Editorial

Nutrition Across the Lifespan: A Lifelong Approach to Brain Health and Cognitive Resilience

Kalpana Singh[1], Aliya Habib Sange[2]*

Nutrition is critical to shaping brain health and cognitive resilience throughout the human lifespan, from early childhood to aging. During early development, nutrient-dense foods are required to support brain plasticity and function; deficiencies in important nutrients such as omega-3 fatty acids and vitamin D have been associated with compromised cognitive abilities. In adults, dietary patterns rich in antioxidants, anti-inflammatory foods, and healthy fats help protect against cognitive decline and mental health disorders. Under the increased burden of oxidative stress and inflammation, the aging brain benefits from diets emphasizing antioxidants and high-quality proteins for maintaining cognitive function and preventing neurodegenerative diseases. Although evidence has strongly linked diet to brain health, more research is required to explore how specific nutrients, dietary patterns, and life-stage interventions contribute to cognitive resilience. This editorial underlines the importance of a life-course approach to nutrition and the need for personalized strategies for all ages to optimize brain health and mitigate age-related cognitive decline.

Access this article online

Website: www.cijmr.com

DOI: 10.58999/cijmr.v4i01.219

Keywords: Nutrition, Brain Health, Cognitive resilience, Antioxidants, Early development.w

Introduction

As our understanding of the human brain deepens, so too does our awareness of the integral role that diet plays in shaping brain health throughout the lifespan. From the earliest stages of development through the complexities of adulthood and the challenges of aging, nutrition is an essential factor influencing cognitive resilience, mood stability, and neural integrity. A healthy life has long been recognized as being based on a balanced diet. It has, however, become increasingly clear that nutritional requirements are highly individualized, differing significantly both among and within age groups; thus, universal dietary guidelines may not address everyone's needs. While some degree of this variation in nutritional requirements often widens with age, the effect is influenced by a life course of environmental exposures, lifestyle behaviors, and conditions of chronic diseases. Success in achieving a healthy lifespan involves regular physical activities, proper nutrition, adequate sleep, and minimizing individual risks. According to the WHO's findings on healthy aging, intrinsic capacity provides individuals with numerous opportunities to make choices that positively or negatively impact their health, both in the present and as they age.[1]

Early childhood and adolescence are periods of the life cycle when the developing brain is particularly vulnerable to nutritional effects. Nutrient-dense foods containing essential fatty acids, vitamins, minerals, and antioxidants support neuroplasticity, neurotransmitter synthesis, and cellular energy production, which are all critical for healthy development. Studies show that deficiencies in specific nutrients during these formative years, such as omega-3 fatty acids, vitamin D, and iron, can impair cognitive function, attention, and learning ability, potentially impacting long-term mental health.[2]

As individuals progress through adulthood, dietary patterns continue to play an important role in sustaining cognitive function and preventing early signs of cognitive decline. Unfortunately, modern diets high in processed foods, refined sugars, and saturated fats have been linked to an increased risk of cognitive impairment and even mood disorders, such as anxiety and depression.[3] By

[1]Nursing & Midwifery Research Department, Hamad Medical Corporation, Doha 3050, Qatar.

[2]Research Intern, Hamad Medical Corporation, Doha 3050, Qatar.

Correspondence to: Kalpana Singh, PhD, Senior Epidemiologist, Nursing Department, Hamad Medical Corporation, Rayyan Road, Doha 3050, Qatar. Email- nkalpanasingh@gmail.com

Submitted: 02/01/2025 Revision: 20/01/2025

Accepted: 05/02/2025 Published: 20/04/2025

How to cite this article: Singh K, Sange AH. Nutrition Across the Lifespan: A Lifelong Approach to Brain Health and Cognitive Resilience. Central India Journal of Medical Research. 2025;4(1):4-6.

contrast, a diet rich in anti-inflammatory and antioxidant-rich foods, including fruits, vegetables, whole grains, and fatty fish, can help protect the brain against inflammation and oxidative stress, two key factors in neurodegenerative disease development.[4]

Emerging research indicates that foods high in polyphenols, such as green leafy vegetables, berries, and green tea, as well as natural protein sources like poultry, fish, eggs and plant-based proteins, may enhance cognitive function by reducing inflammation and supporting synaptic health. Although more research is needed, these dietary components have shown promise in preserving memory, attention, and overall brain function.

