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Review Article

A Pharmacognostic and pharmacological overview on *Woodfordia fruticosa* Kurz.

Muvel Uday[1]*, Devre Kishor[1], Raghuvanshi Ajay[1]
G.R.Y. institute of pharmacy "Vidhya vihar" Borawan (khargone) M.P.451228.

***Corresponding author**
Muvel Uday
Email: udaymuvel707@gmail.com

Abstract: *Woodfordia fruticosa* is locally known as Dhawai, belonging to the Lythraceae family. *Woodfordia fruticosa* is an important medicinal plant of tropical and subtropical India. It has wide range of medicinal and pharmacological application. It is commonly used in the treatment of various diseases like diarrhea, dysentery, fever, headache, hemorrhoids, herpes, internal hemorrhage, leucorrhoea, liver disorders, menorrhagia, ulcer and wounds etc. It has many pharmacological activities like antimicrobial, Hepatoprotective, cardio protective, antiulcer, Immunomodulatory, anti-fertility, Antitumor; Wound healing, Analgesic, Anti-inflammatory, and Antibacterial, Anti-hyperglycemic. The present study was designed to evaluate the analgesic activity of *Woodfordia fruticosa.*
Keywords: *Lythraceae, W. fruticosa,* analgesic activity, Anti-hyperglycemic, chemical constituents.

INTRODUCTION

Woodfordia fruticosa Kurz belongs to the family *Lythraceae*. The English names that are most frequently used for the plant are Fire flame bush and Shiranjitea. The plant is abundantly present throughout India, ascending up to an altitude of about 1500 mitre, and also in the majority of the countries of South East and Far East Asia like Malaysia, Indonesia, Sri Lanka, China, Japan and Pakistan as well as Tropical Africa [1]. According to the Indian systems of medicine, the flower is pungent, acrid, cooling, toxic, alexiteric, uterine sedative and anthelmintic, and is useful in thirst, dysentery, leprosy, erysipelas, blood diseases, leucorrhea, menorrhagia and toothache. Many marketed drugs comprise flowers, fruits, leaves and buds mixed with pedicals and thinner twigs of the plant [2-3]. The World Health Organization (WHO) estimated that 80% of the populations of developing countries rely on traditional medicines, mostly plant drugs, for their primary health care needs [4-5]. *Woodfordia fruticosa* is an important traditional medicinal plant belonging to the family *Lythraceae.* It is extensively used in the preparation of "Ahavas and Arishtas" containing self generated alcohol. It is a flower of *Woodfordia fruticosa Kurz*. are commonly used for the treatment of several ailments which includes rheumatism, leucorrhea, menorrhagia, asthma, liver disorder, and inflammatory conditions [6]. *Woodfordia fruticosa* is a wild plant growing in the forest of Jashpur district of Chhattisgarh, India. It is an evergreen shrub up to 5 m tall, with diffuse, irregular branching. It is usually found flowering throughout the year, but a distinct peak in abundance can be observed in March & April. The nectar-rich flowers are regularly visited by insects. The flowers are stimulant and an infusion of the flowers and leaves is used as an herbal tea. Powdered dried flowers in curdled milk are used in the treatment of dysentery, diarrhoea and internal haemorrhages and, with honey are given for leucorrhoea and menorrhagia. Externally, the powder is sprinkled over foul ulcers and wounds to diminish discharge and promote granulation, and used in lotions for the same purpose. Dried flowers are useful in disorders of the mucous membranes, haemorrhoids and disorders of the liver. Flower and root used in the treatment of rheumatism, dysentery, foot and mouth disease, lumbar and rib fracture [7-10]. In India, different parts of *Woodfordia fruticosa* are commonly used in traditional systems of medicines such as Ayurveda and Unani [11]. In addition antibiotics produce much adverse effect on host, which includes immuno suppression and allergic reactions [12-13]. Plants have been used for human benefit from time immemorial [14]. In the developing world, 70–80% of the population relies on plants for primary health care [15].

