Influence of Nutrition on Mental Health

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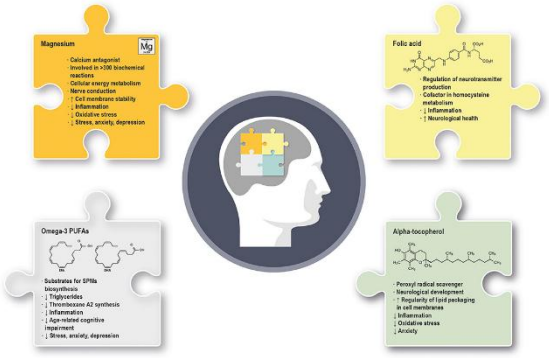
***Abstract*— This review analysed 15 studies on the connection between diet and mental health using PRISMA, SPIDER, and GRADE tools. Results indicate that nutrition significantly impacts mental well-being. Low magnesium and high calcium levels may contribute to anxiety, which *Melissa Officinalis* supplementation can help reduce. Healthy eating patterns, like the Mediterranean diet, are linked to fewer depressive symptoms, while vitamin D supports mental health. Essential nutrients such as magnesium, vitamin D, and B6 play vital roles. A key limitation is the broad definition of "food," which may introduce bias. Overall, maintaining a balanced diet promotes better mental health.**

***Keywords*— Diet and Mental Health, Nutritional Psychiatry, Magnesium and Anxiety, Mediterranean Diet Benefits, Vitamin D and Depression, PRISMA Systematic Review.**

I. INTRODUCTION

The impact of nutrition on physical health is well recognized, yet its influence on mental well-being often receives less attention. However, growing scientific evidence highlights the significant role of diet in emotional and cognitive health. Experts stress the need to balance both body and mind for overall wellness, emphasizing how intentional dietary choices can enhance mental well-being. In today's globalized food landscape, individuals have access to a vast variety of foods from diverse regions. While this abundance offers more options, it also complicates informed nutritional decisions. Understanding how dietary habits directly and indirectly affect mental health is crucial, as nutrition influences mood, cognitive function, and susceptibility to conditions like anxiety and depression. Research suggests that key nutrients such as magnesium, vitamin D, and B6 contribute to emotional stability and help reduce depressive symptoms, whereas poor dietary patterns may worsen mental distress. By examining the relationship between diet and mental well-being, this study aims to deepen our understanding and lay the groundwork for future research in this field. Encouraging mindful eating can foster a healthier relationship with food, making individuals more aware of how their choices impact both physical and mental health. This paper highlights the intricate connection between nutrition and mental well-being, emphasizing the importance of thoughtful dietary decisions in maintaining long-term psychological and emotional stability.



II. LITERATURE

A healthy dietary pattern can affect mental health and well-being through anti-inflammatory, antioxidant, neurogenesis, microbiome- and immune-modifying mechanisms, as well as through epigenetic modifications (1). Dietary profile affects not only the brain composition, structure and function, but also endogenous hormones, neuropeptides, neurotransmitters, and the microbiota-gut-brain axis, in turn playing a key role in modulation of stress and inflammation and in preservation of cognitive function (2). In addition to a healthy and balanced diet, the supplementation of micronutrients (e.g., vitamins and minerals) and macronutrients (e.g., fatty acids) can provide several beneficial effects, due to their multiple biological roles (3). This narrative review aims to summarize the current knowledge about the relationship between the intake of specific nutrients, including the omega-3 polyunsaturated fatty acids (PUFAs) eicosatetraenoic acid (EPA) and docosahexaenoic acid (DHA), alpha-tocopherol, magnesium and folic acid, and the beneficial effect on mental health and well-being (Figure 1). A comprehensive search and critical review have been conducted in PubMed database using the keywords stress, anxiety, sleep disorders, mild cognitive impairment (MCI), depression, bipolar disorders,

obsessive-compulsive disorder, neuroinflammation, inflammation, associated with the nutrients alpha-tocopherol, folic acid/folate, magnesium, omega-3 fatty acids, EPA, and DHA through the use of the Boolean operators AND, OR, identifying the articles relevant to this review. The literature search has been limited to English language articles. Additionally, manual searches for related articles have also been performed. The time range for literature search has been 1994–2020, with about 70% of articles published in 2016–2020. Randomized clinical trials (RCTs) have been prioritized in the selection of research studies to be reviewed; however, some pre-clinical studies in animal models of disease have been discussed as well.

