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Research Article

A COMPARATIVE STUDY OF PHYTOCHEMICAL INVESTIGATION OF *XANTHIUM STRUMARIUM* MEDICINAL PLANT

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ABSTRACT

Xanthium strumarium L. (Compositae) (Hindi: Chota-gokhru), is a gregarious weed found abundantly throughout India. The present study deals with the phytochemical evaluation of *Xanthium strumarium* Linn. Among ancient civilizations, India has been known to be rich repository of medicinal plants. The traditional medicine involves the use of different plant extracts or the bioactive constituents. This type of study provides the health application at affordable cost. The study such as ethno medicine keenly represents one of the best avenues in searching new economic plants for medicine. The extracts were prepared with different selected solvents for the plant to adjudge the major active principles in the solvent that have value in rational drug design. The qualitative analysis of phytochemicals encompasses steroids, alkaloids, flavonoids, triterpenoids, terpenoids, tannins, saponins, quinone, coumarin, protein, sugar and gum. The results of this study could be useful in setting some diagnostic indices for identification and preparation of the monograph of the plant as future medicine.

Keywords: *Xanthium strumarium*, civilizations, Phytochemicals.

INTRODUCTION

The importance of plants is known to us well. The plant kingdom is a treasure house of potential drugs and in the recent years there has been an increasing awareness about the importance of medicinal plants. Drugs from the plants are easily available, less expensive, safe, and efficient and rarely have side effects. Human beings have been utilizing plants for basic preventive and curative health care since time immemorial. Plant extracts or bioactive herbal compounds have been reported scientifically for their biological activities. Phytochemicals may protect human from a host of diseases. Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. Plant produces these chemicals to protect itself but recent research demonstrates that many phytochemicals can protect humans against diseases. There are many phytochemicals in fruits and herbs and each works differently. *Xanthium strumarium* is a gregarious weed found abundantly throughout India. Fructus Xanthii , are used in China for the

treatment of nasal sinusitis, headache caused by wind-cold, urticaria, and arthritis . The chemical composition of ent-kaurane diterpenoids, sesquiterpene lactones, caffeoylquinic acids, and a thiazinedione from this plant (leaves or fruits) have been reported. The plant has wide array for various ailments such as anti-diabetes and anti-oxidation, antibacterial antiviral, antibacterial, insecticidal, herbicidal and antitrypanosomal. The qualitative analysis of phytochemicals encompasses steroids, alkaloids, flavonoids, triterpenoids, tannins, saponins, quinone, coumarin, protein, sugar and gum. The study such as ethno medicine keenly represents one of the best avenues in searching new economic plants for medicine.

MATERIALS AND METHODS

Collection of plant material

Based on the documented ethnopharmacological knowledge on the use of medicinal plants in the treatment of pathological diseases, fresh plant parts of *xanthium strumarium* were collected from various regions of Bhopal District of Madhya Pradesh, and washed 2-3 times in distilled water. The plant materials were shade dried until all the water molecules evaporated and plants became well dried for grinding. After drying, grinded into fine powder, stored in closed container separately with proper labeling for further use. Powdered plant leaves were subjected to organic fraction collection based on polarity, crude alcohol extraction and aqueous extraction.

Organic fraction collection

100g of powdered plant material were successively extracted with cold petroleum ether, chloroform, and methanol. Containers containing plant powders were immersed in the solvent individually for 72 hours and the fractions were collected. Fractions were dried by evaporation at room temperature for complete dried fraction collection and stored in sterile containers.

Crude alcohol and aqueous extraction

100g of powdered plant material were taken in two separate containers and 250ml of ethyl alcohol and water added in individual containers. The materials held for 72 hours to collect the extract and dried.

Preliminary phytochemical screening

The extracts thus obtained were subjected to preliminary phytochemical screening following the standard protocols.

Phytochemical screening procedure

Test for steroids

One gram of the test substance was dissolved in a few drops of acetic acid, acetic anhydride, warmed and cooled under the tap water and drop of concentrated sulphuric acid were added along the sides of the test tube. Presence of green colour indicates the presence of Steroids.

Test for alkaloids

Test substance shaken with few drops of 2N HCL. Aqueous layer formed, decanted and to which one or two drops of Mayer's reagent added. Formation of white turbidity or precipitate indicates the presence of alkaloids.

Test for flavonoids

Shinado's test: To the substance in alcohol, a few magnesium turnings and few drops of concentrated hydrochloric acid were added and boiled for five minutes. Red coloration shows the presence of Flavonoids.

Test for terpenoids

Crude extract was dissolved in 2ml of chloroform and evaporated to dryness. To this, 2ml of concentrated H_2SO_4 was added and heated for about 2 minutes. A grayish colour indicated the presence of terpenoids

Test for triterpenoids

Noller's test: The substance was warmed with Tin and Thionyl chloride. Purple coloration indicates the presence of Triterpeniods.

