



“Evaluation Of Antioxidant Property Of *Rosmarinus Officinalis* (L.) And *Vigna Radiate* Against Scopolamine Induce Memory Dysfunctioning In Albino Rats”

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ABSTRACT:

Objective: The current study investigated that defensive effect of ethanolic extract of *Rosmarinus officinalis* leaves and *Vigna radiata* seeds on learning and memory functions in scopolamine induced memory deficits rats including the effects on various body organs.

Methods: In scopolamine (SCO) induced cognitive deficit rat model Wistar albino rats weighing 150-200 g were divided into 7 groups (6 animals per group). After 30 days of treatment animals were at once scarified, the estimation of markers of oxidative stress in the brain was measured. The protective and cognitive enhancing effects of ROE & *Vigna* seed Extract (VRE) on cognitive shortfall rats induced by scopolamine were investigated by assessing the elevated plus maze, the passive avoidance test and the Morris water maze test. In order to prove the underlying mechanisms of memory enhancing effects of ROE and *Vigna* seed Extract (VRE), activities of AChE, oxidative stress markers such as GSH and MDA were measured.

Results: ROE and VRE at a dose 200 mg/kg may be useful for the cognitive improvement via regulation of cholinergic marker enzyme activities and the antioxidant defense system in SCO induced cognitive deficit rats. ROE and VRE at a dose 200 mg/kg may be protective for the brain via antioxidant defense system in rats.

In acute toxicity study oral dose of 2000 mg/kg of the ethanolic extract did not produce mortality or changes in the general behavior and gross appearance of internal organs of mice and rats. In sub acute toxicity study, ethanolic extract and methanolic extract was evaluated at 100, 200 or 1000 mg/kg/day, orally for 30 days in rats.

Conclusion: These conclusions suggest the possible neuroprotective role for *Rosmarinus officinalis* and *Vigna radiata*, therefore it seems that *Rosmarinus officinalis* may show to be an anti Alzheimer mediator in view of its memory enhancing property observed in the present study.

Keywords: *Rosmarinus officinalis*(ROE), *Vigna radiata* Extract (VRE), Cognitive Functions, Scopolamine, TBARS, Memory.

INTRODUCTION-

The Ayurvedic system, a traditional system of medicine that originated in India over 3,000 years ago, offers a holistic approach to the treatment of cognitive dysfunction. Ayurveda focuses on balancing the body, mind, and spirit to promote overall well-being and mental health. Here, we'll explain the Ayurvedic approach to treating cognitive dysfunction and provide references to support this traditional system of medicine. *Rosmarinus officinalis* is widely studied for its numerous pharmacological properties, and reported to have rich phytochemical contents. It possesses cardenolides, triterpenes, flavonoids, sterols, saponins, diterpenes, resins, tannins, alkaloids and steroids. Some of these chemical contents are well known to be toxic and act on the nervous system. In the pharmacopeia of Burkina Faso, it appears that *Rosmarinus officinalis* is one of plants specifically used by the older (experienced) traditional healers because of its potential toxicity.

The study aim is "To Evaluate Protective effect of *Rosmarinus officinalis* leaves and *Vigna radiata* seed extract against Scopolamine-induced cognitive dysfunctions in Albino Rats" is highly relevant for several compelling reasons. Cognitive dysfunctions and memory impairments, often induced by factors like scopolamine, are prevalent in neurodegenerative disorders, such as Alzheimer's disease. This research seeks to explore the potential of natural remedies, specifically *Rosmarinus officinalis* and *Vigna radiata* seed extract, to ameliorate these cognitive deficits. If successful, this could have far-reaching implications for enhancing cognitive health and the overall quality of life for those affected by such conditions.

PLANT-I

MORPHOLOGY AND MICROSCOPY:

Rosemary is a small evergreen shrub, with an erect stem, divided into many long, slender, ash-colored branches. The leaves are numerous, sessile, opposite, about 2.5 cm. long, rigid, linear, entire, obtuse at the summit, folded background at the edges, of a firm consistence, smooth and green on the upper surface, whitish, woody and glandular beneath. The flowers are axillary, pale blue or white.¹⁰

Rosmarinus officinalis L. is a medicinal plant that belongs to the Lamiaceae family and is commonly known as rosemary. Besides the culinary uses due to the characteristic aroma, this plant is also widely employed by indigenous populations, where it grows wild.



Fig: *Rosmarinus officinalis* plant

Rosemary is an aromatic evergreen shrub with leaves similar to needles. It is native to the Mediterranean and Asia, but is reasonably strong in cool climates. Special cultivars like 'Arp' can withstand winter temperatures down to about -20 °C. It can hold up droughts, surviving a severe lack of water for long periods. In some parts of the world, it is considered a potentially invasive species. The seeds are often difficult to start, with a low germination rate and relatively slow growth, but the plant can live as long as 30 years.⁷

Forms range from upright to trailing; the upright forms can reach 1.5 m tall, rarely 2 m, the leaves are evergreen, 2–4 cm long and 2–5 mm broad, green above, and white below, with dense, short, woolly hair.

