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Challenges and risks of using Omega-3 fatty acids in the supportive treatment of depression

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Abstract:
Introduction: Omega-3 fatty acids, including α-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), are essential nutrients with anti-inflammatory and neuroprotective properties. EPA has demonstrated potential in mitigating depression by enhancing neurotransmitter synthesis, including dopamine and serotonin. However, gastrointestinal side effects, fatigue, anxiety, contamination risks (e.g., mercury, lead), and variability in supplement quality and accessibility pose significant challenges. Addressing these issues is essential to optimize the safe and effective therapeutic use of omega-3 fatty acids in depression management.
Material and methods of research: The materials and literature was collected using searches in Pubmed, research gate and Google Scholar databases and references from retrieved articles.

Results: Omega-3 fatty acids, particularly EPA and DHA, show promise in treating depression due to their anti-inflammatory and neuroprotective effects. However, challenges include differing mechanisms, side effects, contamination risks, and inconsistent supplement quality. Short trials often miss long-term effects, and limited access and population diversity further hinder progress. Rigorous research and improved regulation are essential to unlock their full therapeutic potential.

Conclusion: Omega-3 fatty acids, particularly EPA, show promise as a supportive treatment for depression due to their role in neurotransmitter production and inflammation control.

However, challenges such as side effects, contamination risks, and inconsistent supplement quality necessitate strict monitoring, improved standards, and broader access to high-quality products to ensure their safe and effective use in depression management.

Keywords: omega-3, fatty, acids, risks, challenges

Purpose of the study:

The Aim of the study

The aim of this study is to conduct a comprehensive review and synthesis of the existing body of literature surrounding the pharmacological properties, mechanisms of action, side effects, and potential risks associated with the use of omega-3 fatty acids as a supportive treatment for depression. Recognizing the increasing interest in omega-3 fatty acids due to their anti-inflammatory properties and their role in enhancing neurotransmitter production, this study seeks to critically examine their therapeutic potential while addressing the challenges and risks that may limit their clinical utility. Specifically, it focuses on evaluating the biochemical mechanisms by which omega-3 fatty acids, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), exert their effects on mood regulation, including their influence on inflammatory pathways and the synthesis of key neurotransmitters such as serotonin and dopamine. In addition, the study aims to explore the spectrum of side effects associated with omega-3 supplementation, such as gastrointestinal disturbances, fatigue, and anxiety, which may impact patient adherence and overall treatment outcomes. Another key focus is the risk of contamination in omega-3 supplements with environmental toxins, such as mercury and lead, and how such pollutants could undermine their safety and long-term health benefits. By synthesizing findings from diverse studies, this research aims to provide a nuanced and evidence-based understanding of the challenges and risks involved in using omega-3 fatty acids for depression. This will help inform clinical practice and guide future research, fostering the development of safer, more effective therapeutic approaches for patients with depression.

Materials and methodology:

To investigate the challenges and risks associated with the use of omega-3 fatty acids as a supportive treatment for depression, a structured and systematic approach to literature review was employed. The research process began with a comprehensive search of two widely recognized databases, PubMed and Google Scholar, ensuring broad coverage studies and relevant academic articles. These databases were chosen for their extensive repositories of medical and scientific literature, which include high-quality research on nutrition, psychiatry, and pharmacology. Studies were considered to evaluate the efficacy, safety, and risks of omega-3 fatty acid supplementation, particularly in the context of its biochemical effects, patient adherence.. This methodology aimed to provide a well-rounded understanding of the potential benefits, limitations, and risks of omega-3 fatty acids in addressing depression, thereby guiding both clinical decision-making and future research in this domain.

Introduction

Omega-3 fatty acids, encompassing α-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), are vital polyunsaturated fats that have garnered significant