DESCRIPTION[16]:

A much-branched, beautiful shrub, with fluted stems and long, spreading branches, 1-3 m. high, rarely up to 7 m., commonly occurring throughout North India, ascending to an altitude of c. 1,500 m. in the Himalayas, but rather scarce in South India. It is sometimes cultivated in gardens for its flowers, which are borne during the summer months. Bark reddish brown, peeling off in thin, fibrous strips; leaves lanceolate, oblong-lanceolate or ovate-lanceolate;

flowers numerous, brilliant red in dense axillary paniculate-cymose clusters; capsules ellipsoid, membranous; seeds brown, minute, smooth obovate.

Fig. flowers of woodfordia fruticosa.

Principle Constituents:
Woodfordins A, B, C, D, E, F, G, H, I and were identified from the flowers.

Medicinal uses:

The flowers are acrid, astringent, styptic, depurative, utreine sadative, constipating, antibacterial, corrective of urinary pigments, febrifuge and alexeteric. They are useful in the conditions of kapha and pitta, leprosy, burning sensation, skin diseases, diarrhoea, dysentery, fever, headache, hemorrhoids, herpes, internal hemorrhage, leukorrhea, liver disorders, menorrhagia, ulcers, wounds. Juice of leaves are used in bilious sickness. They are also valued as a stimulant in pregnancy.

Common Names and Scientific Classification [17]

Fire Flame Bush, Red Bell Bush, **Hindi:** Dhawai, **Marathi:** Dowari, **Tamil:** Velakkai, **Malayalam:** Tatiripuspi, **Telugu:** Jargi seringi, Godari, **Kannada:** Tamrapuspi, **Oriya:** Dhobo, **Konkani:** Dhauri, **Urdu:** Jetiko, **Gujarati:** Dhawani, **Sanskrit:** Parvati, Bahupuspika.

Scientific Classification:

Kingdom:	Plantae
Division:	Magnoliophyta
Class:	Magnoliopsida
Order:	Myrtales
Family:	Lythraceae
Genus:	*Woodfordia*
Species:	***W. fruticosa***

PHARMACOLOGICAL ACTIVITIES

Antimicrobial activity [18-19]

Different extracts of dried flowers of *W. fruiticosa* have been reported for their significant antibacterial activity against fourteen human pathogens. Dried flowers were extracted by using five different solvents such as ethanol, methanol, chloroform, petroleum ether, and water. The in-vitro Antibacterial activity of the crude methanolic extract of *W.fruticosa* flower has been reported by comparing it with standard drug ciprofloxacin using agar well diffusion method. The methanolic extract has been reported to be most active against pseudomonas pseudoalcaligenes. The methanolic extract was reported more effective against Gram negative bacteria as compare to Gram positive bacteria.

Hepatoprotective activity [20-24]

Woodfordia fruticosa posses significant Hepatoprotective activity[20]. Hepatoprotective activity of petroleum ether, chloroform, ethyl alcohol, and aqueous extract of the flower of *W. fruticosa* has been reported against carbon tetrachloride induced hepatotoxicity [21]. And phenotoin induced liver damage in rats [22]. The methanolic extract of the flowers of *W. fruticosa* has been reported for Hepatoprotective activity against acetaminophen induced hepatic injury in rats [23] and declofenac sodium induced hepatic damage in rats [24].

Antiulcer Activity [25-26]

The antiulcer potential of *W. fruiticosa* has been reported in ethanol, hydrochloric acid (HCL) and Non-Steroid Anti-Inflammatory Drugs NSAIDS (Diclofenec sodium) induced ulcer in stomach of Wister albino rats. The roots were extracted with chloroform and methanol. Both the extracts have found to significant antiulcer activity.

Immunomodulatory activity [27]

The *in-vitro* and *in-vivo* immunomodulatoy activity of ethanolic extract of the flowers of *W. fruticosa* has been reported. For this the effect of non-specific immune responses in mice was examined. *In vitro* immunomodulatory activity of the extract was examined on marine peritoneal macrophage phagocytosis (using nitro blue tetrazoleum dye reduction, lysosomal enzyme activity, nitric oxide and myeloperoxidase) and on proliferation of bone marrow cells by salforhodamine 'B' (SRB) assay. The in vivo activity has shown on macrophages and bone marrow cells by using carbon clearance test and cyclophosphamide induced myelosupression respectively. The significant increase in the release of myeloperoxidase, nitric oxide, lysosomal enzyme and superoxide from macrophages along with significant increase in phagocytic index in carbon clearance test

Indicates stimulatory activity of the extract in macrophages. The extract was found to show 60% increased bone marrow cells proliferation and offer protection towards cyclophosphamide induced myelosuppression which represent the stimulation of bone marrow.