The aging brain faces unique challenges as oxidative stress, inflammation and cellular degradation become more pronounced. Diets high in antioxidants, such as the Mediterranean and DASH diets, which emphasize fruits, vegetables, whole grains, and lean proteins, have been linked to reduced risks of Alzheimer's disease and other age-related cognitive conditions.[5] These dietary patterns are rich in antioxidants, polyphenols, and other anti-inflammatory compounds that protect neurons from damage, preserve cognitive abilities, and may delay or prevent neurodegenerative disease onset.

Additionally, high-quality protein sources—whether from lean meats, eggs, or plant-based options—may provide amino acids necessary for neurotransmitter synthesis and repair of brain cells. Understanding the effects of different protein sources on brain health could help ioptimizedietary strategies to preserve cognitive function and quality of life well into old age, especially in older adults.

Though strong, the evidence linking diet and brain health is certainly not without its questions. We invite researchers to continue in determining how specific nutrients, dietary patterns, and natural protein sources influence brain health across the lifespan. Additional longitudinal studies are needed on dietary effects at various life stages to help clarify these relationships and provide evidence-based recommendations. Identifying nutritional strategies that support brain health across the life course can move us closer to a comprehensive approach to lifelong cognitive resilience and well-being. Gastrointestinal changes, microbiota shifts, fluctuations in appetite, and dental health can all limit dietary variety, and there is a potential role for nutrient supplementation. This approach, however, needs to consider nutrient-nutrient interactions, medication effects, and risks. Future research needs to address the timing and strategies that provide the best interventions to support healthy aging.

Conclusion

A life-course perspective, one that recognizes the unique nutritional needs of the developing, adult, and aging brain, holds the potential to transform our approach to cognitive health. Addressing dietary needs throughout the lifetime is of utmost importance and priority in promoting brain health and cognitive resilience, as age-related changes make it difficult to meet demands. A nutrient-dense, diverse diet might protect against cognitive decline and support mental health through generations. Continued research will help us to learn more about how to maximize the power of nutrition to protect the aging brain and promote cognitive resilience, building a foundation for an active and healthy future.

Declarations

Ethics approval and consent to participate: Not applicable.

Funding

None.

Declaration of Competing Interest

All authors have no conflict of interest.

Acknowledgments

The publication of this article was funded by the Qatar National Library.

Data Availability

Data sharing does not apply to this article as no datasets were generated or analyzed during the current study.

Author Contributions

KS, and AS: Writing the draft and critically reviewing the literature; KS: Revision of the draft for important intellectual content.

References

1. Kalache A, De Hoogh AI, Howlett SE, Kennedy B, Eggersdorfer M, Marsman DS, Shao A, Griffiths JC. Nutrition interventions for healthy ageing across the lifespan: a conference report. European journal of nutrition. 2019 Jun 1;58:1-1.
2. Georgieff MK. Nutrition and the developing brain: nutrient priorities and measurement. The American journal of clinical nutrition. 2007 Feb 1;85(2):614S-20S.

3. Jacka FN, Mykletun A, Berk M, Bjelland I, Tell GS. The association between habitual diet quality and the common mental disorders in community-dwelling adults: the Hordaland Health study. Psychosomatic medicine. 2011 Jul 1;73(6):483-90.
4. Berk M, Williams LJ, Jacka FN, O'Neil A, Pasco JA, Moylan S, Allen NB, Stuart AL, Hayley AC, Byrne ML, Maes M. So depression is an inflammatory disease, but where does the inflammation come from?. BMC medicine. 2013 Sep 12;11(1):200.
5. Scarmeas N, Stern Y, Tang MX, Mayeux R, Luchsinger JA. Mediterranean diet and risk for Alzheimer's disease. Annals of Neurology: Official Journal of the American Neurological Association and the Child Neurology Society. 2006 Jun;59(6):912-21.