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Pharmacognostical Standardization and Phytochemical Features of *Zanthoxylum armatum* Roxb

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Introduction

The food made from plants are a great source of vitamins, minerals, fibre, and other essential nutrients, making them a vital part of a balanced diet. Plants act as chemo preventative agents in addition to being a part of the diet. Due of the numerous toxicology reports of synthetic chemicals, there is always a need to look for natural cytotoxic, antibacterial, and other chemotherapeutic agents. Southeast Asia is home to many rutaceae plants, including *Zanthoxylum armatum* (Roxb.). It proliferates profusely in Pakistan's Dir, Hazara, and Muree hills. Particularly, the seeds of this plant are employed in numerous traditional medicines as well as several foods. This plant's seeds and bark are used to cure fevers, toothaches, indigestion/heartburn, stomachaches, cholera, and as tonics. When brushing teeth, *Z. armatum* branchlets are used as miswaks (Tejbal), while toothaches are treated with fruit powder [1].

Several Zanthoxylum species have antibacterial, larvicidal, and cytotoxic properties. Terpenes, sterols, flavonoids, alkaloids, and coumarins are a few of the several chemical ingredient classes found in *Z. armatum*.

Description

In the months of June and July, berries of *Z. armatum* were harvested in the mountainous Tanawal, District Haripur, and NWFP of Pakistan. 800 g of fresh berries were crushed and left to macerate in ethanol for 72 hours. It was filtered, and the filtrate's crude extract was obtained by evaporating it at 40 °C under decreased pressure (81 g). The following fractions were produced by successively separating a part of the crude extract (60 g): n-hexane (16 g), chloroform (20 g), and aqueous-methanol (23 g) [2].

Antifungal properties

The agar tube dilution method was used to assess the antifungal activity of the ethanolic extract and subsequent fractions against the chosen human, animal, and plant pathogens. The moulds and yeasts used in this study included *Candida albicans* (ATCC2091, human pathogen), *Fusarium solani* (ATCC11712, plant pathogen), *Aspergillus flavus* (ATCC32611, human pathogen), *Microsporum canis* (ATCC11622, human/animal pathogen), *Trichophyton longifusis* (clinical isolate, human pathogen), and *Candida glabrata* (ATCC90030, human pathogen). Miconazole was used as the standard drug and the experiments were run in triplicates [3].

Bacterial resistance

The agar well diffusion methodology was used to evaluate the crude extract's antibacterial activity against various Gram positive and Gram negative human infections. Gram negative species included *Escherichia coli* (ATCC 25922), *Shigella flexenari* (clinical isolate), *Pseudomonas aeruginosa* (ATCC 27853), and *Salmonella typhi* whereas Gram positive bacteria included *Bacillus subtilis* (ATCC 6633) and *Staphylococcus aureus* (ATCC 25923), (ATCC 19430). The standard antibacterial agent was imipenum [4].

Cytotoxicity

The ethanolic extract of *Z. armatum* and its subsequent fractions were tested against *Artemia salina* (larvae of brine shrimp) at three distinct concentrations (5, 50, and 500 g/mL). SPSS (Version 19) statistical software was used to analyse the data and determine the LD50 values with a 95% confidence interval (confidence interval). Etoposide was employed as a typical cytotoxic medication.

An infection caused by a parasite called leishmaniosis is common worldwide, primarily in developing nations. The focus has switched to the active phytochemicals isolated from plants for the efficient therapy along with minimum side effects due to various disadvantages with synthetic medications used to treat leishmaniosis. According to this study and earlier research on Zanthoxylum, the ethanolic extract and its hexane fraction may be a valuable source of anti-leishmanial chemicals. It is commonly recognised that weeds are becoming more resistant, and the traditional synthetic pesticides are becoming less effective against these resistant biotypes. These facts call for the development of novel herbicides. Because they have a non-toxic effect and are more suited than synthetic herbicides, natural herbicides are becoming more and more important [5].

Conclusion

The well-known negative effects of synthetic insecticides on agroecological systems have led to a rise in interest in insecticides with a botanical origin during the past few decades. In order to explore the potential of plant secondary metabolites as pest control agents, studies on plant-insect chemical interactions have grown, and the use of plant allelochemicals has become a major method for pest management. The ethanolic extract, n-hexane, and chloroform soluble components of the current study have demonstrated significant insecticidal action against the most frequent insects that seriously contaminate wheat, rice, and pulses while they are in storage. This activity might be brought on by the presence of some alkaloid components, such as the same-genus pellitorine.

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