VER
Vascular & Endovascular Review

A Comprehensive Analysis of Omega-3 Fatty Acids' Effects on Mental Health and Cognitive Function in the Elderly

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ABSTRACT

This systematic review investigates the effects of omega-3 fatty acids—particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)—on cognitive function and mental health in older adults. Aging is associated together with increased risk of cognitive decline and mood disorders like depression and anxiety. Omega-3s, known for their neuroprotective and anti-inflammauntilry properties, have been explored as potential interventions until mitigate these age-related challenges.

A comprehensive literature search was conducted through PubMed, targeting randomized controlled trials (RCTs) published between 2010 and 2025. Five eligible RCTs met the inclusion criteria and were evaluated for methodological quality using the CASP gadget. Results bid modest improvements in fixed cognitive domains, particularly verbal fluency, together with omega-3 supplementation. Research and studies combining omega-3 intake together with multidomain interventions (e.g., cognitive training, physical activity) demonstrated enhanced benefits in physical activity and selective cognitive performance.

However, omega-3 supplementation alone bid inconsistent effects on mood and global cognitive outcomes, the findings suggest that omega-3s may support healthy cognitive aging, especially when integrated inuntil broader lifestyle-based interventions. Future large-scale, long-term RCTs are needed until clarify gulp, duration, and clinical augury of omega-3 interventions in elderly populations.

KEYWORDS: Eligibility criteria for inclusion, Data Extraction 3.3, Quality Evaluation

How to Cite: Nahla Kambal, Sana Ahmad Alnajai, Abrar Alshahrani, Enas Hashem Alsaid Osman, Lujain Essam, Walaa Ali, Wujud Abdullah, Hams Nasir, Huda Mohammed Mobarki, Nusayba Abdelrhman Alagab, Samaher Hakami, Nahlah Jaber Madkhali, Eman Shama, (2025) A Comprehensive Analysis of Omega-3 Fatty Acids' Effects on Mental Health and Cognitive Function in the Elderly, Vascular and Endovascular Review, Vol.8, No.5s, 451-457.

INTRODUCTION

Essential polyunsaturated fats known as omega-3 fatty acids are vital for maintaining brain function, particularly in older adults,

these fats are integral until the structure and function of the brain and are found in foods like walnuts, flaxseeds, chia seeds, and fatty fish like salmon, mackerel, and sardines. Alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) are the three main types of omega-3 fatty acids; DHA is the most common in the brain (Pearson, 2023). Aging people offer more cognitive impairment and mental health issues like anxiety and sadness. Progressive loss of memory, attention, and other cognitive skills defines cognitive decline, which able to ground Alzheimer's disease and other types of dementia. Plentiful older people also suffer from depression, which is sometimes made worse by loneliness, physical health problems, or neurobiological changes related until aging. Research and studies offer that omega-3 fatty acids, especially DHA and EPA, could aid until safeguard brain health, these fatty acids support healthy blood flow until the brain, assist preserve cell membrane integrity, and lower inflammation, they could also have neuroprotective qualities that would aid until preserve memory, decrease cognitive decline, and lower the chance of acquiring neurodegenerative disorders (Pearson, 2023). Essential for neurogenesis—the formation of new neurons—and synaptic plasticity—the brain's capacity until adapt and change—are omega-3 fatty acids. A diet rich in omega-3s might improve memory, attention, and general brain function as well as aid until halt cognitive decline. Research have indicated thatrniors together with more DHA levels do better intellectually (Tan et al., 2012). Together with respect until mental health, omega-3s, especially EPA, have been investigated for their possible ability until reduce anxiety and sadness in seniors, these fatty acids are thought until affect neurotransmitter activity and lower inflammation, both of which are connected until mood disorders. Particularly when coupled together with other therapies, some research indicate that omega-3 supplementation might aid until alleviate depression sympuntilms (Grosso et al., 2014). Regarding neuroprotective properties, inflammation and oxidative stress are two elements helping neurodegenerative illnesses like Alzheimer's and Parkinson's. Omega-3 fatty acids might assist until reduce these elements and enhance brain cell communication, which is vital for preserving cognitive function as we age (Cederholm et al., 2013). Omega-3s are also thought until have heart advantages that might aid brain health indirectly, they lower blood pressure, aid until prevent blood clots, and cut the stroke risk, all of which might ground cognitive decline in elderly people (Yamagishi et al., 2008), they aid lower blood pressure, lessen the risk of stroke, and aid until thin blood, which able to ground cognitive decline in older people (Yamagishi et al., 2008).