attention in the field of mental health due to their multifaceted roles in cellular and neurological functioning. These essential fatty acids are crucial for maintaining the structural integrity and fluidity of neuronal membranes, a property that influences neurotransmission and synaptic plasticity. Furthermore, omega-3 fatty acids are intimately involved in regulating inflammatory processes and modulating the synthesis of key neurotransmitters such as serotonin and dopamine, both of which are critical in mood stabilization and the pathophysiology of depression. Among the omega-3 subtypes, EPA has been particularly highlighted for its potential antidepressant properties, with studies indicating its efficacy in alleviating symptoms of mild-to-moderate depression, especially when used as an adjunctive treatment alongside conventional antidepressant medications. However, despite the growing enthusiasm surrounding omega-3 fatty acids as a supportive therapy for depression, their clinical application is not without challenges. Common side effects such as gastrointestinal discomfort, including nausea and diarrhea, as well as more variable effects like fatigue and increased anxiety in certain individuals, underscore the need for cautious patient selection and monitoring. Additionally, variability in individual response to omega-3 supplementation and the lack of standardized dosing guidelines further complicate its widespread adoption in clinical practice. Significant concern is the contamination of omega-3 supplements with environmental pollutants such as mercury, lead, and polychlorinated biphenyls (PCBs), substances that can accumulate in marine sources of these fatty acids. These contaminants pose serious health risks, particularly in the context of chronic supplementation, where long-term toxicity could overshadow potential therapeutic benefits. Additionally, the variability in supplement quality due to inconsistent manufacturing practices complicates their use in clinical settings, as differences in purity, potency, and bioavailability may significantly influence both safety and efficacy. Access to high-quality omega-3 supplements also remains inequitable, particularly in low-resource settings where cost, availability, and awareness of such treatments can limit their utilization, potentially widening health disparities. These factors, combined with the known side effects of omega-3 supplementation such as gastrointestinal discomfort and occasional mood fluctuations, highlight the complex landscape of challenges associated with their clinical application. This paper aims to thoroughly explore these challenges, identifying strategies to mitigate risks and improve the reliability and safety of omega-3 supplementation. These challenges, alongside the complexities of integrating nutritional interventions into established pharmacological and psychotherapeutic frameworks, highlight the necessity for continued research to optimize the therapeutic use of omega-3 fatty acids in the management of depression. As such, a comprehensive understanding of their mechanisms of action, potential risks, and patient-specific considerations is essential for advancing their role in the supportive treatment of this pervasive mental health condition.

Overview of omega-3 fatty acids

Omega-3 fatty acids are a group of essential polyunsaturated fatty acids that hold tremendous significance in human health, particularly for their roles in reducing inflammation and supporting neurological and psychological well-being, including the management of depression as an adjunctive treatment. Their defining characteristic is their molecular structure, which features the final double bond at the third carbon atom from the methyl end of the carbon chain, distinguishing them from other fatty acids. The primary types of omega-3 fatty acids are α-linolenic acid (ALA), derived mainly from plant-based sources such as rapeseed seeds, walnut oil, almonds, and green leafy vegetables, and the marine-derived fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are abundant in fatty fish like salmon, mackerel, tuna, and herring, as well as other seafood (1,2). These fatty

acids are considered essential because the human body cannot synthesize them de novo, necessitating dietary intake to meet physiological demands. Omega-3 fatty acids play an indispensable role in cellular function by being integral components of cell membrane phospholipids. This incorporation into cellular membranes enhances their fluidity, elasticity, and functionality, enabling efficient ion transport, calcium binding, and prostaglandin synthesis, which are vital processes for maintaining the structural and functional integrity of cells, particularly in cardiac and neural tissues (3).

Among the omega-3 fatty acids, EPA and DHA are especially significant because of their anti-inflammatory properties. They replace saturated fats and omega-6 fatty acids within cell membranes, leading to a decrease in the production of pro-inflammatory mediators derived from omega-6 fatty acids. This substitution not only reduces inflammation but also has a profound effect on the regulation of inflammation-related gene expression. One of the key mechanisms by which this occurs is through the suppression of nuclear factor kappa B (NF-κB), a central transcription factor that governs the expression of many pro-inflammatory genes (4). Moreover, DHA has a unique ability to bind to the GPR120 receptor, a specialized receptor that, when activated, triggers enzymatic cascades that further inhibit NF-κB activity, enhancing the anti-inflammatory response and providing additional neuroprotective benefits (5). These processes collectively mitigate the chronic low-grade inflammation that has been increasingly recognized as a key contributing factor to the pathophysiology of depression. Chronic inflammation, through the release of cytokines and other inflammatory mediators, disrupts normal neurotransmitter function and neural plasticity, both of which are critical for mood regulation. By addressing these underlying inflammatory pathways, EPA and DHA offer promising support in the management of depressive disorders.