Anti-fertility activity [28]

The anti-fertility activity of various extract of dried flowers of *Woodfordia fruticosa* has been reported on female albino rats. The ethanolic extract of the powder of the dried flowers was prepared by extracting successively with petroleum ether, benzene, chloroform, and ethanol and also extracted individually with 50% aqueous alcohol and water. Anti-fertility activity of successive alcoholic, individual aqueous and individual hydroalcoholic extracts was studied in female albino rats. The results revealed that the alcoholic extract posses significant abortifacient activity, whereas aqueous and hydroalcoholic extracts hold moderate activity as compared to the control. Thus, the successive alcoholic extract showed promising abortifacient activity at 100 mg/kg body weight.

Antitumor activity [29]

Woodfordin C, a macro-ring hydrolyzable tannin dimmer from dried flower was reported to posses' antitumor activity.

Wound healing activity [30]

The present study demonstrated that oral administration of the ethanolic extract of *W. fruiticosa* flowers was effective in wound healing, supported the folklore use by the tribal's of Chhattisgarh district.

Analgesic activity [31-32]

The present study revealed the positive analgesic activity of extracts of *Woodfordia fruticosa* stem bark in hot plate model and acetic acid induced writhing model. Pain sensation in acetic acid induced writhing method is elicited by triggering localized inflammatory responses resulting the release of the free arachidonic acid from tissue phospholipids via cyclooxygenase (COX), and prostaglandin biosynthesis.

Anti-inflammatory activity [33-34]

The anti-inflammatory activity of *W. fruticosa* was determined with the help of two different models viz. carrageen an and egg-albumin induced inflammation test. Male albino rats were fasted for 24 h before the commencement of experiment but water was provided ad *libitum.* Freshly prepared carrageen 0.1 ml (1 % suspension in normal saline) or 0.1 ml/kg of fresh egg-albumin was injected into the plantar region of hind paw of the rats to induce inflammation. For each model, animals were grouped as; group 1(vehicle, 10 ml/kg), group 2 (Indomethacin 10 mg/kg), group 3 (WF-EE 100 ml/kg) and group 4 (WF-EE 200 mg/kg) for each group n=6. The WF-EE and Indomethacin were suspended with 1% CMC suspension (w/v) and administered orally 1 h before the carrageen or egg-albumin injection. Change in paw volume was measured after administration of phlogistic agent at 1, 3 and 5 h in carageenan and at 20, 40, 60, 80, 100 and 120 min. after egg albumin injection.

Antibacterial activity:

The antibacterial activity of the crude methanol extract of the *Woodfordia fruticosa* was determined against fifteen bacterial strains which is reported. The antibacterial activity was observed to be in dose dependent manner i.e. 5 mg/mL showed more level of activity than 2.5 mg/mL against all the tested microorganisms. Grampositive bacteria, *B. subtilis* and *M. flavus* were most resistant strains. Gram-negative bacteria *P. mirabilis* showed antibacterial activity at only one concentration i.e. 5 mg/mL. The methanol extract of *Woodfordia fruticosa* was most active against *P. pseudoalcaligenes* in comparison to all the microorganisms tested. Gram-negative bacteria were more susceptible to then plant extract than Gram-positive bacteria which contradict the previous reports that plant extracts are more active against Grampositive bacteria than Gram-negative bacteria [35-36].

Antihyperglycemic activity:

The ethanolic extract of *W. fruiticosa* flowers (250 and 500 mg/kg) significantly reduced fasting blood glucose level and increase insulin level after 21 days treatment in streptozotocin diabetic rats[37]

Conclusion: The herbal drugs play vital role for restore to health of the modern civilization. The literature review showed that *W. fruiticosa* has been used pharmacologically in the treatment of various disease conditions. The main constituents of this plant are woodfordins A, B, C, D, E, F, G, H, I and were identified from the flowers. It has various medicinally uses such as acrid, astringent, styptic, depurative, utreine sadative, constipating, antibacterial, corrective of urinary pigments, febrifuge and alexeteric etc.

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