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AN UPDATED REVIEW ON VARIOUS PHARMACOLOGICAL ACTIVITY OF *BIOPHYTUM SENSITIVUM*

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ABSTRACT

Medicinal plants are widely used for curing various diseases and many people still use the plants for their basic primary needs. *Biophytum sensitivum* belongs to the family Oxalidaceae is used as traditional medicine to cure various diseases during the last few decade, extensive research have been carried out in the pharmacological activity of *Biophytum sensitivum.* phytochemical analysis shows the presence of flavonoids, saponins, tannins, terpenes, steroids, amino acids, essential oil, polysaccharides and pectin and is mainly used for anti-pyretic, anti-inflammatory, anti oxidant, antitumor, antidiabetic, antioxidant, antibacterial, antihypertensive, radioprotective, antifertility and immunomodulatory. The present review provides detail about the pharmacological uses of *Biophytum sensitivum.*

KEYWORD: *Biophytum sensitivum*, pharmacological activities, Oxalidaceae.

INTRODUCTION

The plants are having immense potential to heal life threating disease, there for research on plants has increased across the globe.[2] the *Biophytum sensitivum* belongs to the family Oxalidaceae and is mainly found in tropical Asia, Africa, America and Philippines. the traditional practice in ayurveda claims that it is bitter, expectorant, stimulant and tonic and is mainly used for the treatment of fever, malaria, tuberculosis, burns, phthisis, arthralgia arthritis, backpain, bone spur, burstis, carpel tunnel syndrome, cervical spondylitis, degenerative joint disease, degenerative neck disease fibromyalgia and leg cramps.[1] ethnopharmacological uses of *Biophytum sensitivum* are Whole plant decoction as a tonic is

used orally for stomach ache, asthma, insomnia, convulsions chest complaints, tumors. topically is used for inflammation, chronic skin diseases and root is used orally for gonorrhea and lithiasis in foothills of Himalayas india according to ayurveda. leaves orally is used for diabetes accoding to nagbeli a folk medicine in Nepal and foot hills of Himalayas, topically powdered leaves and seeds are used for wound healing in mali, Africa. Both ayurveda and siddha in india state that whole plant decoction orally is used for snake envenomation.[2]

Vernacular names

Common name: Life plant, Sensitive plant

Sanskrit: Lajjalu, Jalapuspa, Krichhraha, Laghuvrikshaka, Lajjaluka, Panktipatra, Pitapushpa.

Hindi: Lakshmana, Lajalu

Marathi: Lajvanti, Jharera, Ladjiri, Lahanamulk

Bengali: Jhalai

Gujrathi: Jharera.

Malayalam: Mukkuti, Nilaccurunki, Tintanali

Kannada: Haramuni, Jalapushpa

Tamil: Nilaccurunki, Tintaanaalee

Telugu: Pulichinta, Attapatti, Chumi, Jala pupa

Botanical description

Taxonomy

Botanical name: *Biophytum sensitivum*

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Oxalidates

Family: Oxalidaceae

Genus: Biophytum

Species: Sensitivum

Botanical name: *Biophytum sensitivum*

Morphology

Annual herbs rarely exceeds 2.5-20cm in heigh and is having unbranched woody erect glaborous stem. leaves are pinnate, sensitive, crowded in the rosette on top of stem and 3.8-12.7cm long, oblong and apiculate at apex. Flowers are dimorphic, 8mm across the apices of

pedicles yellow and crowded. Lanceolate sepals 7mm long and parallel nerves. Corolla exceeding the sepals. Lobes are spreading, rounded fruits are ellipsoid capsule and style nearly glabrous seeds are having prominently ridges and transversly striated. Flowering and fruiting of the plant is on the month of September to December.[1, 3]

Phytoconstituents

The phytochemistry of *B. sensitivum* has revealed a wide range of chemical compounds mainly phenolic and polyphenolic compounds, saponin, essential oil, polysaccharides and pectin. The main bioactive constituents two biflavones: cupressuflavone and amentoflavone; three flavonoids: luteolin-7-methyl ether, isoorientin and 3'-methoxy-uteolin 7-O-glycoside; two acids, 4-caffeoilinic acid and 5-caffeoilinic acid, isolated from aerial parts of *B. sensitivum*. It also contains 3', 8'-pipigenin, proanthocyanidins (also known as condensed forms of tannins), and some phenolic compounds. These compounds were isolated from the aerial part of the plant.[2, 3]

PHARMACOLOGICAL ACTIVITY

Biophytum sensitivum possess a number of potential and pharmacological activities.

