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The promising form of supporting the treatment of depression

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Abstract

Introduction and purpose

Recently, there has been a significant increase in interest in the dynamically developing field of science, nutripsychiatry, which has contributed to an increase in the number of studies conducted assessing the relationship between the use of a vegetarian nutritional model and its potential therapeutic impact on holistically understood mental health.

Material and methods

For the purposes of this work, a review of the literature available in the PubMed and Google Scholar search engines, was performed using the following keywords: vegetarian diet; depression; psychiatry. Works published before 2015 were excluded from the analysis. During the review of the literature of available scientific texts, attempts were made to comprehensively present the state of current knowledge.

State of knowledge

Numerous clinical studies support the beneficial effect of a vegetarian diet on mood by improving well-being and lower levels of anxiety and depression. However, there are also studies that did not show a relationship between the diet and the mood of the subjects, as well as studies indicating possible dangers associated with the use of this nutritional model.

Conclusions

The use of a vegetarian dietary pattern as a potential intervention is a promising method of non-pharmacological support. The amount of available scientific data confirming the beneficial effect of a vegetarian diet on mental health is insufficient to recommend it as a standard form of supporting the treatment of depression. Before implementing a vegetarian nutritional model, it is necessary to assess its safety in the patient and individualize dietary recommendations.

Key words : depression; psychiatry; vegetarian diet

1. Introduction

The first records of vegetarianism date back to 3200 B.C., when ancient Egyptian civilizations began to use a vegetarian diet because it was believed that refraining from eating meat would facilitate reincarnation [1]. At the same time, we cannot forget about India as another important region for the origins of vegetarianism, where refraining from eating meat was also related to religious issues [2].

Over recent years, interest in both vegetarian and vegan dietary patterns has increased in the general population and in the scientific community [3,4], which was motivated by various factors: health, ethical and environmental [5-8]. The very definition of a vegetarian diet is a very diverse concept and in the literature you can find descriptions of several main types: flexitarian diet - in which meat is eaten occasionally or it is possible to eat white meat to the exclusion of red meat, pesco-vegetarian diet - which excludes meat, except fish and seafood, the ovolacto-vegetarian diet, which excludes all types of meat but allows dairy products and eggs, and strict vegetarianism - which excludes all animal products [2].

Literature in the field of nutritional psychiatry has shown that healthy dietary patterns such as the Mediterranean diet - based on the consumption of vegetables, fruit, nuts and fish - are associated with a lower risk of developing depression, while a diet rich in processed and high-calorie products is correlated with depression and anxiety [9]. However, in the case of vegetarians, conflicting results have been obtained, showing a beneficial effect on mood or an increased risk of depression [10]. The potential impact of diets on mental health remains largely unknown, which seems surprising given that depressive disorders are one of the leading causes of disability among all diseases worldwide, with prevalence rates ranging from 2.6% to 5. 9% depending on gender and region of the world. According to data prepared by the World Health Organization (WHO), 322 million people worldwide suffered from depressive disorders in 2015 [11]. Recently, there has been significant interest in the field of nutripsychiatry, which is a link between dietetics and psychiatry, which has contributed to numerous studies assessing the relationship between the use of various nutritional models and their impact on broadly understood mental health. Research in the field of nutritional psychiatry considers dietary

interventions as potential therapeutic options supporting the pharmacotherapy of mental illnesses.

2. Material and method

This publication is based on a review of the literature covering the years 2015 - 2023, available in the Google Scholar (GS) and PubMed (PM) search engines using the keywords: vegetarian diet; depression; mental health; nutripsychiatry. Works published before 2015 were excluded from the analysis. An exception was made for a few older papers due to the limited amount of similar research in recent years.

3. State of knowledge

3.1. Etiological hypotheses of depression and the importance of a vegetarian diet

Several etiological hypotheses can be distinguished regarding the occurrence of depressive disorders: biochemical, related to abnormalities in the secretion of neurotransmitters, vascular, inflammatory, related to oxidative stress and disorders in the brain-gut axis, while a plant diet may potentially play an important role in each of them [10,12]

The role of the plant dietary pattern in the biochemical hypothesis is to increase the level of tryptophan (present e.g. in legumes, seeds) as a substrate for serotonin production, as well as a higher carbohydrate to protein ratio compared to a high-protein meat diet, which facilitates the entry of tryptophan into the brain, and thus, it helps reduce the risk of developing depression [13].

In turn, in the vascular hypothesis, vegetarians have lower levels of total serum cholesterol, Low Density Lipoprotein (LDL) cholesterol and ultrasensitive C-reactive protein (High-Sensitivity CRP (hs-CRP)) compared non-vegetarians have a lower cardiovascular risk, which is characterized by a protective effect on brain tissue and a lower risk of developing Cerebral Small Vessel Disease (CSVD), and thus depression [14]. Most CSVD-related markers correlated with the development of new depressive symptoms in the elderly population, as demonstrated by the authors of a 2015 study. [15], which was further confirmed in a 2017 meta-analysis, where CSVD and higher levels of plasma markers of endothelial dysfunction were also associated with the occurrence of depression [16].

