and atherosclerosis (see table I).

Spices that have a beneficial effect on diseases of the digestive system.

These include: ginger, turmeric, cinnamon, garlic, onion, dill, oregano, parsley, cumin, basil, rosemary, peppers. All of them primarily act by increasing the secretion of the stomach, pancreas, intestines, bile, improving digestion at all levels, regulating motility (see table I).At the same time, almost all of them have anti-inflammatory, antibacterial, antiviral, antifungal, analgesic, antispasmodic effects [see table]. Some of them have a good wind-blowing effect (fennel, cumin, basil, oregano). In general, they suppress the pathogenic microflora, helping to eliminate dysbiosis.

Resorption of the factors of these spices from the intestine further contributes to the normalization of lipid disorders in the blood, other metabolic processes, kidney function (parsley, rosemary, oregano, basil), act as antioxidants (garlic, ginger, basil, oregano), and some of them antitumor effect (garlic, onion, pepper, parsley, basil, nutmeg, blackberry) (see table I).

However, it should be remembered that spices in the period of exacerbation of diseases of the digestive system are contraindicated, and such as ginger, turmeric and pepper - even in remission of chronic calculous cholecystitis and gallstone disease [12, 13, 28].

One of the problems of internal medicine is the growing phenomenon of multidrug resistance of bacteria to antibiotics. Scientific studies have now proven the antibacterial effect on such pathogens of active factors of black sowing [37], garlic [11], cinnamon [21].

Difficult to understand treatment is secondary immunodeficiency (FD), which is usually the result of many causes, including various sources of chronic infection, long and debilitating lesions of the digestive system, malnutrition, environmental negatives and more. In the complex treatment of such patients it is advisable to use ginger, garlic, turmeric, onions, parsley, peppers, basil, cloves (see table I).It is advisable long-term (2-3 months) use of 2-3 spices in food (ginger, garlic, onion, turmeric, peppers, parsley), or with teas (ginger, cloves, basil), fruit drinks, smoothies, basil, cloves, parsley). These spices activate the activity of the main system of biological support - digestive, and suppress any foci of infection, have antioxidant, stimulat-

ing, adaptogenic effects, indirectly helping to restore the functional state of the immune system.

One of the greatest trials of humanity and medicine in the world in the last two years was the pandemic of COVID-19 infection, and its consequences in the form of the so-called postcovid syndrome (PCS) or long-covid syndrome [8]. In the majority of patients who have undergone inpatient variants of the acute period of COVID-19 infection, they are activated and become worse, more difficult to treat diseases that occurred in the evidence period. Such patients in the inpatient phase of treatment have undergone a forced aggressive drug load, often with various side effects, therefore, in the presence of a PCS clinic, they are reluctant to accept treatment recommendations with modern chemotherapeutic agents and are more inclined to use various physical, dietary or folk remedies. In this context, in the rehabilitation complex of non-drug treatment, it is advisable to consider the use of spices with well-studied by modern science mechanisms of action in various diseases.

An important argument for this consideration is the fact that the pandemic of COVID-19 infection in the countries of the Asia-Pacific region, where folk medicine is strong and traditionally used in the diet of spices, was much smaller than in Europe and the United States. Scientists from these countries have published a number of important articles in the world medical and biological press, which state that along with herbal medicines, spices such as ginger, cinnamon, and garlic were used. [9].

Scientists of these publications consider the use of herbal medicines and spices as an important key in the management and rehabilitation of patients with modern infectious diseases. [9, 10, 41].

Based on their own experience in the use of health nutrition in various diseases, summarized monographically [2] and the latest scientific information on the healing properties of spices in various diseases, the authors of this report participated in the dietary rehabilitation of patients with PCS with an emphasis on the use of spices [42]. Our first experience showed a fairly good result in mild manifestations of PCS in a relatively short period (up to two months) and in moderate manifestations of PCS in patients with inpatient variants of COVID-19 infection, including oxygen-dependent cases, on the background of poly- and comorbidity. Usually the rehabilitation period of such patients was longer (up to six months) and the intensity of the use of spices, especially ginger, turmeric, cinnamon, onions, garlic, cloves. We note the importance in the successful implementation of the rehabilitation process with the use of health food and spices, providing appropriate informational and educational support to patients and their families (home care team) and modern telecommunications monitoring to assess the effectiveness of rehabilitation or correction. Our results allow us to consider this area of rehabilitation of patients with different severity of PCS, as effective, cost-effective, promising and psychologically receptive to patients.

CONCLUSIONS

The state of population health of the Earth's population at the present stage is characterized by a progressive increase in age of poly- and comorbidity due to various external causes and improper lifestyle and nutrition. The progressive growth of oncological and endocrine pathology is also alarming. The pathophysiological basis of these phenomena is specific systemic disorders in the form of oxidative stress, endothelial dysfunction and the resulting vascular and metabolic abnormalities, systemic inflammation and immune dysfunction.

The pandemic of COVID-19 infection has become a catalyst for these phenomena and processes in the acute and postcovid period, which worsens the course and results of rehabilitation measures at all stages. Viral intoxication and forced intensive medication load in the acute period of the disease causes a certain intolerance to patients with postcovid syndrome rehabilitation with modern synthetic drugs and a greater tendency to use non-drug measures, especially health nutrition, which in such cases should be enhanced by various applications.

Numerous fundamental fundamental studies of the pharmacological properties of spices and testing their use in various diseases, including cancer, endocrine and even acute infectious diseases such as COVID-19 infection, have been conducted in various countries around the world..

According to the latest research, spices at the level of the gastrointestinal tract act as activators of impaired functions of various parts of the digestive system; after resorption from it, spice factors act as correctors of disturbed metabolic and regulatory processes, and in relation to various infectious agents - as inhibitors of their activity, which is especially important in the conditions of their growing polyresistance to antibiotics. All this together provides a qualitatively better level of functioning of the organism as a whole, even with polysystemic (poly- and comorbidity) lesions. This can be considered as one of the most natural ways to activate systemic sanogenetic mechanisms.

Thus, at the present stage of human existence, patients with poly- and comorbidities, especially in age, use spices in a wide range and consciously enter the diet as an effective way to prevent exacerbations and their progression, prolong quality and longer life. In this they should be helped by doctors, who themselves should acquire the necessary knowledge and experience in this area.

According to the world's leading scientist in the field of food biochemistry Colin T. Campbell in his advanced country - the United States for the entire period of training doctors in medical schools to master dietetics are given only 20-22 hours, which is clearly not enough at present. there is no mention at all. The new realities of human health / ill health put forward in this aspect much deeper requirements of the peculiarities of prevention. Is the situation with the training of doctors in European countries much better - the question is debatable, it most likely needs to be improved…

However, the information obtained by scientists allows to deepen the views of health professionals and ordinary

people and change the paradigm of using spices not only as enhancers of taste, quality and appearance of food, but as multifaceted optimizers of organs and systems, correctors of systemic metabolic and regulatory disorders in various diseases – prophylactic direction.

They provide a basis for wider use in clinical practice, in the rehabilitation of this category of patients.

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