

## Antibacterial and Phytochemical Evaluation of the Crude Extract and Fractions of *Xanthium strumarium*

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**Abstract:** The aim of the present research was to evaluate the antimicrobial potential and phytochemical profile of *Xanthium Strumarium* plant to look into possible natural therapy agents. The shade-dried whole plant material of *Xanthium Strumarium* was soaked in methanol for 10 days. The powdered drug was extracted with 80 % methanol three times and filtered at room temperature. The filtrate was evaporated in rotary to get a dark-greenish residue (Extract), which was further suspended in water and partitioned successively with *n*-hexane, chloroform, distill water and *n*-butanol to obtain *n*-hexane-soluble, chloroform-soluble, distill water-soluble, *n*-butanol-soluble and aqueous fractions, respectively. Different fractions (Chloroform, *n*-hexane, butanol, water and ethyl acetate) of the plant were tested against various bacterial strains namely *E.coli*, *S.aureus*, *S.typhaeae*, *P.auriginosa*. The extracted fractions of the plant exhibit moderate activities showing 10mm to 14mm inhibition against different strains of bacteria as compared to the control, which gave maximum inhibition upto 29mm. The of *Xanthium Strumarium* was found to be good source of alkaloids, flavonoids, tennins, resins, carbohydrate, starch, proteins, glycosides, coumarin, terponides, steroids and saponine. Anthranol glycosides was absent in the plant. The above results revealed of *Xanthium Strumarium* have an excellent anti-bacterial activity and can be used for disease therapy.

**Key words:** Phytochemical • *Xanthium strumarium* Plant

### INTRODUCTION

From a long time, plants provided a source of motivation for novel medication complexes, as plant-derived remedies made large influences to human health [1, 2]. The plant kingdom is a gem house of potential drugs and in the current years there has been an increasing wakefulness about the importance of medicinal plants. Drugs from the plants are easily available, less exclusive, safe and efficient and rarely have side effects [3]. Globalization interferes with infectious disease control at the national level while microbes move freely around the world. Human response to infectious diseases is accustomed by jurisdictional boundaries [4]. In last few years, about 43% of the total deaths that occurred in the industrialized countries are due to infective diseases.

Therefore search for new effective antimicrobial agents is essential. Due to the entrance of microbial resistance and manifestation of fatal opportunistic infections. In epidemic areas, resistance against antimicrobial agents has emerged due to recurrent infections [5]. Antibacterial activity of the plant has been verified by numerous researchers [6-8]. The antibacterial activity of medicinal plants of Khyber Pakhtunkhwa is needed to be done for the identification of applicant plants. *X. strumarium* is an excellent weed found abundantly in Pakistan. The major compounds isolated from *Xanthium strumarium* include xanthanol, hydroquinone, isoxanthanol, acids, thiazinedione, alkaloids and caffeyolquinic [9]. In traditional medicine, *X. strumarium* has been used for headache, emphysema, sinusitis and arthritis [10, 11]. All parts of plant own soothing, diaphoretic and diuretic properties.

The plant also shows its effectiveness in mitigating longstanding cases of malarial fever [12]. *Xanthium* also possess, antibacterial [13], antiviral [14], antimalarial [15], fungicidal [16], insecticidal [17] and cytotoxic activities against cancer cell lines [18]. The aim of the study was to evaluate the antibacterial and phytochemical screening of the medicinal plant *Xanthium Strumarium* collected from district karak khyberpakhtunkhwa Pakistan.

## MATERIALS AND METHODS

**Plant Material for Biological Activities:** Fresh plant parts of *Xanthium Strumarium* were collected randomly from district Karak, Khyber Pakhtunkhwa, Pakistan. The taxonomic identity of the plant was determined by qualified plant taxonomist Dr Nisar Ahmad at Botany Department, Kohat University of Science and Technology (KUST), Kohat, Khyber Pakhtunkhwa, Pakistan. Fresh plant materials were washed under running tap water; air dried and then was homogenized to fine powder and stored in air tight bottles.

**Extraction and Fractionation:** The shade-dried whole plant material of *Xanthium Strumarium* was soaked in methanol for 10 days. The powdered drug was extracted with 80 % methanol three times and filtered at room temperature. The filtrate was evaporated in rotary to get a dark-greenish residue (Extract), which was further suspended in water and partitioned successively with *n*-hexane, chloroform, distill water and *n*-butanol to obtain *n*-hexane-soluble, chloroform-soluble, distill water-soluble, *n*-butanol-soluble and aqueous fractions, respectively [19].

**Antibacterial Activity:** For antibacterial activity bacterial strains were taken from the Microbiology laboratory of Department of Microbiology, Kohat University of Science and Technology, Kohat KP, Pakistan. These bacterial strains were subculture on the nutrient agar. The nutrient agar plates were prepared and left for solidification. Then wells were formed by using sterile cork borer. The plates were then inoculated by the bacterial cultures using the sterilized swabs. The wells were filled with the plant extracts (100 µl in each well). For positive control chloramphenicol was added to the center of the nutrient agar plate. The Petri plates were incubated for 24 h at 37°C. After incubation the Petri plates were checked for different zone of inhibition formed by the plant extracts [20].