Table 1. Summary of the clinical trials we reviewed and providing statistically significant results about the beneficial effect of nutrient supplementation on mental health and well-being.

Tested molecule(s)	Disorder	Study Design	Number of participants	Main results	Reference
Magnesium oxide, folic acid, multivitamin supplementation	Stress	8-week randomized controlled trial on women aged 25–45 and experiencing psychological distress. Post-intervention data collected 8 weeks after the start of the supplement intake	60 subjects randomized in an active group or in a placebo group	Positive impact of nutrient supplementation on pro-inflammatory cytokine profiles in the active group; no effect on psychological state	(19)
Magnesium, vitamin B6	Stress	8-week, Phase IV, randomized, controlled, investigator-blinded, parallel-group trial on subjects aged 18 to 50, with moderate to extremely severe stress and hypomagnesemia at screening	264 subjects randomized 1:1 to treatment with either the magnesium–vitamin B6 combination or magnesium alone	Significant reduction of perceived stress *vs.* baseline; no significant difference between the two treatment groups	(20)
DHA	Stress	6-week double blind randomized placebo-controlled clinical trial on academic personnel, aged 18–60, experiencing stress	93 subjects randomized in an active group treated with fish oil ($n = 16$), a control group treated with olive oil ($n = 14$), or in a control group with no treatment ($n = 63$)	Significant reduction of perceived stress in the active group *vs.* control groups	(21)
DHA, EPA	Burnout	8-week double-blind and placebo-controlled intervention on subjects aged 18–65, with self-reported signs of workplace-related exhaustion	43 subjects randomized in an active group treated with DHA and EPA ($n = 22$), or in a placebo control group ($n = 21$)	Significant improvement of burnout scores and decrease of saliva morning cortisol secretion	(22)
Omega-3 PUFAs	Psychotic disorders	6-month multicenter, double-blind, placebo-controlled trial on subjects aged 13–40, at ultra-high risk for psychotic disorders	304 subjects randomized in an active group treated with n-3 PUFA together with cognitive behavioral case management (CBCM) ($n = 66$) or in placebo group treated with CBCM only (n=62)	Increases of the erythrocyte n-3 index and DHA levels are predictive of better symptomatic and functional outcomes at month 6 in the active group	(23)
DHA, EPA	Depression and anxiety	16-week placebo-controlled trial on subjects aged 15–40, with recent onset schizophrenia-spectrum ($n = 46$) or bipolar ($n = 4$) disorders and current psychotic symptoms, treated with risperidone	50 subjects receiving risperidone randomized 1:1 in an active group treated with adjuvant n-3 PUFAs ($n = 25$) or in a placebo control group ($n = 25$)	Substantial decrease in depression-anxiety symptoms in the n-3 PUFA group *vs.* the placebo group	(24)
Omega-3 PUFAs	Major depressive disorder	12-week double-blind, randomized and placebo controlled clinical trial on subjects aged 18–65, with major depressive disorder, treated with sertraline	50 subjects receiving sertraline randomized 1:1 in an active group treated with adjuvant n-3 PUFAs ($n = 25$) or in a placebo control group ($n = 25$)	Substantial improvement of symptoms of depression, and of dimensions of anxiety and sleep symptoms in the n-3 PUFA group *vs.* the placebo group	(25)
DHA	Sleep disorder	14–18-week longitudinal, randomized, double-blinded, placebo-controlled trial on pregnant women aged 18–35	48 pregnant women randomized in an active group receiving DHA-supplemented functional food ($n = 27$) or in a placebo group ($n = 21$)	Significant improvement of infant sleep organization in the first 48 h in the DHA group *vs.* the placebo group	(26)
Omega-3-/-Omega-6 PUFAs,antioxidant vitamins (alpha-tocopherol, gamma-tocopherol, vitamin A)	Mild cognitive impairment	6-month randomized, double-blind, placebo-controlled trial on subjects aged ≥65 years, with probable mild cognitive impairment	46 subjects randomized 1:1 in an active group treated with PUFAs ($n = 23$) or in a placebo group ($n = 23$)	Favorable improvement of functional capacity and cognitive function for the participants receiving the supplementation *vs.* the placebo group	(27)
DHA, EPA	Major depressive disorder	8-week randomized, double-blind, placebo controlled trial on subjects aged 18–80, with major depressive disorder and high plasma levels of inflammation biomarkers	196 subjects randomized in an active group treated with DHA ($n = 66$), an active group treated with EPA ($n = 65$) or in a control group treated with placebo (n=65)	Significant improvement of depressive symptoms in EPA-treated patients with high plasma levels of inflammation biomarkers	(28)
DHA, EPA	Antenatal depressive disorder	12-week randomized trial on pregnant women aged ≥20 years with antenatal depressive disorder	100 subjects randomized in an active group treated with omega-3 PUFAs ($n = 49$) or in a control group treated with placebo ($n = 51$)	Significant association between increased EPA and estradiol and decrease of depressive symptoms in the active group	(29)