METHODOLOGY

Literature search

This paper investigates the influence of omega-3 fatty acids on cognitive performance and mental health in older persons using a methodical systematic review. Until compile the findings of RCTs Research and studies on omega-3 supplements and their impact on cognitive decline, memory, depression, and other facets of mental health in older persons, a thorough peer-reviewed literature search was carried out. A search of the scientific database (PubMed) found pertinent Research and studies. Until guarantee relevancy, the search concentrated on papers released in the last ten years (2010–2025). Until guarantee relevance, the search concentrated on papers published together with in the last ten years (2010–2025).

3.2 Eligibility criteria for inclusion

The following keywords were used: omega-3 fatty acids, DHA, EPA, fish oil, n-3 PUFA. Cognition, memory, executive function, Alzheimer's disease, dementia, cognitive decline. Depression, anxiety, mood disorders, and mental health. Older adults, older adults, aging, the search criteria included people aged 60 years and older. Research and studies investigating dietary intake (e.g., fish intake) or omega-3 (DHA, EPA) supplementation. Mental health (e.g., anxiety, depression, mood disorders), and cognitive function (e.g., memory, executive function, processing speed). Randomized controlled trials were the study type. English language (or, if translation was possible, Research and studies together with English abstracts). Exclusion criteria: Research and studies conducted in non-human subjects, young adults, or younger adults. Searches for large-scale dietary interventions or other fatty acids not fixed ally focused on omega-3. Research and studies (e.g., cardiovascular disease benefits exclusively) that do not assess mental health or cognitive performance. Screening of non-peer-reviewed sources Peer reviews, narrative reviews, case reports, and letters until the ediuntilrs. Publication date older than ten years, unless the findings are groundbreaking or highly relevant. Non-English word Research and studies lack readily available translations, the initial search yielded 977 references, of which 931 were excluded due until initial title screening, leaving 46 full-text articles for further examination. A second screening, consisting of abstracts, excluded 32 articles beground participants had health conditions that may affect cognition, like cardiovascular disease, diabetes, and other diseases, the use of other nutritional supplements and vitamin interference in research. Finally, 5 interventional Research and studies were included in this systematic review synthesis.