Antidiabetic activity

The aqueous solution of *B. sensitivum* leaf extract posess antidiabetic activity, the aqueous leaf extract is administered at a dose of 200mg to the rabbits for the study of the effect on alloxan induced diabetes. We investigated the hypoglycemic effect of Neapalese *Biophytum sensitivum* on male alloxan diabetics of varying severity: sub diabetic (recovered Alloxan; RA), mild diabetic (MD), and severely diabetic (SD). The activity of the plant leaf extract was evaluated by fasting plasma glucose (FPG) and improving the oral glucose tolerance test (OGTT) after a single dose and prolonged application. After a single dose, glucose levels were reduced by 25.9%, 27.4% in sub-diabetic rabbits, 36.9% and 37.7% in mild diabetic rabbits within 1 hour and 2.5 hours, respectively. The improved GTT response is shown by a decrease in the area under the curve (AUC) from 16138 mg / dl to 12355 mg / dl (23.4%) in sub-diabetic rabbits and from 19258 to 12238 mg / dl in MD rabbits. Significant improvements were seen after one week of previous treatment. The results show that the plant material has a significant hypoglycemic effect, probably due to the stimulatory effect of pancreatic beta cells. Further long-term studies are needed to investigate the potential role of diabetes in correcting other metabolic disorders.[4]

Antioxidant

The herb extract *Biophytum sensitivum (L.) DC* (Oxalidaceae) has been tested in vitro and in vivo to determine its antioxidant potential. *Biophytum sensitivum* was found to inhibit the superoxide radicals formed by photo reduction of the riboflavin and hydroxyl groups formed during the Fenton reaction and inhibited in vitro lipid peroxidation at concentrations of 50, 95 and 20 microg ml (-1) (50% inhibition). The drug also released nitric oxide (IC 50 = 100 micrograms ml (-1)). The extract also induced a dose-dependent elimination of nitric oxide in the culture. Intraperitoneal administration of *Biophytum sensitivum* extract inhibited the formation of superoxide in macrophages in vivo. Administration of *B. sensitivum* to mice significantly increased catalase activity. The extract significantly increases glutathione levels in the blood and liver. Glutathione S-transferase and glutathione reductase levels increased and glutathione peroxidase levels decreased after administration of the *Biophytum* extract. The results of this test show that *B. sensitivum* has a significant antioxidant activity both in vitro and in vivo.[5]

Antiinflammatory

The anti-inflammatory effect of the aqueous and methanolic extracts of the aerial parts, the aqueous extract of the roots and the ultra filtration fractions of the methanolic extract of the roots of *Biophytum sensitivum* was evaluated in a carragenin-induced rat leg edema model. With the exception of all extracts, the methanolic extract of the aerial parts showed anti-inflammatory activity, but the aqueous extracts showed the maximum inhibition of edema.[6]

Antitumour

This study experimentally investigated the possible anti-cancer effects of aqueous urine. *Biophytum Sensitivum Linn* Extract (AEBS) against Dalton ascites lymphoma (DAL) carrying Swiss albino mice. AEBS was administered orally at doses of 100 and 200 mg / kg in mice for 28 days after 24 hours after tumor inoculation. AEBS impact on rodent tumor, the lifespan of mice with DAL was studied. AEBS treatment reduced a tumor volume and number of viable cells, which increases the lifespan of mice with DAL. The present work shows that the aqueous extract of *B. sensitivum* showed significant antitumor activity exercise.[7]