CLASSIFICATION:

Scientific name: *Salvia rosmarinus*

Higher classification: Sage

Family: Lamiaceae

Rank: Species

Order: Lamiales

Kingdom: Plantae

CHEMICAL CONSTITUENTS:

Phytochemical Studies exposed that rosemary contains **terpenoids, essential oils, alkaloids and flavonoids**. Chemical analysis of different kinds of rosemary extracts composition reveals that the most potent active components are triterpenes, phenolic diterpenes and phenolic acids with rosmarinic acid, carnosic acid, rosmanol, carnosol, ursolic acid and betulinic acid. According to the documents, rosmarinic acid and carnosic acid possess the most medicinal effects among the mentioned phenolic compounds i.e. anti-inflammatory and anti-oxidants.

PLANT-II**MORPHOLOGY AND MICROSCOPY:**

Mung bean (*Vigna radiata* L.) is an important pulse consumed all over the world, especially in Asian countries, and has a long history of usage as traditional medicine. It has been known to be an excellent source of protein, dietary fiber, minerals, vitamins, and significant amounts of bioactive compounds, including polyphenols, polysaccharides, and peptides, therefore, becoming a popular functional food in promoting good health. The mung bean has been documented to ameliorate hyperglycemia, hyperlipemia, and hypertension, and prevent cancer and melanogenesis, as well as possess hepatoprotective and immunomodulatory activities.



Fig: *Vigna radiata* Plant

Scientific Classification:

- Kingdom: Plantae
- Phylum: Angiosperms
- Class: Eudicots
- Order: Fabales
- Family: Fabaceae
- Genus: *Vigna*
- Species: *radiata*

Common Names: Mung bean, Green gram, Moong bean.

- Plant Height: Mung bean plants typically range from 30 to 100 cm in height.
- Leaves: The leaves are trifoliate, with ovate leaflets.
- Flowers: The flowers are small, yellow, and borne in clusters on long stems.
- Fruits: The pods are cylindrical and contain 10-15 small, green, or black seeds.

Chemical Constituents: The mung bean rich in polyphenolic constituents like, Phenolic acids (1.81-5.97mg/gm), Flavonoid (1.49-1.78mg/gm) and Tannins (1.00-5.75mg/gm)^{9,11}.

PHARMACOLOGICAL PROFILE:

Antioxidants and anti-inflammatory compounds- Rosemary is a rich source of antioxidants and anti-inflammatory compounds, which are thought to help boost the immune system and improve blood circulation. Laboratory studies have shown rosemary to be rich in antioxidants, which play an important role in neutralizing harmful particles called free radicals.³

Improving digestion- In Europe, rosemary is often used to help treat indigestion. In fact, Germany's Commission E has approved rosemary for the treatment of indigestion. However, it should be noted that there is currently no meaningful scientific evidence to support this claim.

Enhancing memory and concentration- According to research outlined in *Therapeutic Advances in Psychopharmacology Trusted Source*, the aroma from rosemary can improve a person's concentration, performance, speed, and accuracy and to a lesser extent, their mood.

Neurological protection- Scientists have found that rosemary may also be good for your brain. Rosemary contains an ingredient called carnosic acid, which can fight off damage by free radicals in the brain.

Prevent brain aging- Some studies have suggested that rosemary may significantly help prevent brain aging. Trusted Source The therapeutic ability of rosemary for prevention of Alzheimer's shows promise, but more studies are needed.

Cancer- Research published in *Oncology Reports Trusted Source* found that "crude ethanolic rosemary extracts (RO)" slowed the spread of human leukemia and breast carcinoma cells."

Skin Flap Survival- Skin flaps are used in the reconstruction of soft tissues and large wound defects. This technique has been employed in plastic surgery, and its efficacy is dependent on the location of the wound and extent of the defect.

Anti-inflammatory Activity-The inflammatory activity of *R. officinalis* extract is attributed to the presence of carnosol and carnosic acid and of ursolic, oleanolic, and micromeric acids.

Antifungal Treatment- Dermatophytes are the most common agents causing topical mycoses. The World Health Organization estimates that 20% of the global population is affected by dermatomycoses the prevalence of these diseases tends to increase with age and is dependent on the climate and location. *R. officinalis* was reported to be active against dermatophytes in vivo.⁴ The antifungal activity of rosemary essential oil was tested against *Candida albicans*, *Candida dubliniensis*, *Candida parapsilosis*, and *Candida krusei*^{10,11}.

