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Antioxidant Property of *Rosmarinus Officinalis* (L.)And*vigna Radiate*

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Abstract: Objective: The current study investigated that defensive effect of ethanolic extract of Rosmarinus officinalis roots 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 seven 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 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, activities of AChE, oxidative stress markers such as GSH and MDA were measured. Hematological (WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, LYM and NEUT) and biochemical parameters (AST, ALT, ALP, ALBN, TB, TP, TG, BUN, creatinine and glucose) revealed either no or less alteration in the treated group for the observed the effects of body organs.Results: ROE 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 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 250, 500 or 1000 mg/kg/day, orally for 30 days in rats. Conclusion: These conclusions suggest the possible neuroprotective role for Rosmarinus officinalis, therefore it seems that Rosmarinus officinalismay show to be an anti Alzheimer mediator in view of its memory enhancing property observed in the present study.

Keywords: Rosmarinus officinalis, Cognitive Functions, Scopolamine, TBARS, Memory.

Introduction- 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 subacute toxicity study, ethanolic extract was evaluated at 250, 500 or 1000 mg/kg/day, orally for 30 days in rats. The behavioral response profile of the treated mice and rat was also evaluated along with other parameters such as, absolute and relative body weight along with relative weight of various organs. Biochemical and hematological parameters were analyzed in order to study the time-dependent effect and correlation of the extract. All treated animals did not show any signs of toxicity during the experimental period. There were no significant differences in the body and organ weights between the control and the treated group of mice and rats. Hematological (WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, LYM and NEUT) and biochemical parameters (AST, ALT, ALP, ALBN, TB, TP, TG, BUN, creatinine and glucose) revealed either no or less alteration in the treated group. Hence, the *Rosmarinus officinalis* was found to be safe in single dose acute and repetitive dose sub acute toxicity studies.

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.

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 backward at the edges, of a firm consistence, smooth and green on the upper surface, whitish, woolly and glandular beneath. The flowers are axillary, pale blue or white.[10]

Rosmarinus officinalis L. isa medicinal plant that belongs to theLamiaceaefamily and is commonly known as rosemary. Besides the culinary uses due to the characteristic aroma, this plantis also widely employed byindigenous populations, where it grows wild

Fig: *Rosmarinus officinalis* plant

Rosemary is an aromatic evergreen shrub with leaves similar to hemlock needles. It is native to the Mediterranean and Asia, but is reasonably hardy in cool climates. Special cultivars like 'Arp' can withstand winter temperatures down to about −20 °C. It can withstand droughts, surviving a severe lack of water for lengthy 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 of *Rosmarinus Officinalis*:

Scientific name: Salvia rosmarinus

Higher classification: Sage

Family: Lamiaceae

Rank: Species

Order: Lamiales

Kingdom: Plantae

Chemical constituents:

Phytochemical studies revealed 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, phenolicditerpenes and phenolic acids including 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.

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.*

Screening of extract of parts:

Leaves:

The extracts of Rosmarinus officinalis L.leaves at a dose of 150 and 300mg/kg, p.o for ten days showed significant hepatoprotective activity in rats, as judged from serum marker enzymes glutamate pyruvatetransaminase (SGPT), glutamate oxaloacetate transaminase (SGOT), alkaline phosphates (ALP) and serum parameters like albumin, total protein and bilirubin. Study concluded that Rosmarinus officinalis L. extracts having good hepatoprotective activity in dose dependent manner against CCl_4 induced hepatotoxicity in rats[6].

Blood samples were withdrawn and serum separated. Serum was used for the estimation of alkaline phosphatase, (ALP), total protein (TPL), aspartateaminotransaminase, (AST), alanineaminotransaminase (ALT), acid phosphatase (ACP), albumin (Alb) and total bilirubin (TB) levels. Biochemical parameters were assessed in method of calorimetric enzymatic using commercial kits (Boehringer Mannheim Diagnostica GmbH, Mannheim, Germany).

Histopathology Analysis- All the animals from each group were sacrificed for histopathological examinations of major internal organs. Organs such as liver, kidney were collected from all the animals. The collected organs were weighed and preserved in 10% neutral buffered formalin, then dehydrated in alcohols and embedded in paraffin. Five micron thickness of tissue sections were stained with haematoxylin and eosin (H and E) for histopathological study[2].

Literature Review:

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

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