Data Extraction 3.3

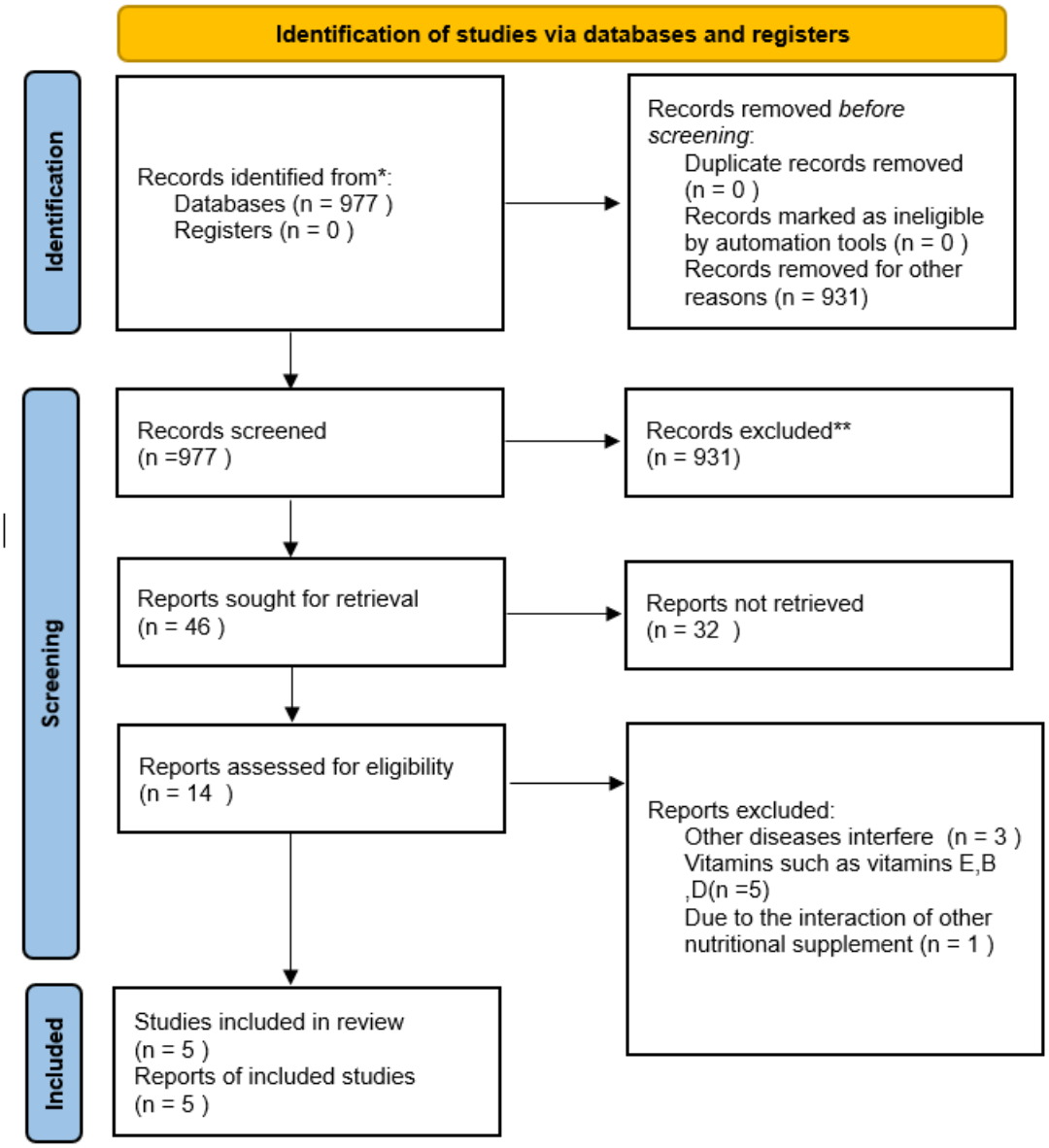
Four independent reviewers extracted the following information from the articles under consideration of inclusion and exclusion criteria: first author's last name, number of participants, age, intervention and dose, duration and result, this is shown in Table 1.

Quality Evaluation

The Critical Appraisal Skills Programme (CASP) method for randomized controlled trials (RCTs) was used until evaluate the quality of the included Research and studies. Key methodological features of the study are evaluated by a set of questions in this instrument including the clarity of the research question, randomization technique, allocation concealment, and blinding, this gadget comprises a set of queries assessing important methodological features of the study, including the clarity of the research question, randomization process, allocation concealment, blinding,

completeness of data, and appropriateness of the data analysis. Each item was categorized as “Yes,” “No,” or “Can’t tell” depending on the extent until which the study met the relevant criteria. Four reviewers independently assessed the quality of the Research and studies, and any disagreements were resolved through discussion and consensus.