Furthermore, the effects of omega-3 fatty acids extend beyond inflammation reduction. Their ability to enhance membrane fluidity also influences neurotransmitter signalling and receptor functionality in the central nervous system. This is particularly relevant for conditions like depression, where imbalances in neurotransmitters such as serotonin, dopamine, and norepinephrine are implicated. Additionally, omega-3 fatty acids are thought to promote the synthesis of neuroprotective factors and support the repair of neuronal damage, further contributing to their antidepressant potential. Their role in cardiac health, where they enhance cardiac muscle cell function and reduce systemic inflammation, complements their benefits for mental health, as cardiac and mental health are often closely interlinked. These multifaceted actions underscore the potential of omega-3 fatty acids as a valuable component of an integrative approach to depression treatment, particularly when combined with conventional therapies such as antidepressant medications and psychotherapy. By addressing both the inflammatory and neurochemical dimensions of depression, omega-3 fatty acids serve as a crucial link between nutrition, inflammation, and mental health. (4,5)

Omega-3 fatty acids also exhibit antithrombotic effects by lowering fibrinogen levels and mitigating the pro-aggregatory effects of inflammation, thereby reducing excessive blood clotting. Additionally, they diminish vascular smooth muscle cell proliferation by limiting the influence of growth factors such as TGF and platelet-derived growth factor (PDGF), leading to reduced vascular stiffness and wall thickness (6). Clinically, omega-3 fatty acids display a wide array of therapeutic effects, including anti-inflammatory, anti-atherosclerotic, antiarrhythmic, and antithrombotic actions. They are known to lower triglycerides, improve lipid profiles, and reduce pro-inflammatory cytokines such as interleukin-1 and TNF, while also providing neurochemical support by contributing to serotonin and dopamine synthesis. This neurochemical modulation underpins their antidepressant effects, as lower dietary intake and serum concentrations of EPA and DHA have been linked to heightened symptoms of depression. Notably, EPA has demonstrated superior efficacy compared to DHA and placebo as an adjunctive treatment for mild-to-moderate depression, underscoring its potential in the

management of mental health disorders (7,8,9). These multifaceted benefits highlight the vital role of omega-3 fatty acids in maintaining overall health and managing a spectrum of inflammatory, cardiovascular, and mental health conditions.

Risks and challenges associated with Omega-3 Use

Usage of omega-3 fatty acids may also lead to adverse effects. In study (J.Shima et al., 2008) group of 16 patients taking eicosapentaenoic acid 2 cases of fish aftertaste, and respectively 1 case per; diarrhoea, drowsiness and anxiety was reported. The use of omega-3 fatty acids, particularly EPA, in depression treatment has been linked to various biological mechanisms, but differences in their effects raise significant concerns. EPA and DHA, the primary omega-3 components, exhibit distinct and sometimes opposing actions on inflammatory cytokine production and serotonin metabolism. EPA, for instance, has been shown to significantly reduce interferon-gamma (IFN-γ) secretion, which plays a role in lowering serotonin availability by activating tryptophan-metabolizing enzymes. This enzyme activity has been implicated in monoaminergic dysfunction, a key feature of depression. Furthermore, EPA's influence on arachidonic acid pathways, which are associated with unipolar depression, appears more pronounced than that of DHA. However, these mechanisms also introduce variability in treatment outcomes due to differing EPA-to-DHA ratios in supplements. While DHA, the primary omega-3 fatty acid in the brain, supports neuronal processes, its effects are distinct from EPA's, which may explain the inconsistent results observed in clinical trials. Importantly, while EPA is generally safe and offers cardiovascular benefits, limitations in trial designs, such as small sample sizes and lack of placebo control, make it difficult to establish its efficacy reliably. This variability underscores the need for individualized approaches when prescribing omega-3s for depression, especially given the interplay between inflammatory pathways, serotonin metabolism, and brain fatty acid composition. (10).

In trail by (M.Lucas et al 2009) similar adverse effects were observed in observed EPA-group of 55 participants. Respectively 3 patients reported nauseam 6 digestive discomfort, 4 diarrhoea and 8 occurrence of constipation.