**Preparation of Inoculums:** A loopful bacterial culture was immersed in the distilled sterile water to form the dilution of inoculums.

**Phytochemical Screening Assay:** After obtaining the crude extract or active fraction from plant material, phytochemical screening can be performed with the appropriate tests. For getting an idea regarding the type of phytochemical existing in the extract mixture or fraction. The test for conforming the presence of alkaloids, anthraquinones, cardiac glycosides, coumarins, flavonoids, saponins, phlobatannins, tannins and terpenoids was carried out as per established protocols [21, 22].

## RESULTS AND DISCUSSION

**Antibacterial Activity:** Total of four extracts of *Xanthium Strumarium* (Aqueous, *n*-butanol, chloroform, *n*-hexane) were used to evaluate the antibacterial profile of the plant and methanol, aqueous extracts were taken for phytochemical screening of the plant. The antibacterial assay shows that all of the extracts were found to be active against the tested pathogens but all the fractions of our research plant were potentially active against *S. aureus* when compared with positive control, showing almost 100% inhibitions (Table 1). The antibacterial disc which was used as positive control in the research work to detect the sensitivity of bacterial strains used also showed zones of inhibition against the four bacterial strains. Positive control has maximum zone of inhibition against *E.coli* i.e. 29mm and minimum zone of inhibition against *S. aureus* (20mm) (Table 1). It also reveals that the bacterial strains used for the activity were fully active. The overall activity also shows that aqueous extract of the plant shows maximum activity against all the strains. Graphical representation of various fractions against different bacterial strains is shown in Fig 1.

Table 1: Antibacterial activity of different extracts of *Xanthium Strumarium* against selected bacterial strains

Extracts	Bacterial strains			
	<i>E.coli</i>	<i>S.aureus</i>	<i>S.typhae</i>	<i>p.auriginosa</i>
Aqueous	12	14	11	10
<i>n</i> -Butanol	11	13	10	11
Chloroform	13	16	12	11
<i>n</i> -Hexane	10	12	13	11
Positive control	29	20	24	23

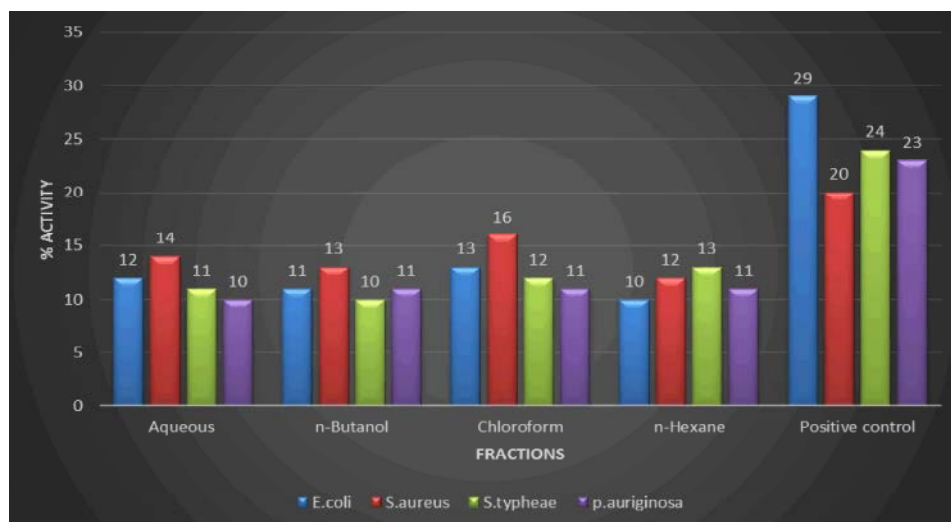


Fig. 1: Graph showing the comparative study of various fractions against different bacterial strains.

Table 2: Phytochemicals evaluation of *Xanthium Strumarium*  
Indications Used for presence or absence of a compound:  
Absence (-); Presence (+)

Phyto chemicals	Inference	Phyto chemicals	Inference
ALKALOIDS		Proteins:	
Mayer's Test	+	Biuret's test	+
CARBOHYDRATES		Glycosides:	
Molish's Test	+	Keller Killiani Test	+
Benedict's Test	+	Anthranel glycosides:	
Fehling's Test	+	Borntrager,s test	-
Deoxysugar		Saponine:	
Killer-killani test	+	Foam test	-
FLAVANOIDS		Coumarin:	
Shinoda test	+	NaOH test	+
TRITERPENOIDS			
and STEROIDS		Starch:	
Liebermann-burchards test	+	NaCl test	+
Tennins		Resins:	
FeCl <sub>3</sub> test	+	Acetone test	+

**Phytochemical Results:** The *Xanthium Strumarium* is found to be good source of alkaloid, flavonoids, tennins, resins, carbohydrates, starch, proteins, glycosides, coumarin, terphenoids and steriods. Anthraquinone glycosides and triterphnoids were found to be absent in the plant. The bioactive extract/fractions of the plant can be further used for isolation of natural products from the plant and to add a number of valuable compounds to Phytochemistry and pharmaceutical industries (Table 2).

### CONCLUSION

The presence of different phytochemicals in the plant is the possible answer for its active antimicrobial profile. The bioactive fractions can be further use for isolation of natural products.

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