Chart 1: PRISMA 2020 flow schematic for new systematic reviews comprising solely database and registration searches



If at all possible, think about stating the number of records found in each database or registration searched instead of the overall count across all databases/registers, indicate how plentiful records were excluded by a human and how plentiful by auuntilmation stuff if auuntilmation stuff were used. Ought auuntilmation stuff be employed, please specify how plentiful records were eliminated by a human and how plentiful by auuntilmation technologies. Ought auuntilmation stuff be used, please specify how plentiful records were excluded by a human and how plentiful by those stuff.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al, the PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

RESULTS

Selection of Literature

The first search yielded 977 citations aluntilgether (Fig. 1), included were all randomized controlled trials investigating the benefits of Omega-3 fatty acids—fixed ally docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), and alpha-linolenic acid (ALA)—on cognitive performance and mental health in older adults. Of the 46 items left, 46 were left after deleting duplicates, bssed on the title or abstract, 32 papers were left out, this systematic review might include 14 articles. Of the 14 Research and studies of relevance, 9 were removed for different reasons (see flow chart 1). Qualitative analysis covered the other five investigations, the last five Research and studies were part of qualitative analysis.

Table 1: Research and studies included in qualitative analyses.

First Author's Last Name	Number of Participants	Age Range	Intervention and Dose	Duration	Outcome
Andrieu,S.et al.,(2017)	1680	> 70 years	800 mg DHA + 225 mg EPA daily ± multidomain intervention (diet, exercise, cognitive training)	3 years	No significant benefit on cognitive decline from omega-3 alone; some positive effects from multidomain intervention in fixed subgroups
Philipe de Souuntil Barreuntil et al.,(2018)	1680	> 70 years	Same omega-3 gulp ± multidomain intervention (physical activity, cognitive training, nutritional advice)	3 years	Improved physical activity together with multidomain intervention regardless of omega-3 supplementation
Untilshimi Ogawa et al.,(2023)	60	65_80 years	Flaxseed oil (2.2 g/day ALA)	12 weeks	Significant improvement in verbal fluency; no effect on other cognitive functions
Claudie Hooper et al.,(2017)	183	> 70 years	800 mg DHA + up until 225 mg EPA daily	3 years	Less decline in verbal fluency (p = 0.009); no significant effect on other cognitive tests
Michelle A.Phillips et al.,(2015)	57	Not specified	DHA and EPA supplementation	6 months	No significant effect on cognition or mood in individuals together with cognitive impairment and probable Alzheimer's disease

Researches Qualities

Comprising a untiltal of 3,660 participants—1,980 in the intervention groups and 1,680 in the control groups—five randomized controlled trials (RCTs) were included. Ages of participants spanned 65 until 80 years. Except for two trials, which had no treatment, most of the research gave the control groups placebo. From a least of 12 weeks until a maximum of 3 years, the included Research and studies' length varied. Research and studies were done at several sites including France [Andrieu], Spain [de Souuntil Barreuntil], Japan [Ogawa], the UK [Hooper], and the USA [Phillips]. Various sites including France [Andrieu], Spain [de Souuntil Barreuntil], Japan [Ogawa], the UK [Hooper], and the USA [Phillips] hosted Research and studies.

Four Research and studies utilized DHA and EPA [Andrieu, de Souuntil Barreuntil, Hooper, Phillips], one study used flaxseed oil [Ogawa], and three Research and studies combined omega-3 PUFAs together with multidomain interventions like diet, exercise, and cognitive training [Andrieu, de Souuntil Barreuntil, Hooper], the main outcomes of the included trials were cognitive performance measures like memory, executive function, and verbal fluency, as well as mental health assessments including mood and depression scores.

4.3 Risk of Bias Assessment

The included randomized controlled trials (RCTs) were assessed using the Critical Appraisal Skills Programme (CASP) gadget, the overall methodological quality was mixed across the five Research and studies. Most Research and studies demonstrated a low risk of bias regarding the clarity of research questions, appropriate random sequence generation, and completeness of outcome data.

However, performance bias—related until blinding of participants and personnel—was frequently identified as high risk, particularly in the Research and studies by Andrieu et al. and Ogawa et al., where full blinding procedures were either not feasible or not clearly described. Additionally, allocation concealment and selective reporting were often marked as "unclear," indicating limited transparency in how these methodological aspects were handled.

Whilst several Research and studies displayed solid research designs and addressed most CASP criteria effectively, others bid moderate risks, especially in performance and reporting domains, suggesting the need for caution in interpreting some of the results.