The use of omega-3 fatty acids, particularly E-EPA, in treating depressive symptoms presents challenges, as evidenced by an 8-week trial in women with premenstrual dysphoria (PD) and depressive symptoms related to menopause. The study found no significant benefits of E-EPA over placebo, particularly in women diagnosed with major depressive episodes (MDE). Notably, women with PD without MDE exhibited significant improvements in scales such as HAM-D-21 and PGWB compared to placebo, but these effects diminished over time, likely due to hormonal fluctuations and the trial's limited duration. The population sample, predominantly middle-aged, educated, white women, further restricted the generalizability of findings. Additionally, the study's 8-week duration may have been insufficient for tissue-level changes in omega-3, as prior research suggests that red blood cell DHA and EPA levels reach maximal concentrations only after 180 days. Variability in treatment effects across studies also raises concerns about the optimal formulation and dose, with some evidence suggesting that EPA and DHA ratios significantly influence outcomes. For instance, DHA monotherapy has not consistently shown efficacy in managing MDE, indicating that specific combinations may be critical. (11)

Risk of contamination in commercially available omega 3 supplements should be monitored to ensure safety as contamination impacts health risks. As need for supplementing omega 3 grows more variants are available. The question arise of quality control and monitoring sources of products which supplements are made of. Growing pollution of water reservoirs might impact quality of the supplements by contamination by heavy metals and pollutants thus implicating long-term health problems. (12) In the article (N.Burca et al.,2014) impact of pollutants were outlined as mercury, lead, selenium, arsenic, PCBS, cadmium,

DICHLORODIPHENYLTRICHLOROETHANE and dieldrin. Their presence undermining potential of supplements in high dosages. Authors point out that through build up of toxins during high dosage and longer period of consumption might impact development of central nervous system especially during nervous system development (13,14). Heavy metals build up in organism might also lead to neurotransmitter disruption causing depression, cardiovascular diseases, mitochondrial damage leading to prolong fatigue and pathologies of fetal development. (13,15)

Proper production protocols, including the use of antioxidants and controlled environments, are critical to minimizing oxidation and ensuring the stability of these supplements. Additionally, inadequate storage conditions, such as exposure to light, heat, or air, can further exacerbate oxidative degradation. Consuming omega-3 supplements that exceed safety thresholds for total oxidation not only undermines their potential therapeutic benefits but also poses risks of gastrointestinal distress, inflammation, and other oxidative stress-related conditions. The challenge is compounded by the widespread availability of untested or poorly regulated supplements in the market, which may not adhere to stringent quality control standards. As a result, individuals using these supplements without proper verification of their quality or adherence to recommended safety levels are at an increased risk of experiencing adverse effects, which may counteract the intended mental health benefits. Addressing these issues requires improved regulatory oversight, education on safe supplementation practices, and further research to develop robust strategies for minimizing oxidative degradation in omega-3 products. Without these measures, the full therapeutic potential of omega-3 fatty acids in the treatment of depression cannot be reliably harnessed. (16,17,18)

Regulatory and Practical Challenges

Regulatory and practical challenges concerning the use of omega-3 fatty acids as a supportive treatment for depression are multifaceted and highlight significant barriers to their safe and effective clinical application. One critical issue revolves around the inconsistent quality and labelling of omega-3 supplements available on the market, which poses risks to patient safety and therapeutic efficacy. A study by (F.Pasini et al., 2022) revealed that 2.5% of analysed omega-3 supplements failed to meet the declared content on their labels, with some products containing undisclosed omega-3 ethyl esters. These ethyl esters may increase the risk of adverse effects, such as gastrointestinal discomfort or hazardous interactions with concurrently prescribed medications, further complicating their use in vulnerable patient populations, including those with depression (19). This lack of transparency underscores the necessity for stricter regulatory standards to ensure that manufacturing processes and product labelling accurately reflect their content. The issue becomes particularly concerning given the expanding role of omega-3 in the management of depression, where precise dosing and consistent therapeutic quality are critical for achieving desired outcomes. Moreover, the variability in product composition, compounded by a lack of standardized dosing guidelines, presents a practical challenge for clinicians aiming to integrate omega-3 into treatment regimens effectively. Patients with comorbid conditions or those taking multiple medications may be especially at risk due to potential interactions, emphasizing the need for healthcare providers to critically evaluate product quality before recommending omega-3 supplements.

