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Pharmacological Activities of Martynia (*Martynia annua* Lin.): A Brief Review

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Authors' contributions

This work was carried out in collaboration between both authors. Author JKM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author VK managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The plant selected for present study is based on that there is no written and systematic study has been done. At present only few (not specific) phytochemical studies have been done on this plant. Therefore, this plant is having wide scope for detail pharma-cognostical and phytochemical investigations. The revival of interest in herbal therapy recently has been witnessed in many countries and use of herbal drugs is increased because of its potency and low toxicity. Now a days in the modern advance stage scientific method of evaluation using Phytochemical investigation to isolate the components present and pharmacological screening for their therapeutic efficacy have tend to rational usage of the medicinal plants.

Keywords: Martynia, pharmacological activities.

1. INTRODUCTION

The present study is aimed to investigate Pharmacognostical and Phytochemical parameters of *Martynia annua* Lin. (Family Martyniaccae) which is commonly known as scorpion (in Hindi, Bichchhu or Baghnukh), has been used from ancient time in traditional

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medicine in India. From the available literature, it is known that various parts of the plant possess different medicinal properties. The leaves are used in epilepsy and applied locally to tuberculosis glands of camel's neck, the juice of the leaves as a gargle for sore throat, fruit in inflammation, the leaf paste for wounds of domestic animals and the paste of the nut has beneficial effect when applied to the bites of venomous insects and [1] from the available literature, it is known that various parts of the plant possess different medicinal properties. The leaves are used in epilepsy and applied locally to tuberculosis glands of camel's neck, the juice of the leaves as a gargle for sore throat; fruit in inflammation, nut's paste has beneficial effect when employed to the bites of venomous insects, and the leaf's paste for wounds of domestic animals. The plant selected for present study is based on that there is no systematic study has been done. At present only few phytochemical studies have been done on this plant. Therefore this plant is having wide scope for detail Phytochemical and pharmacological investigations. According to the literature, the different parts of the *Martynia annua* Lin. leaves, roots, seeds, stems, flowers and whole plant have been used for various medicinal purposes like analgesic, anti- inflammatory, wound healing, anti-oxidant, antibacterial, stomach ache, hypertension, anti diabetic etc. The piper betel acted as a protective agent in the early phase of wound healing by increasing total protein content and wound contraction rate in experimentally induced diabetic rats [2]. The extracts of *A. nervosa* having significant wound healing effect in normal (topically treated) and diabetic (both topically and orally treated) rats. In later activity, the topically treated group showed more significant effect than the orally treated groups [3]. The anti-diabetic activity of methanol extracts of *M. annua* (MEMA) flower in streptozotocin (STZ) and Streptozotocin-Nicotinamide (STZ-NIC) induced diabetes in Wistar rats [4]. The methanolic extract of Catharanthusroseus L significantly increases the wound contraction in mice that promises to overcome the delayed wound healing in diabetic condition [5]. The Wound Healing Activity of Ethanolic Leave Extract of *Mimosa pudica* L. In Diabetic rats [6].

2. PHARMACOLOGICAL ACTIVITY

Plant is cultivated in Indian tribes throughout the south and is cooked and eastern table the nutritious dried seeds are rich in oil and protein and shelled and eastern. Sometime the oily seed are used to polish in some parts of the United States they grown pickled like cucumbers okra, either alone or with other vegetables in Mexico tribal prepare a tea from the fruits of *Martynia annua* Lin.

3. ANTIFERTILITY ACTIVITY

The anti-fertility activity of 50% ethanol extract of *Martynia annua* Lin. roots. It has significant decreases in the weights of seminal vesicle, testes, epididymides & ventral prostate. Moreover, reduction in the testicular sperm count, epididymal sperm count and motility, number of fertile males, the ratio between delivered and inseminated females and number of pups has been observed. Significant reduction in serum concentration of luteinizing hormone and Testosterone supports the anti-fertility activity of extracts. As no alterations in hematological parameters recorded so this plant is more beneficial as compared to other plants exhibiting anti-fertility activity [7].