III. METHODOLOGY

This study will utilize a mixed-methods approach, combining quantitative surveys and qualitative interviews to explore the relationship between nutrition (specifically EPA and DHA) and mental health.

- A systematic review of existing studies will be conducted using databases like PubMed and Google Scholar, focusing on research published from 1990 to 2024, with keywords such as "EPA," "DHA," "nutrition," and "mental health."
- Adults aged 18-65, both with and without diagnosed mental health conditions, will be recruited from local health centers and online forums. Informed consent will be obtained.
- Quantitative data will be gathered through surveys assessing dietary habits and mental health outcomes. Qualitative data will be collected through interviews or focus groups to gain insights into participants' perceptions of the nutrition-mental health link.
- Quantitative data will be analyzed using statistical software (e.g., SPSS), while qualitative data will undergo thematic analysis to identify key themes regarding nutrition's impact on mental health.

The link between nutrition and mental health has garnered increasing attention, especially in India, where diverse dietary practices and lifestyle choices significantly impact mental well-being. This literature review synthesizes findings from various studies that investigate how specific dietary components affect mental health outcomes.

1. Nutritional Deficiencies and Their Impact Many individuals in India experience nutritional deficiencies, particularly in micronutrients like vitamins D, B12, and iron, which can adversely affect mental health. Research conducted by Gupta et al. (2021) highlights that a deficiency in vitamin D is common among urban adolescents, correlating with elevated levels of anxiety and depression. Additionally, iron deficiency anemia is prevalent among women and children in India, leading to cognitive deficits and emotional disturbances (Mishra et al., 2018). These nutritional gaps can

intensify stress levels and contribute to the onset of mental health disorders.

2. Dietary Patterns and Psychological Health Traditional Indian diets, which include a variety of fruits, vegetables, whole grains, and legumes, have been associated with improved mental health outcomes. A study by Sethi et al. (2020) found that individuals adhering to a Mediterranean-style diet—characterized by high consumption of plant-based foods and healthy fats—tend to experience lower rates of depression and anxiety. The presence of antioxidants and phytochemicals in these foods helps mitigate oxidative stress, which is linked to mental health issues.

IV. CONCLUSION

Mental health is a crucial part of overall health, and an unhealthy lifestyle can negatively affect mental well-being. Research shows that including both micro- and macronutrients in a balanced and diverse diet, along with maintaining a healthy lifestyle, is important for supporting proper brain function and overall wellness. This approach is especially vital in the context of global aging, as the brain can be greatly affected by long-term stress throughout life.

V. ACKNOWLEDGMENT

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