Regulatory and practical challenges related to the use of omega-3 fatty acids as supportive treatment for depression are further complicated by significant regional disparities in access to high-quality supplements and omega-3-rich foods. (J.P. Schuchardt et al., 2024) highlighted global variations in the Omega-3 Index (O3I), a biomarker that measures the combined percentage of EPA and DHA in red blood cells, revealing stark differences across populations due to dietary patterns, socioeconomic factors, and availability of omega-3-rich resources (20).

These variations are particularly evident in regions where plant-based diets predominate, as these diets often lack sufficient marine-based omega-3 sources such as fatty fish, resulting in lower O3I levels. Such deficiencies may impede the therapeutic efficacy of omega-3 supplementation in managing depression, especially in areas where access to high-quality, reliable omega-3 supplements is limited. Furthermore, disparities in public awareness and education about the mental health benefits of omega-3 supplementation compound these challenges, making it difficult to promote its standardized use in clinical practice. Socioeconomic barriers also play a pivotal role, as populations in low-income regions may face financial obstacles to obtaining high-quality omega-3 supplements, which are often priced higher than generic alternatives that may lack the necessary EPA and DHA content.

The regulatory and practical challenges of using omega-3 fatty acids in the supportive treatment of depression are multifaceted and require coordinated efforts to ensure safety, efficacy, and accessibility. A significant issue lies in the lack of universal standards for the production and quality assurance of omega-3 supplements, resulting in variability in purity, dosage, and bioavailability between products. This inconsistency complicates both clinical recommendations and patient outcomes. To address these concerns, regulatory agencies worldwide must collaborate to establish and enforce stringent guidelines for the manufacturing, labeling, and testing of omega-3 products, ensuring they meet standardized safety and efficacy benchmarks. Beyond regulatory measures, public health initiatives play a crucial role in educating healthcare providers and the public about the proper use of omega-3 fatty acids, particularly in populations with low dietary intake or limited knowledge about supplementation. Additionally, economic and logistical barriers remain a significant hurdle, as high-quality omega-3 supplements are often cost-prohibitive or inaccessible in certain regions, widening the gap in treatment options for those most in need. Addressing these barriers will require subsidies, incentives for manufacturers to improve affordability, and enhanced distribution networks to reach underserved communities. Further complicating matters are the varying levels of clinical evidence supporting omega-3 use for depression, which necessitate ongoing research to solidify dosing guidelines and identify patient populations most likely to benefit. A comprehensive approach combining improved regulatory frameworks, public health campaigns, and equitable access initiatives is essential to overcome these challenges, ultimately enabling the safe and effective integration of omega-3 fatty acids into supportive treatment plans for depression and other health conditions.

Discussion

The therapeutic potential of omega-3 fatty acids in managing depression is widely recognized; however, significant risks and challenges need to be addressed to optimize their use. One primary challenge lies in the differential and sometimes conflicting effects of EPA and DHA. While EPA is known to modulate inflammatory cytokines such as interferon-gamma (IFN-γ), which indirectly affects serotonin metabolism by reducing tryptophan availability, DHA plays a distinct role in neuronal function. This dichotomy may contribute to the variability in treatment outcomes, as differing EPA-to-DHA ratios in supplements could impact their efficacy. Clinical trials have demonstrated this inconsistency, with some studies showing benefits primarily with EPA, while DHA monotherapy often fails to yield significant improvements. These disparities highlight the importance of tailored supplementation, accounting for individual differences in metabolic pathways and the nature of depressive symptoms.

Adverse effects further complicate the use of omega-3s. Gastrointestinal issues such as nausea, diarrhea, and constipation have been frequently reported in trials, including those by (Shima et al. 2008) and (Lucas et al. 2009). Such side effects, although mild, may affect adherence to

long-term supplementation. Additionally, the short duration of many studies limits our understanding of potential long-term risks. For example, omega-3 incorporation into red blood cell membranes and tissues occurs gradually, with maximum levels observed only after six months. This slow process suggests that short-term studies may underestimate both therapeutic benefits and risks, necessitating trials of longer duration to fully evaluate their impact.