The inflammatory hypothesis posits that high levels of pro-inflammatory cytokines in the blood, especially interleukin 6 and 8 and tumor necrosis factor (TNF), are associated with the future development of clinically significant depression [12], and a vegetarian diet rich in magnesium,

fiber, polyunsaturated fatty acids, flavonoids and carotenoids, helps to reduce their levels. This confirms the anti-inflammatory effect of a plant-based diet compared to traditional diets [17].
However, the importance of the oxidative stress hypothesis is based on the disturbance of the balance between the formation and removal of free oxygen radicals (Reactive Oxygen Species, ROS). In turn, the central nervous system is particularly sensitive to oxidative stress due to high oxygen consumption and low levels of antioxidant substances such as phenolic acids, flavonoids and carotenoids as well as vitamins A, C and E, which are rich sources of plant foods. Several studies have shown that increased oxidative stress occurs in depressive disorders, and markers of oxidative stress were generally lower in vegetarians compared to omnivores [18], which may demonstrate a protective effect on mood.
A vegetarian diet is usually characterized by a higher content of carbohydrates and fiber with lower levels of proteins and fats in particular saturated fats, and studies comparing the intestinal microflora of vegetarians and non-vegetarians show that a properly balanced plant diet can influence the development of more diverse and stable ecosystems of beneficial bacteria from the group Ruminococcus, Eubacterium rectale and Roseburia, which creates a more favorable intestinal bacterial profile [2,19]. This has a positive impact on the host's health, both at the intestinal and systemic levels, contributing to the prevention of cardiovascular diseases, anti-pathogenic and anti-inflammatory effects, as well as protective effects on the blood-brain barrier [19–23]. The two-way communication path between the intestines and the central nervous system is the brain-intestinal microflora axis. Disturbances in the intestinal bacterial ecosystem may promote the development of neuroinflammation and changes in the level of neurotransmitters, which is associated with the development of mood disorders [24].

3.2. The impact of a vegetarian diet on mood - research results

So far, of the still small amount of research conducted in this field, many support the beneficial effect of the use of a plant-based dietary pattern on mood [25–29]. The aim of the 2021 prospective cohort study involving 12,062 participants from Taiwan [10] was to determine whether the use of a plant-based dietary pattern could reduce the risk of depressive disorders. The type of diet consumed was assessed using a 57-item Food Frequency Questionnaire (FFQ), on the basis of which the subjects were divided into vegetarians and non-vegetarians. The main finding of the study was that vegetarians had a lower risk of developing subsequent depressive episodes compared to non-vegetarians (adjusted hazard ratio 0.7). The obtained results are consistent with a study of the South Asian population [30], which found a 43% lower

probability of depression among vegetarians compared to non-vegetarians, and with an analysis of population data in America from 2023. [4]. It included 9,584 people, of which 910 people had results suggesting depression. Mental health status was assessed using the 9-item Patient Health Questionnaire (PHQ-9). Based on the data analysis, it was concluded that following a vegetarian diet was associated with a reduced risk of developing depression. In the same year, a pilot study was conducted on 20 people assessing the relationship between mood, diversity of intestinal microbiomes and type of diet [31]. The Depression Anxiety Stress Scale (DASS-42), The World Health Organization - Five Well-Being Index (WHO-5) and the Hospital Scale were used to assess the subjects' mood and anxiety. Anxiety and Depression Scale (HADS). It was shown that after switching to a vegetarian diet, which contained a higher percentage of fat and protein than a typical non-vegetarian diet, there was an improvement in well-being and lower levels of anxiety and depression, while higher carbohydrate intake in the traditional diet produced the opposite results. Additionally, lower caloric intake was associated with a greater diversity of the gut microbiome, and with it decreased levels of anxiety and depression.

In turn, another cross-sectional study from 2021. involving 339 undergraduate students aimed to assess the relationship between the use of a plant-based dietary pattern and the impact on mood and overall well-being. This study assessed the severity of depressive symptoms using the PHQ-9, the level of anxiety using the 7-item Generalized Anxiety Disorder (GAD-7) and the general mental state of the subjects. In turn, the Dietary Screener Questionnaires (DSQ) were used to assess dietary preferences in the previous month. Three groups were distinguished among the participants: group 1 - consuming plant foods, dairy products and whole grains, group 2 - eating a diet consisting of animal products, and group 3 - eating a diet rich in highly processed food and sweet, high-calorie snacks, the so-called junk diet. The study results show that the use of an unhealthy diet, rich in highly processed food, is associated with the severity of depressive symptoms and anxiety, but no significant connections were observed between the use of a plant or animal diet and the impact on the mental health of the respondents [32]. Similarly, the lack of a relationship between a vegetarian diet and depressive symptoms was obtained in a meta-analysis from 2020 [33], which included thirteen studies: four observational cohort studies and nine cross-sectional studies. Six of the included studies were conducted in Europe, six in Asia, and one in the United States. Three studies assessed only women, one study included only men, and nine studies included both men and women. The number of subjects ranged from 435 to 90,380. In total, 147,964 participants aged 17 years and older were included in the review. Eleven studies assessed the association between adherence to a vegetarian diet