4. ANALGESIC AND ANTIPYRETIC ACTIVITY

The analgesic effect of petroleum ether, chloroform, ethanol and aqueous extracts of *Martynia annua* Lin. fruits in Swiss albino mice by using tail flick & hot plate methods for antipyretic effect against brewers-yeast- induced hyperpyrexia in adult Wistar rats. The extracts having significant analgesic & antipyretic activity at 20 mg per kg. It has been also observed that the petroleum ether & chloroform extracts exhibits more analgesic and antipyretic activities as compared to other extract [8].

5. ANTHELMINTIC ACTIVITY

The Anthelmintic activity of the petroleum ether extract of *M. annua* roots against earthworms Pheritimaposthuma. This result show more potent anthelmintic activity compared to standard drug Albendazole [9].

6. ANTI-NOCICEPTIVE ACTIVITY AND CENTRAL NERVOUS SYSTEM (CNS) DEPRESSANT ACTIVITY

The anti-nociceptive and CNS depressant activity of petroleum ether, ethyl acetate and methanol root extracts of *M. annua*. Among all these extracts pet. Ether extracts showed the significant increase in reaction time in hot plate

method and also showed the more inhibitory effect on writhing induced by acetic acid against all extracts with standard drug Pentazocineand, Paracetamol respectively [10].

7. ANTIOXIDANT ACTIVITY

The antioxidant activity of the methanol and aqueous extracts of *Martynia annua* Lin. leaves by reducing power assay, DPPH radical-scavenging activity, nitric oxide scavenging activity, H_2O_2 radical scavenging activity, superoxide radical scavenging assay, hydroxyl radical scavenging activity, and total antioxidant capacity method. The results revealed that the methanol extracts produced higher antioxidant activity than the aqueous extract [11]. The *in vitro* antioxidant activity of *Martynia annua* Lin. from its fruit oil. DPPH radical and superoxide radical methods were used where IC50 being 87.56 µg/ml and 106.80 µg/ml, respectively. The oil of *Martynia annua* Lin. exhibited 87.25 ± 1.13 mg/100 g of total polyphenol content. The outcomes justify the oil of *Martynia annua* Lin. is a potential source of natural antioxidants [12].

8. ANTIBACTERIAL ACTIVITY

The antibacterial activity of chloroform, ethyl acetate and methanol extract of *M. annua* leaves against 60 gram +ve & 90 gram -ve bacteria. All the extracts show antibacterial activity against different bacteria. Chloroform extract produces higher antibacterial activity against *Bacillus thuringensis, Proteus vulgaris* and *Bacillus subtilis* while ethyl acetate extracts potentially effective against *Proteus mirabilis*, *Proteus vulgaris,Salmonella paratyphi* A, *Salmonella paratyphi* B and *Klebsiella pneumonia*, whereas the methanol extracts, shows greater antibacterial activity towards *B. subtilis*, *S. paratyphi* B, *Proteus vulgaris* and *Pseudomonas aeruginosa* [13,14,15].

9. ANTI-CONVULSANT ACTIVITY

The anti-convulsant activity of methanol extract of *M. annua* leaves on Maximal Electroshock (MES) and Pentylenetetrazole (PTZ) in induced seizure's models in albino rats. The methanolic extract 200 mg per kg and 400 mg per kg body weight have shown 66.31% and 82.731% protection respectively against maximal electroshock (MES) induced seizures whereas on comparison with the standard drug diazepam (100%) the methanolic extract 200 mg per kg and 400 mg per kg body weight have shown 70.33% and 82.88% protection of convulsion and 83.33% and 100% protection of mortality respectively against pentylenetetrazol (PTZ) induced epilepsy. However, the anticonvulsant activity of MEMA was due to the potentiating of neurotransmitter within the brain [16,17,18].

10. WOUND HEALING ACTIVITY

The wound healing potential of ethanol extract of *M. annua* leaves using excision and incision model on rats. They reported that fraction MAF-C from ethanol extracts of *Martynia annua* Lin. leave is found most effective in wound healing and histopathological study also showed better angiogenesis, matured collagen fibers and fibroblast cells as compared to the control group. Moreover, phytochemical studies demonstrated that the methanol extract mainly contains flavonoid luteolin responsible for enhancement of the wound healing process due to the free-radical scavenging mechanism [19,20].