The risk of contamination in commercially available omega-3 supplements is another critical concern. Environmental pollutants such as mercury, arsenic, PCBs, and dioxins are known to bioaccumulate in marine life, which forms the primary source of EPA and DHA. Chronic exposure to these toxins through contaminated supplements can have serious health implications, including neurotoxicity, disruption of neurotransmitter pathways, and developmental issues in fetuses. Important highlights of (Burca et al. 2014) emphasizes the potential for heavy metals to accumulate in the central nervous system, potentially exacerbating depressive symptoms or causing cardiovascular damage. These findings underscore the importance of rigorous quality control in supplement production to prevent contamination and ensure safety.

Another significant issue is the oxidative degradation of omega-3 fatty acids during production and storage. When improperly stored, omega-3 supplements can oxidize, leading to the formation of harmful byproducts that not only diminish the therapeutic potential but also increase the likelihood of adverse effects. Regulatory oversight is essential to ensure that supplements meet safety standards for oxidation levels. (Pasini et al. 2022) highlighted discrepancies in the labelled content and actual composition of omega-3 products, with some supplements containing undisclosed ingredients such as omega-3 ethyl esters, which could exacerbate side effects. This lack of transparency in supplement manufacturing poses a challenge to healthcare professionals and patients alike, as it undermines trust and complicates the selection of high-quality products.

Global variability in omega-3 access and quality further adds to the complexity. (Schuchardt et al. 2024) demonstrated significant regional differences in Omega-3 Index values, reflecting disparities in dietary intake and supplement quality. In regions where seafood consumption is low, reliance on omega-3 supplements is higher, increasing the importance of ensuring their safety and efficacy. However, these regional differences also highlight the need for standardized supplementation guidelines tailored to the dietary habits and needs of specific populations.

Finally, the limited scope of many studies, often restricted by small sample sizes, homogeneous populations, or lack of placebo controls, restricts the generalizability of findings. For example, trials focused primarily on middle-aged, educated, white women may not reflect the experiences of broader populations with different genetic, dietary, or environmental factors. Moreover, hormonal fluctuations in women, particularly during menopause, add another layer of complexity, as these changes may interact with omega-3 metabolism and influence treatment outcomes. Larger, more diverse studies are needed to address these gaps and provide robust evidence for clinical practice.

Summary

Omega-3 fatty acids, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are recognized for their anti-inflammatory and neuroprotective effects, making them promising candidates for depression treatment. However, their use is accompanied by significant challenges and risks. A major challenge is the variability in the effects of EPA and DHA, as they have distinct and sometimes opposing mechanisms. EPA influences serotonin

availability by reducing inflammation and affecting tryptophan metabolism, while DHA primarily supports neuronal processes. This difference complicates the formulation of effective supplementation strategies and may explain the inconsistent results observed in studies.

Adverse effects such as gastrointestinal disturbances, including nausea, diarrhea, and constipation, have been reported, particularly with EPA supplementation. These side effects, while generally mild, can affect patient adherence to long-term treatment. Another challenge lies in the duration of clinical trials, as many are too short to adequately evaluate the long-term efficacy and safety of omega-3 fatty acids. The incorporation of these fatty acids into cellular membranes is a slow process, and shorter studies may fail to capture their full therapeutic potential or associated risks.

Contamination of omega-3 supplements is another concern due to environmental pollutants such as mercury, arsenic, and PCBs, which are often present in marine sources. Chronic exposure to these contaminants can result in neurotoxicity, disruption of neurotransmitter pathways, and developmental issues, particularly during fetal growth. Additionally, improper storage and oxidative degradation of omega-3 fatty acids can produce harmful byproducts, increasing the likelihood of adverse effects. Regulatory oversight is essential to ensure the safety and quality of these supplements, as discrepancies between labeled and actual content have been observed in commercially available products.

Access to high-quality omega-3 supplements also varies across regions, reflecting differences in dietary intake and supplement availability. This highlights the need for region-specific guidelines to ensure safe and effective supplementation. Moreover, the limited diversity of study populations, often focused on specific demographic groups, raises questions about the generalizability of findings. Broader trials that include diverse populations are needed to fully understand the risks and benefits of omega-3 fatty acids in depression treatment.

In summary, while omega-3 fatty acids show promise in supporting depression treatment, their application is not without challenges. Variability in individual responses, the risk of side effects, contamination issues, and the need for longer and more inclusive studies underscore the importance of further research and stricter quality control measures. Efforts to address these challenges will be critical in optimizing the therapeutic potential of omega-3 fatty acids in mental health care.

Disclosure

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