and depression, five studies assessed the association between a vegetarian diet and anxiety, and only two studies assessed the association between a vegetarian diet and stress. In total, seven indices were used to assess symptoms of depression, including: the Geriatric Depression Scale (GDS), the Center for Epidemiological Studies Depression Scale (CES-D), the Edinburgh Postpartum Depression Scale (EPDS) and the Hospital Anxiety and Depression Scale (HADS). Four cross-sectional studies and one cohort study did not show a significant relationship between the factors studied and the diet used, while three cohort studies and four cross-sectional studies showed lower levels of anxiety and depression after switching to a vegetarian diet. One cohort study, in turn, showed increased anxiety and depression.

On the other hand, despite the benefits of using plant-based diets, there are risks associated with adopting such a dietary model, and some studies suggest that vegetarians and vegans have an increased risk of depressive symptoms compared to their omnivorous counterparts [34–38]. Several studies have shown a link between nutritional deficiencies [28] e.g. of certain amino acids, long-chain omega-3 fatty acids, vitamins B6 and B12, zinc, creatine among vegetarians and vegans [39] and a negative impact on mental health [40] From the meta-analysis conducted in 2021. shows that regardless of the duration and type of plant-based diet used - vegan or vegetarian - the subjects had a higher risk of developing depression when depression was assessed as a categorical variable, while the level of anxiety was lower compared to omnivores [41]. Interestingly, people under 26 years of age eating a plant-based diet showed higher levels of anxiety than older people. This may reflect the greater susceptibility of young people to nutritional deficiencies due to their rapid growth and development. Similar results were obtained in a study on students of German and Chinese origin [42], where the use of a plant-based dietary pattern in both groups - 16% of German and 22% of Chinese students - was associated with a greater risk of developing mental health problems. There are various possible explanations for the negative impact of a plant-based dietary pattern on mental health: an inadequately balanced diet resulting in nutrient deficiencies, dieting by a minority of the population (despite a rapid increase in recent years), which may result in feelings of low well-being due to belonging to a minority group [40], as well as the fact that people with psychosocial disorders may be more likely to adopt a vegetarian or vegan diet to improve their mental health. However, the still small number, high heterogeneity and low quality of studies, the use of different assessment tools and the main drawback of not adjusting for confounding factors such as sociodemographic factors, physical activity, alcohol consumption, smoking and medical history make it impossible to draw final conclusions. More research is needed on the impact of

a plant-based eating pattern on mental health before definitive positive or negative conclusions can be drawn.

4. Conclusions

The collected literature review shows that a vegetarian diet seems to be a promising measure, helpful in reducing the risk of depressive disorders and the severity of anxiety, and has a positive impact on mood and holistically understood mental health [4,25–31]. In turn, there are studies that have shown a correlation between the consumption of highly processed unhealthy food and the severity of depressive symptoms and anxiety, but no significant effect on mood was observed in the case of a plant-based diet [32,33]. On the other hand, some studies indicate possible dangers resulting from the implementation of a vegetarian diet - especially when it is improperly balanced, which may result in nutrient deficiencies, mainly vitamin B6 and B12, as well as increased anxiety and depression in vegetarians compared to omnivores [28 ,34–39,41,42]. Despite the increase in interest in recent years and the intensive development of the field of nutripsychiatry, we still have a small number of clinical studies on the impact of a plant-based dietary pattern on mental health and mood. Due to conflicting research results and the fact that mental health is influenced by many different factors - stressful life events, physical activity, sleep and social support - the implementation of a vegetarian diet as a potential therapeutic agent requires further research in the field of nutritional psychiatry. This will allow for a full assessment of the validity of introducing this measure into clinical practice.

Author's contribution

Conceptualization, Izabela Halczuk, Bartłomiej Stachura; methodology, Justyna Górska, Samanta Gawryszczak; software, Izabela Halczuk; check, Anna Gliwa, Katarzyna Nowak; formal analysis, Izabela Halczuk, Bartłomiej Stachura; investigation, Justyna Górska, Samanta Gawryszczak; resources, Anna Gliwa, Katarzyna Nowak; data curation, Anna Gliwa, writing–rough preparation, Katarzyna Nowak; writing–review and editing, Justyna Górska, Samanta Gawryszczak; visualization, Izabela Halczuk, supervision, Bartłomiej Stachura; project administration, Izabela Halczuk; receiving funding, Justyna Górska.

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