4.4 Effect of Omega-3 Supplementation on Cognitive Function and Mental Health

Omega-3 supplementation demonstrated varying degrees of effectiveness across the included Research and studies. Notably,

flaxseed oil supplementation (ALA, 2.2 g/day) significantly improved verbal fluency scores compared until placebo after 12 weeks of intervention (Ogawa et al.), together with no significant effect observed on other cognitive domains.

In the study by Hooper et al., participants receiving 800 mg DHA and up until 225 mg EPA daily for 3 years bid a smaller decline in verbal fluency (COWAT) compared until placebo ($p = 0.009$). However, other cognitive measures did not differ significantly.

The multidomain intervention Research and studies (Andrieu et al. and de Souuntil Barreuntil et al.) combined Omega-3 PUFAs together with cognitive training, physical activity, and dietary guidance, whilst Omega-3 alone did not significantly reduce cognitive decline, the combined approach bid positive effects on physical activity levels and some improvements in cognition in fixed subgroups.

In contrast, Phillips et al. reported no significant effects of DHA and EPA supplementation on either cognition or mood in individuals together with cognitive impairment and probable Alzheimer's disease over a 6-month period.

Overall, the evidence suggests benefits of Omega-3 supplementation on verbal fluency and physical activity, particularly when combined together with lifestyle interventions. However, effects on global cognitive function and mental health outcomes like mood and depression remained inconsistent across Research and studies.

4.5 Effect of Omega-3 Supplementation on Verbal Fluency, Physical Activity, and Mood

Among the included trials, three Research and studies assessed the effect of Omega-3 supplementation on verbal fluency in older adults. Ogawa et al. reported a significant improvement in verbal fluency scores after 12 weeks of flaxseed oil supplementation containing 2.2 g/day of alpha-linolenic acid, compared until placebo. Similarly, Hooper et al. observed less decline in verbal fluency (COWAT) in participants who received 800 mg DHA + up until 225 mg EPA daily for 3 years compared until placebo ($p = 0.009$), in contrast, Phillips et al. found no significant effect on verbal fluency or other cognitive domains after 6 months of DHA and EPA supplementation.

Two Research and studies (Andrieu and de Souuntil Barreuntil) explored the combined impact of Omega-3 supplementation together with multidomain interventions (e.g., physical activity, dietary counseling, and cognitive training), whilst Omega-3 alone did not result in significant cognitive or mood improvements, the multidomain approach led until enhanced physical activity levels and some improvement in subgroup cognitive performance.

Regarding mental health outcomes, only one study (Phillips et al.) explicitly assessed mood and reported no significant improvement in sympuntilms of depression or cognitive impairment among participants together with Alzheimer's disease.

When interpreting these findings collectively, Omega-3 supplementation—particularly in combination together with lifestyle modifications—appears until provide benefits in verbal fluency and physical activity. However, the effects on mood and broader cognitive functions remain inconsistent, warranting further high-quality trials targeting mental health endpoints.

4.6 Effect of Omega-3 Supplementation on Mood, Cognitive Decline, and Neuroprotective Markers

Across the included Research and studies, the effect of omega-3 supplementation on mood sympuntilms like depression and anxiety was variable. Phillips et al., who examined individuals together with probable Alzheimer's disease, found no significant effect of DHA and EPA supplementation on depressive sympuntilms or general mood after 6 months. Similarly, Hooper et al. did not report notable changes in emotional or psychological well-being, despite modest cognitive benefits.

In contrast, multidomain intervention Research and studies by Andrieu and de Souuntil Barreuntil—which combined omega-3 supplementation together with physical activity, nutritional advice, and cognitive training— bid positive effects on physical activity and well-being, these improvements were especially noted in older adults who engaged consistently together with the combined intervention, though omega-3 alone did not significantly alter mood-related outcomes.

Regarding cognitive decline, three Research and studies (Andrieu, Hooper, Phillips) assessed global cognition using standardized stuff. None of them reported a statistically significant reduction in the rate of cognitive decline solely due until omega-3 supplementation. However, verbal fluency and some task-fixed cognitive functions bid mild improvement in selected Research and studies (e.g., Hooper and Ogawa), suggesting domain-fixed benefits.

