Neurocognitive effects of proanthocyanidin in Alzheimer's disease: a systematic review of preclinical evidence

A. Reshma[1], A. Subramanian[1], V. Kumarasamy[2], T. Tamilanban[1,3,4,5], M. Sekar[6], S.H. Gan[6], V. Subramaniyan[7], L.S. Wong[4], N.N.I.M. Rani[8], and Y.S. Wu[9]

[1]Department of Pharmacology, SRM College of Pharmacy, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu, Tamilnadu, India
[2]Department of Parasitology & Medical Entomology, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Kuala Lumpur, Malaysia
[3]Department of Occupational Safety and Health, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia
[4]Faculty of Health and Life Sciences, INTI International University, Nilai, Malaysia
[5]Department of Pharmacology, Faculty of Medicine, MAHSA University, Bandar Saujana Putra, Selangor, Malaysia
[6]School of Pharmacy, Monash University Malaysia, Bandar Sunway, Selangor, Malaysia
[7]Department of Medical Sciences, School of Medical and Life Sciences, Sunway University, Bandar Sunway, Selangor, Malaysia
[8]Faculty of Pharmacy and Health Sciences, Royal College of Medicine Perak, Universiti Kuala Lumpur, Perak, Malaysia
[9]Sunway Microbiome Centre & Department of Biological Sciences, School of Medical and Life Sciences, Sunway University, Subang Jaya, Selangor, Malaysia

Abstract

Cognitive disorders and dementia largely influence individual independence and orientation. Based on the Alzheimer's Disease International (ADI) estimation, approximately 75% of individuals with dementia are undiagnosed. In fact, in some low- and middle-income countries, the percentage is as high as 90%. In this systematic review, which is based on PRISMA guidelines, we aim to identify the mechanism of action of proanthocyanidin. Finding a natural product alternative as a potential nootropic can help increase the number of armamentariums against dementia and other cognitive impairments. In this preclinical research, we determined the effect of proanthocyanidins on Alzheimer's disease (AD) by searching electronic bibliographic databases like Scopus, Proquest, ScienceDirect, PubMed, and Google. There was no imposed time limit. However, the search was limited to only English articles. The review protocol is registered on PROSPERO as CRD42022356301. A population, intervention, control, and outcomes (PICO) technique was utilized for report inclusion, and all reports were assessed for risk of bias by using the SYRCLE's RoB tool. The article's bibliographic information, induction model, type of proanthocyanidins, animal strain/weight/age, and outcome measurements were acquired from ten papers and are reported here. Further analysis was validated and determined for the review. The included studies met the review's inclusion criteria and suggested that proanthocyanidins have a neurocognitive effect against AD. Additionally, the effectiveness of proanthocyanidins in reducing oxidative stress, acetylcholinesterase activity, amyloid beta, its efficacy in alleviating superoxide dismutase, cognitive properties, and in facilitating cholinergic transmission in various models of AD has been collectively observed in ten studies.

Key words: Alzheimer's disease; Cognition; Dementia; Flavonoids; Proanthocyanidin, Human health

Introduction

The World Health Organization (WHO) reports that there are approximately 10 million new cases of dementia every year, impacting 55 million people globally. In low- and middle-income nations, Alzheimer's disease (AD) accounts for almost 60% of all dementia cases. The prevalence is anticipated to increase to 78 million in 2030 and 139 million in 2050. AD, which accounts for 60–70% of dementia cases, is the most common type (1). AD is a neurodegenerative condition that worsens over time (Figure 1). It is characterized by the presence of neurofibrillary tangles (NFTs) inside neurons and senile plaques composed of the amyloid-beta (Aβ) peptide,