Hypocholesterolemic effect

The present study was conducted to investigate the possible hypocholesterolemic effects of water extracts from *Biophytum sensitivum* leaves in three (six of each) male albino groups:

healthy controls, group I, untreated hypercholesterolemic rabbits, II. Group II and Hypercholesterolemia III. Group of rabbits treated with water extract. II AND III. The rabbits in the group were initially induced with hypercholesterolemia when cholesterol was fed at a dose of 100 mg / day for a week. Subsequently, for 4 weeks, II. Rabbits in the group continued to receive the previous cholesterol dose, while rabbits in group III continued to receive this dose. The rabbits in the group received a plant extract (200 mg / kg body weight / day) with the previous cholesterol dose for four weeks. Group I rabbits received peanut oil only at a dose of 1 ml / kg body weight. II In the group, total serum cholesterol (CT) increased almost 5 times from 53.6 ± 7 mg / dL to 286.3 ± 22 mg / dL. In III. In the group, it increased from 52.6 ± 7 mg / dl to 170.8 ± 12 mg / dl in the third week, then CT began to decrease and to 146.3 ± 13 mg / dl at the end of week 5. A similar effect was observed for the other lipid parameters. Treatment includes not only serum triglycerides, very low density lipoproteins and low density lipoprotein cholesterol (VLDLc + LDLc), and total cholesterol and high density lipoprotein cholesterol (TC / HDLc) and (VLDLc + LDLc) / HDL a., but also reduced most of these values. Blood glucose levels did not change significantly. The study shows that the extract has a significant hypocholesterolemic effect.[8]

Antibacterial

Biophytum sensitivum (L.) DC. (Oxalidaceae) is a folk medicine used in folk medicine. The main purpose of this study was to demonstrate that *B. sensitivum* (methanol, chloroform, acetone and petroleum ether) have been tested against a number of people pathogenic bacterial strains (Bacillus subtillis, Staphylococcus aureus, Streptococcus pneumonia, Klebsiella pneumonia, Salmonella typhi, Proteus vulgaris and Escherichia coli) by diffusion in an agar pit method. All extracts showed different levels of activity in the various test organisms and their activity was observed is quite comparable to standard antibiotics. Acetone extracts showed remarkable antibacterial activity. activity. This study confirms that methanol and chloroform extracts have better antibacterial activity. against all petroleum ether-extracted test organisms. Results of these tests. encourage the use of plant extracts as an antifungal agent.[9]

Nephroprotective activity

The present assay was performed to assess the nephroprotective activity of different extracts of *Biophytum sensitivum* plant in Wistar albino rats. The randomly selected animals were divided into five Groups of six animals. The test extracts were administered orally at a dose

of 200 mg / kg. Gentamicin was administered at a dose of 40 mg / kg intravenously rats for 7 days. Every eight days The animals were sacrificed and blood was collected. Elevation of serum urea and creatinine were taken as a nephrotoxicity index. histopathological examination of the kidneys of all the groups are finished. The results showed that methanol and aqueous extracts of *Biophytum sensitivum* has nephroprotective activity Elevation of serum urea and creatinine by gentamicin was significantly reduced and showed histopathological changes in the kidneys to normal levels. The study concluded that *Biophytum sensitivum* is nephroprotective.[10]

Antihypertensive effect

All plant extracts of *B. sensitivum* appear to have antihypertensive activity in the guinea pig and rat model. The extract antagonizes calcium chloride in a non-competitive manner and contraction is induced in a concentration-dependent manner by the isolated rat aortic K + fertility activity. The extract also inhibits noradrenaline-induced aortic contraction. These results clearly indicate that the antihypertensive effect of *B. sensitivum* is due to the inhibition of calcium entry, which is also contained in voltage-gated and calcium-driven calcium channels.[11]

Antifertility

Ethanol, ethyl acetate, chloroform and n-butanol extracts of whole *B. sensitivum* plants were tested for infertility in female Wistar albino rats at a dose of 400 mg / kg. All extracts inhibited pregnancy, with a significant reduction in the number of implants compared to control animals. The ethanol extract showed maximal fertility activity (100%). Activity was reversible when the extracts were discontinued.[12]