Test for tannins

The substance mixed with basic lead acetate solution. Formation of white precipitate indicates the presence of Tannins.

Test for saponins

The substance shaken with water, foamy lather formation indicates the presence of saponins.

Test for quinones

To the test substance, sodium hydroxide was added. Blue green or red colour indicates the presence of Quinone.

Test for coumerin
To the test sample 10% of sodium hydroxide and chloroform were added. Formation of yellow colour indicates the presence of Coumerin.

Test for protein
To the test solution the Biuret Reagent is added. The blue reagent turns violet in the presence of proteins.

Test for sugars
The substance was mixed with equal volume of Fehling's A and B solutions, heated in water bath. Formation of red colour is the indication of the presence of sugar.

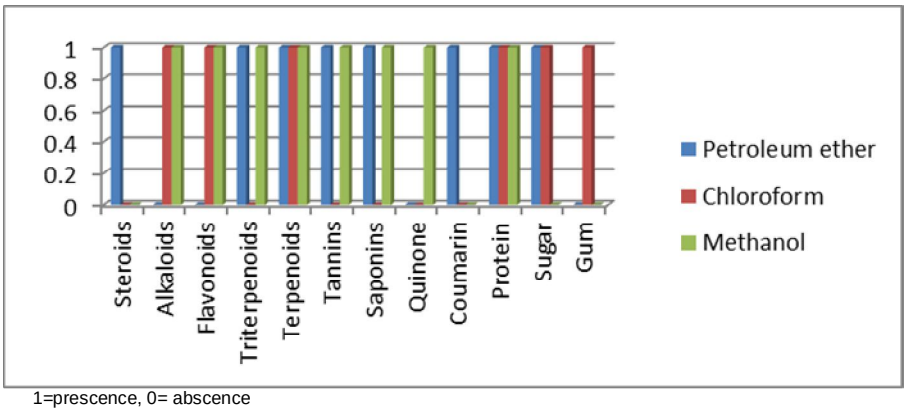
Test for gum
To the substance, add few ml of water and shake well. Formation of swells or adhesives indicates the presence of gum.

RESULTS
In the present investigation, preliminary phytochemical screening has been done in the various extracts of *xanthium strumarium* and comparison made between each other. The results revealed the presence of medically active compounds in the plant It showed the presence and absence of various phytochemical constituents (Table 1).

Table 1: The analysis of phytochemicals in the different organic extracts of *xanthium strumarium*

Phytochemicals	Petroleum ether	Chloroform	Methonol
Steroids	+	_	_
Alkaloids	_	+	+
Flavonoids	_	+	+
Triterpenoids	+	_	+
Terpenoids	+	+	+
Tannins	+	_	+
Saponins	+	_	+
Quinone	_	_	+
Coumarin	+	_	_
Protein	+	+	+
Sugar	+	+	_
Gum	_	+	_

+ = Presence; - =Absence.



1=prescence, 0= abscence

DISCUSSION
Studies on the native or folk medicinal use of medicinal plants are important from the scientific point of view in that it enables rapid scientific studies towards finding and development of newer drugs from centuries old practical use-derived knowledge of medicinal plants. Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit medicinal as well as physiological activities. Analysis of the plant extracts revealed the presence of phytochemicals such as phenols, tannins, flavonoids, saponins, glycosides, steroids, terpenoids, and alkaloids. Herbal extracts contain different phytochemicals with biological activity that can be of valuable therapeutic index. The medicinal value of these plants lies in some

chemical substances that have a definite physiological action on the human body. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. For example, Alkaloids protect against chronic disease. Saponins protect against hypercholesterolemia and antibiotic properties. Steroids and triterpenoids show the analgesic properties. The Steroids and saponins were responsible for central nervous system activitie.The study also reveals that the presence of contained alkaloids, flavonoids, steroids, saponines, tannins and triterpenoids and also have various medicinal values
such as anti-inflammatory, anti-diabetic and analgesic activities. Alkaloids have been associated with medicinal uses for centuries and one of their common biological properties is their cytotoxicity . Several workers have reported the analgesic, antispasmodic and antibacterial, properties of alkaloids. Glycosides are known to lower the blood pressure according to many reports . The results obtained in this study thus suggest the identified phytochemical compounds may be the bioactive constituents and these plants are proving to be an increasingly valuable reservoir of bioactive compounds of substantial medicinal merit. The plant studied can be used to cure many diseases and the identification and isolation of the active compounds could lead to the new drug discovery of cheaper cost which would be useful for the patients.

CONCLUSION

The experimental plant *xanthium strumarium* studied here can be a potential source of useful drugs exploiting the anti -inflammation, anti-cancer, immunomodulation, anti-infection, antihepatotoxicity, anti-atherosclerosis, anti-diabetes activities of the plant. This type of study provides the health application at affordable cost. Further research needs in the angle whether the phytochemicals could be useful to treat other dreadful diseases. Advanced studies are being conducted on thes plants in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds.

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