11. ANTIDIABETIC ACTIVITY

The anti-diabetic activity of methanol extracts of *M. annua* flower in streptozotocin (STZ) and Streptozotocin-Nicotinamide (STZ-NIC) induced diabetes in Wistar rats. This methonolic extract showed excellent reductions in blood glucose, triglyceride and glycosylated hemoglobin levels and increased HDL levels in diabetic rats (after 21 days). A result revealed that this extract exhibited good anti-diabetic activity in STZ and STZ-NIC induced diabetic rats [21,22].

12. GASTROPROTECTIVE ACTIVITY

The gastro protective activity of MEMA leaves in rats with 200 mg per kg and 300 mg per kg body weight on ethanol-induced gastric ulcer [23]. Results were calculated by using ulcer index based on lesion index and pH which showed significant inhibition on the ulcer lesion index in rats hence effect of ethanol extract with 300 mg/kg dose significantly ($p<0.05$) change the gastric volume, ulcer index, and pH.

12.1 Immunomodulatory Activities

12.1.1 *In vivo* phagocytosis using the carbon clearance method

The non-specific immunity characterized by the change in macrophage phagocytic activity *via* the reticuloendothelial system was determined by

carbon clearance test. The overall phagocytic index for each respective group was determined using the following formula:

$$Phagocytic\ index = \frac{K\ sample}{K\ control}$$

Where, K_{sample} represents the slope for various treatments (PEE50, PEE100 or CP), and $K_{control}$ represents the slope for untreated control group animals [24,25].

12.1.2 SRBC-Induced delayed type hypersensitivity reaction (DTH) response

The effect of extracts on antigen-specific cellular immunity was evaluated by measuring footpad swelling as an indicator for delayed type hypersensitivity response. Treatment for fourteen days as mentioned earlier was carried to challenge with SRBC [26].

12.1.3 Neutrophil adhesion test

The method used for evaluating the effect of drug on neutrophil adhesion. After 14 days of treatment to all four groups, blood samples were collected in heparin zed vials by retro-orbital puncture, and total as well as differential leukocyte count was determined. After initial counts, the blood samples were incubated with 80 mg / mL of nylon fibers at 37°C for 15 min. The incubated samples were further analyzed for total and differential leukocyte count. The product of total leukocyte count and percentage neutrophil, known as neutrophil index, was determined for each animal of each respective group using the formula [27,28].

12.1.4 Humoral response to SRBC (Hem agglutination antibody titer value)

For the detection of antibody formation, on day 0 all animals were immunized by *i.p.* administration of 0.2 mL of 1% w/v BSA in phosphate buffered saline (PBS). After immunization a drug regimen of 14 days. On day 7 blood samples were collected and antibody IgG levels of immunized animals were measured by simple indirect enzyme linked immuno sorbent assay (ELISA) and recorded as primary antibody levels. On day 14, after the last dose, animals were challenged with 0.2 mL of 1% w/v BSA, and on day 21 blood samples were collected and subjected for ELISA to determine IgG levels which were recorded as secondary antibody levels [29,30,31].

12.2 Diabetic Induced Wound Healing Model

12.2.1 Streptozotocin induced diabetic rats model

The mice were divided into two groups diabetic (D) and non-diabetic (ND) comprising five animals in each groups. Diabetes was induced by giving *intraperitonial* streptozotocin injection for 05 consecutive days. The animals were confirmed for diabetes before the start of experiment. The serum glucose level was measured by glucose oxidase-peroxidase method using glucose test kit (Span diagnostics Ltd., India). The other five groups of mice were considered as non-diabetic [32].

12.2.2 Wound creation

To develop wounds, a single full thickness 1.0 cm diameter superficial excision was made on the mid-dorsum of each diabetic and non-diabetic mouse at day 0. The measurement of the wound diameter was taken on 1st , 7th and 13th days by using transparency paper and permanent marker [33].

13. CONCLUSIONS

The plant *M. annuais* commonly grown in wastelands throughout India, and also found in the region of Burma, America, Mexico, West Pakistan. The scientific investigation has indicated a significant pharmacological effect of *M. annua* extracts. This property of plant makes it to the object of various phyto-chemical researchers. In this review, we have tried to present the importance and most-recent findings on the therapeutic uses, and phyto constituents of the *M. annua*.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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