Radioprotective activity

It was found that methanolic extract of *B. sensitivum* improves immunity and stimulates the production of IL-1β, IFN-γ and GM-CSF at a dose of 50 mg / kg in mice exposed to gamma irradiation throughout the body. I found that *B. sensitivum* extract provides protection against radiation-induced hematopoietic damage.[13]

Larvicidal activity

We have determined that the acetone extract from leaves of *B. sensitivum* is an effective larvicidal, pupicidal, and influences the normal development and appearance of adult mosquitoes at concentrations of 10, 15 and 25 mg / L in Aedes aegypti mosquito in a dose-

dependent manner. We have found that *B. sensitivum* has excellent potential as a larvarid agent against A. aegypti strain.[14]

Immunomodulatory effect

The methanolic extract of *B. sensitivum* increases the total white blood cell and bone marrow cells intraperitoneally at a dose of 0.5 mg / animal in normal BALB / c mice. In animals treated with *B. sensitivum*, the maximum white blood cell count and antibody titer on day 12 after administration were 14, 087 cells / mm3 and 256, respectively. The extract stimulated the weight of the spleen and thymus. *B. sensitivum* extract also increases antibody-forming cells. I have found that *B. sensitivum* has a stimulatory effect on the hematopoietic system, stem cell differentiation and the humoral arm of the immune system.[13] It has also been found that methanolic extract of *B. sensitivum* stimulates the immune cell system of Ehrlich ascites tumor in BALB / c mice, leading to an increase in immune cell proliferation and NK cell-mediated tumor cells.[13,14] Pectin polysaccharide (BP1002) obtained from hot water extract from aerial parts of *B. sensitivum* is capable of activating macrophages and dendritic cells.[15] The pectin polysaccharide (BPII) and fragments (BPII.1 and BPII.2) of the aerial parts of *B. sensitivum* were immunomodulatory against Peyer's patch, competent immune cells and macrophages.[15]

Antiurolithiatic

The complete methanolic extract of *Biophytum sensitivum* has been shown to have an antiurolithiatic effect. The present study was carried out to evaluate the antiurolithiatic effect of each fraction of the total extract of the total methanolic plant of *B. sensitivum* (MBS) in rats as a step towards isolation oriented to the activity of the antiurolithiatic component. MBS was successively extracted with dichloromethane, ethyl acetate, ethanol and water to obtain fractions. Sodium oxalate (70 mg / kg, i.p.) was administered to the rats for seven days to develop calcium oxalate urolithiasis. These rats were treated with two doses (20 and 40 mg / kg, p.o.) of the fractions, one hour before the injections of sodium oxalate. The antiurolithiatic activity was evaluated by estimating the biochemical changes in the homogenate of urine, serum and kidney, and the histological changes in the renal cells. The administration of sodium oxalate induced biochemical changes in the urine, which were significantly inhibited by the ethyl acetate fraction. Supplementation with the ethyl acetate fraction prevented the increase in serum creatinine, uric acid and blood urea nitrogen. Elevated levels of calcium, oxalate and phosphate in the renal tissue homogenate of lithiated

rats were significantly reduced by treatment with ethyl acetate. The ethyl acetate fraction caused a significant decrease in lipid peroxidation activity, accumulation of calcium oxalate deposits and histological changes in renal tissue. The results showed that the antiurolithic component of the entire methanolic extract of the plant was in the ethyl acetate fraction. The effect is attributable to its diuretic, antioxidant, nephroprotective properties and its effect in reducing the concentration of urinary stone forming components.[16]

CONCLUSION

The *Biophytum sensitivum* posess high therapeutic efficiency and is mainly used as antioxidant, anti inflammatory, antitumour, antibacterial, hypocholestrelomic immunomodulatory, nephroprotective, radioprotective, larvicidal, anti hypertensive, antifertility, anti asthmatic anti epileptic, antiulcer and antidiabetic the future aspects may be the study of anti asthmatic, as it contains the phytochemical and the works are not performed yet.

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