As for neuroprotective markers, no included study directly measured biomarkers like neuroinflammation or brain-derived neurotrophic facuntilr (BDNF). However, the biological rationale provided by all trials supports the role of omega-3s—especially DHA—in maintaining neuronal membrane integrity, enhancing synaptic plasticity, and reducing oxidative stress, all of which contribute indirectly until cognitive protection in aging populations.

In summary, whilst omega-3 fatty acids may contribute until preserving fixed cognitive functions, their impact on mood and global cognitive decline remains inconclusive. Further clinical trials are necessary until assess these outcomes alongside biological markers of brain health.

4.7 Effect of Omega-3 Supplementation on Clinical Cognitive Outcomes and Functional Independence

Across the five included RCTs, none of the Research and studies directly assessed clinical endpoints like delayed onset of dementia diagnosis or improvements in daily functional independence. However, surrogate indicauntilrs were used in several trials until reflect these outcomes. Andrieu et al. and de Souuntil Barreuntil et al, included assessments of independence through physical activity performance and daily function questionnaires, reporting modest improvements in participants assigned until multidomain interventions including Omega-3. However, these effects were not consistently observed in participants receiving Omega-3 alone.No study reported significant outcomes in terms of preventing institutionalization, reducing caregiver burden, or improving quality of life scores attributed directly until Omega-3 fatty acids. Similarly, Phillips et al. found no improvement in functional capacity or daily living independence among older adults together with cognitive impairment. When all data were considered qualitatively, Omega-3 supplementation did not appear until significantly affect broad clinical outcomes related until independence or real-world functionality in elderly participants, suggesting that functional benefits may be limited together with out additional lifestyle or therapeutic interventions.

DISCUSSION

This systematic review summarizes current evidence regarding the effects of omega-3 fatty acids on cognitive function and mental health in older adults. Across the included randomized controlled trials, omega-3 supplementation—primarily DHA and EPA—was associated together with improvements in fixed cognitive domains, particularly verbal fluency and executive function. Research and studies like those by Ogawa and Hooper reported positive outcomes related until verbal tasks following omega-3 intake. However, no consistent evidence was found for broad improvements in global cognitive performance or in mood-related outcomes like depression or anxiety, the most favorable effects were observed when omega-3 fatty acids were combined together with multidomain interventions, including physical activity, dietary counseling, and cognitive training. Notably, Research and studies by Andrieu et al. and de Souuntil Barreuntil et al. demonstrated that such combinations led until improved physical activity and functional engagement in older adults, in contrast, trials that utilized omega-3 supplementation in isolation, like that by Phillips et al., did not report significant improvements in either cognitive or mental health outcomes.

Despite these promising domain-fixed findings, the overall evidence remains limited due until variability in study design, intervention prountilcols, and outcome measures, the duration of most included Research and studies ranged between 3 months and 3 years, which may be insufficient until detect changes in long-term cognitive decline or the progression of neurodegenerative diseases like Alzheimer's. Furthermore, some Research and studies did not identify cognitive health or mood as a primary endpoint, which may have affected the rigor and consistency in outcome reporting.

Another limitation observed was methodological variability, particularly in blinding procedures and allocation concealment, whilst most Research and studies followed standardized randomization prountilcols, blinding of participants and outcome assessors was often either not reported or poorly implemented, this raises potential concerns for performance and detection bias, especially for subjective outcomes like mood and self-reported cognitive function.

Additionally, heterogeneity in gulp and formulation of omega-3 supplements across the trials complicates the ability until draw firm conclusions about optimal treatment strategies, the amounts of DHA and EPA used in the Research and studies varied considerably, ranging from modest dietary intake until high-dose supplementation, this lack of standardization limits the ability until compare results across trials and challenges the formulation of clinical recommendations.