Literature Review:

A literature survey was undertaken to find out the different Phytoconstituents and pharmacological activities of *Rosmarinus officinalis* (L.) and Vigna. The details are given as under:

- Mishra et al.(2020) reported that “Mild cognitive impairment (MCI) is an intermediate stage between normal cognitive alterations associated with aging and dementia. MCI individuals identified as having a faster rate of progression to dementias. Main body: There is different type of risk factors for MCI progression include greater cognitive deficits at baseline, ApoE4 carrier status, brain volume changes, cerebrospinal fluid (CSF) changes, and the presence of behavioral and psychological symptoms. Refinements in the diagnostic criteria for MCI and the identification of biomarkers result in the development of possible prevention and treatment strategies. Conclusion: In the present study, we summarize the epidemiology, neuropsychological aspect, management and preventive treatment for MCI. As, better understanding of MCI could help in minimizing risk of MCI.”[100]
- Amini et al.,(2022) reported that “Automated computational assessment of neuropsychological tests would enable widespread, cost-effective screening for dementia. Methods: A novel natural language processing approach is developed and validated to identify different stages of dementia based on automated transcription of digital voice recordings of subjects' neuropsychological tests conducted by the Framingham Heart Study (n = 1084). Transcribed sentences from the test were encoded into quantitative data and several models were trained and tested using these data and the participants' demographic characteristics. Results: Average area under the curve (AUC) on the held-out test data reached 92.6%, 88.0%, and 74.4% for differentiating Normal cognition from Dementia, Normal or Mild Cognitive Impairment (MCI) from Dementia, and Normal from MCI, respectively. Discussion: The proposed approach offers a fully automated identification of MCI and dementia based on a recorded neuropsychological test, providing an opportunity to develop a remote screening tool that could be adapted easily to any language.”[130]
- Winblad et al.(2004) reported that “The First Key Symposium was held in Stockholm, Sweden, 2-5 September 2003. The aim of the symposium was to integrate clinical and epidemiological perspectives on the topic of Mild Cognitive Impairment (MCI). A multidisciplinary, international group of experts discussed the current status and future directions of MCI, with regard to clinical presentation, cognitive and functional assessment, and the role of neuroimaging, biomarkers and genetics. Agreement on new perspectives, as well as recommendations for management and future research were discussed by the international working group. The specific recommendations for the general MCI criteria include the following: (i) the person is neither normal nor demented; (ii) there is evidence of cognitive deterioration shown by either objectively measured decline over time and/or subjective report of decline by self and/or informant in conjunction with objective cognitive deficits; and (iii) activities of daily living are preserved and complex instrumental functions are either intact or minimally impaired.”[110]
- Kim et al.,(2020) reported that “As the average life expectancy continues to increase, interest in cognitive impairment is increasing. Nowadays, as social media expands its reach, academic research is spreading

through social media, changing the way and speed by which research is propagated and also who consumes this content. Therefore, using Altmetric, a new web-based set of metrics that analyzes the impact of content on social media platforms, we investigated the characteristics of influential research articles on the topic of cognitive impairment in social media. The journal “Neurology” was the most cited journal for cognitive impairment articles shared on social media. Among the various types of cognitive impairment, most articles were related to dementia (all subtypes), Alzheimer's disease, and aging. The most common article type was original scientific paper, especially cohort study. The most popular topic was the identification of protective or risk factors for cognitive impairment. The characteristics of articles with a high Altmetric Attention Score were somewhat different from those of articles with a high number of traditional citations. Social media had the disadvantage that it was difficult to verify the authenticity of the primary source in question, but the advantage was that it could immediately determine the trends regarding how information about that source was being shared and consumed. Therefore, it may be advisable to use Altmetric analysis in combination with traditional methods of evaluating the research articles to understand the dissemination of scientific research and to direct future research.”[108]

- Andriambelason et al.,(2014) reported that “There is a growing body of evidence pointing to the pivotal role of alpha-7 nicotinic acetylcholine receptor ($\alpha 7$ nAChR) dysfunction in cognitive disorders such as Alzheimer's disease or schizophrenia. This study was undertaken to establish and characterize an in vivo model for cognitive disorder secondary to the blockade of $\alpha 7$ nAChR by its specific antagonist, methyllycaconitine (MLA). The results show that MLA elicited cognitive dysfunction as assessed by reduced spontaneous alternation of mice in the T-maze. The maximal effect of MLA produced 25–30% reduction in the spontaneous alternation of mice, a level comparable with that induced by the muscarinic antagonism of scopolamine. Donepezil and galantamine fully reversed both MLA and scopolamine-induced cognitive dysfunction. However, the ED50 of donepezil and galantamine was significantly shifted to the left in the MLA- compared to scopolamine-treated mice (0.0005 and 0.002 mg/kg for donepezil; 0.0003 and 0.7 mg/kg for galantamine). Moreover, memantine elicited marked reversion of cognitive dysfunction (up to 70%) in MLA-treated mice while only a weak reversal effect at high dose of memantine (less than 20%) was observed in scopolamine-treated mice. The above findings indicate that MLA-induced cognitive dysfunction in the mouse is highly sensitive and more responsive to the current procognitive drugs than the traditional scopolamine-based assay. Thus, it can be of value for the preclinical screening and profiling of cognition-enhancing drugs.” [110]

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