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7 Acetylcholinesterase inhibitory activity of spices and culinary herbs

7.1 Introduction

Cholinesterases play an important role in the area of neurobiology, toxicology, and pharmacology, out of which acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) are vital in nerve impulse transmission [1]. The enzyme AChE catalyzes the hydrolysis of the ester bond of acetylcholine to terminate the nerve impulse transmission at the cholinergic synapses [2]. Compounds that are capable of suppressing the activity of AChE are known as AChE inhibitors or anticholinesterases. Anticholinesterases inhibit AChE enzyme, thereby increase the levels of acetylcholine near the synaptic cleft of cholinergic neurons. Prolonged availability of acetylcholine facilitates the cholinergic nerve impulse transmission process in patients with cognitive decline. AChE inhibitors are used to treat many pathological conditions, including Alzheimer's disease (AD), Parkinson's disease, myasthenia gravis, postural tachycardia syndrome, etc. AD is one of the progressive neurodegenerative diseases that affect memory and cognitive behaviour [3–4]. People of age over 60 years are affected most and it is one of the major causes of dependency among elderly people. About 5% of the world's elderly population (47 million people) was affected with dementia in 2015, and this figure is predicted to increase to 75 million in 2030 and 132 million by 2050. At present nearly 60% of people with dementia live in low- and middle-income countries [5].

There are many synthetic and natural anticholinesterases. Donepezil, tacrine, metrifonate and galantamine are anticholinesterases approved by the United States Food and Drug Administration (FDA) and currently in use. Galantamine is a plant-derived natural product [6]. In traditional medicine, many plants have been used to treat cognitive disorders. A large number of plants have been screened using well-established *in vitro* methods. Ethnopharmacological approach and bioassay-guided fractionation have facilitated the identification of potential anticholinesterases [7]. The majority of plant-derived compounds with anticholinesterase activity can be

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