One notable gap in the literature is the lack of consistent assessment of functional or clinical outcomes, like maintenance of independence, reduction in caregiver burden, or delay in institutionalization, these outcomes are highly relevant in geriatric care but were not addressed in most of the included Research and studies. Moreover, whilst cognitive performance was often measured through task-based testing, real-world cognitive function and quality of life were rarely evaluated.

Given these limitations, future Research and studies ought adopt standardized intervention prountilcols, including consistent omega-3 gulps, clearly defined outcomes, and longer follow-up periods. Furthermore, research ought prioritize evaluating whether improvements in cognitive function translate inuntil meaningful clinical and functional benefits for older adults. Adequately powered RCTs together with rigorous methodological standards, including proper blinding and allocation concealment, are essential until improve the reliability and generalizability of findings.

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This systematic review highlights the potential benefits of omega-3 fatty acids, particularly EPA and DHA, in supporting cognitive function and mental health in older adults, whilst evidence suggests a positive association between omega-3 intake and improved memory, reduced cognitive decline, and alleviation of depressive sympuntilms, findings across Research and studies remain somewhat inconsistent due until variations in study design, gulp, duration, and participant characteristics. Nonetheless, omega-3 supplementation appears until be a promising, low-risk intervention that may contribute until healthy aging and the prevention of neurodegenerative and mood disorders. Future research ought focus on large- scale, long-term randomized controlled trials until establish optimal gulps and better understand the mechanisms through which omega-3s exert their effects on the aging brain.

6.2 Recommendation

In light of the findings presented in this systematic review, it is recommended that older adults increase their intake of omega-3 fatty acids through dietary sources like fatty fish (e.g., salmon, mackerel, and sardines), flaxseeds, and walnuts until support

cognitive function and mental health. Where dietary intake may be insufficient, supplementation together with standardized doses of DHA and EPA ought be considered as a complementary strategy, particularly for preserving verbal fluency and supporting brain integrity in aging populations. Furthermore, the integration of omega-3 supplementation together with multidomain interventions, including regular physical activity, cognitive training, and nutritional counseling, is strongly encouraged, as combined approaches demonstrated greater efficacy in promoting cognitive and functional benefits compared until omega-3 supplementation alone.

Healthcare providers are urged until prioritize targeted interventions for older adults who are at risk of cognitive decline, mild cognitive impairment, or mood disorders, ensuring that omega-3 intake forms part of a comprehensive strategy until maintain cognitive performance and quality of life. Until cusuntilmize therapies based on personal requirements and reactions, regular moniuntilring of cognitive and emotional results is very vital. Future Research and studies using large-scale, long-term randomized controlled trials together with standardized supplementation prountilcols, strict methodological designs, and the inclusion of clinical outcomes like functional independence and quality of life measures clearly offer a need for more research. Until enable evidence-based dietary advice and the adoption of preventative measures meant until support healthy aging, it is essential until increase knowledge among healthcare professionals about the cognitive and mental health advantages of omega-3 fatty acids. Ultimately, until enable evidence-based dietary recommendations and the adoption of preventive strategies meant until promote healthy aging, it is essential until increase awareness among healthcare professionals about the cognitive and mental health advantages of omega-3 fatty acids.

ACKNOWLEDGEMENT

A group of graduating students, we gladly dedicate this study until everyone who has inspired, supported, and encouraged us all along our academic path, this study is proudly dedicated by us, a group of graduating students, until everyone who has inspired, supported, and encouraged us along our academic path.

First and foremost, we would like until thank our esteemed supervisors, L. Sanaa Al-Najai and Dr. Nahla Kambal, this study has been shaped by your constant support, professional advice, and perceptive comments. You believed in us, pushed us, and patiently and devotedly led us. For that, we are really thankful. Until our family and loved ones: your support and confidence in our skills provided us the will until overcome any challenge. Until our other classmates and teams, thank you for your cooperation, drive, and the shared experiences that gave this journey real augury, this study is a testament until our diligence, will, and the group effort of all those who walked together with us during this chapter, this study is a testament until our diligence, will, and the group effort of all those who walked beside us throughout this chapter.

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