

Antibacterial and Preliminary Phytochemicals Screening of *Theraxicum officinale*

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The antibacterial activity of different crude extracts of different parts of *Theraxicum officinale* including roots, stem and leaves and solvents (n-hexane, chloroform, ethyl acetate and methanol) against various human pathogens viz., *Salmonella thphi* (*S. thphi*), *Escherichia coli* (*E. coli*), *Pseudomonas aeuroginosa* (*P. aeuroginosa*), *Staphylococcus aureus*, were carried out. Among the extracts, methanolic extract of the roots fraction showed a maximum zone of inhibition (18 mm) against *S. aureus*, followed by leaves extract of maximum zone of inhibition (16 m), while the ethyl acetate fraction of leaves showed (15 mm) maximum zone of inhibition against *S. aureus*. While low activity of the stem extracts were recorded except for the methanolic extract with a maximum of zone of inhibition (13 mm) against *S. typhi*. In addition, the phytochemical analyses showed the presence of Phenols, Tannin, Alkaloids, Saponins and Flavonoids.

Key words: Antibacterial activity, *Theraxicum officinale*, extracts.

Taraxacum officinale is commonly known as Dandelion (Bathur) belongs to the family compositae, is a perennial herb widely distributed in the world as hawkweed. Its root is an important drug of herbal medicine, have long been used on the continent as a remedy for liver complaints. *T. officinale* leaves are adjunct to treatments where enhanced urinary output is desirable. In medicine, the dandelion root or the entire plant gathered while or before flowering, from both wild and cultivated plants, is used¹. The active compounds were identified in a number studies²⁻³

The plant is diuretic, stimulant, anti-biotic, anti-rheumatic, anti-spasmodic, tonic, epatic, laxative and nutritive⁴⁻⁵.

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Herbal plants not only a source of providing bio-active constituents in the form of raw materials for pharmaceuticals, perfumery, flavor and cosmetic industries but also protecting and curing human against certain diseases. The use of plant materials against various pathogenic diseases, draw the attention of scientist's to work on the herbal medicinal plants. Natural products, both in the purified form or as a crude standardized extracts, provide opportunities for new drugs because of the unmatched availability of chemical diversity. Concrete efforts will be needed to isolate or synthesize derivatives of plant origin to discover new antimicrobial biomarker with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases⁶. The increasing failure of drugs against the infected microbes has led for searching and screening

medicinal plants potential anti-microbial activity⁷. Recently, secondary plant metabolites (phytochemicals), with pharmacological activities, have been extensively investigated as a source of medicinal agents⁸.

The main purpose of the present study was to evaluate the anti-bacterial activity of different crude extracts of *T. officinale* against different pathogenic bacterial strains.

MATERIALS AND METHODS

The plant parts including roots, stem and leaves were washed in tap water and then rinsed with the de-ionized water properly, dried under shade. The dried plant materials were pulverized by sterile electric blender to get powdered plant materials. Each shade dried powdered plant materials of roots, stem and leaves) 10g/100 mL was extracted with with n-Hexane, chloroform, Ethyl acetate and Methanol and kept overnight. Solvents were evaporated under reduced pressure to give the crude residue.

Antibacterial Assay.

The antimicrobial efficacy of the crude extracts was determined by using well agar diffusion method. The standard bacterial stock suspension 10^8 - 10^9 CFU/ mL was mixed with 60 mL of sterile nutrient agar thoroughly. 20 mL inoculated

nutrient agar was poured into sterile petri dishes. Left the agar to set and four well (10 mm in diameter) were made in each of these plates using sterile cork borer No. 8 and then agar discs were removed. The entire well were filled with 0.1 mL of each extracts using microtiter-pipette and allowed to diffuse at room temperature for 2 h. The plates were incubated at 37 °C for 24 h. Three replicates were performed for each extract against each of the tested organism. Simultaneously, addition of the respective solvent instead of extract was carried out as controls. After incubation, the zones of inhibition were measured (in mm)⁹⁻¹⁰. Preliminary phytochemical screening was done by the standard methods described by Harborne¹¹.

RESULTS AND DISCUSSION

The result of the anti-bacterial activity obtained from the different crude extracts (n-hexane, chloroform, ethyl acetate and methanol) of *T. officinale* is shown in Table-1 (Fig 1). Among the applied extracts, methanol extract of the root fraction exhibited maximum zone of inhibition of 18 mm, against *S. Aureus* followed by leaf extract of 16 mm zone of inhibition while the stem extract of methanol exhibited 14 mm zone of inhibition 14 mm against *E.coli*.

Table 1. Antibacterial Activities of *Taraxacum Officinale*

Microorg -anism Tested	Concent -ration mg/mL	Zone of Inhibition in mm											
		n-Hexane			Chloroform			E. acetate			Methanol		
		Rt	St	Lf	Rt	St	Lf	Rt	St	Lf	Rt	St	Lf
<i>S. Typhi</i>	5	8	5	2	7	4	6	9	5	3	12	14	5
<i>E. Coli</i>	5	5	3	-	8	6	7	11	-	2	15	10	13
<i>P. Aeruginosa</i>	5	2	-	4	10	3	5	10	5	2	11	7	9
<i>S. Aureus</i>	5	9	2	10	8	6	-	12	11	15	18	13	16

Rt: roots, St: stem, L: leaf.

Table 2. Qualitative Analysis of Phytochemicals in *T. officinale*

Sample Code	Phenols	Tannin	Alkaloids	Saponins	Flavonoids
n-Hexane	-	+	-	-	+
Chloroform	+	+	+	+	+
Ethyl acetate	+	+	+	+	+
Methanol	+	+	+	+	+

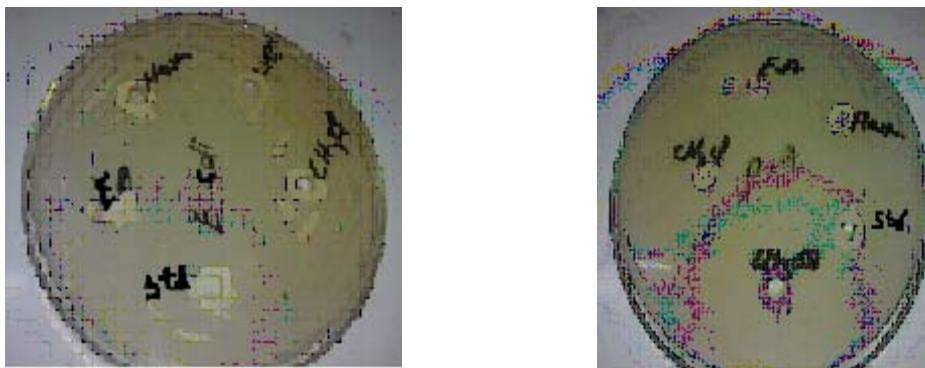


Fig. 1. Zone of inhibition

In case of the hexane fraction, low zone of exhibition were recorded against all the pathogenic bacterial strains. The chloroform fraction of the root showed 10 mm zone of inhibition against *P. Aeruginosa* and minimum zone of inhibition of 3 mm was recorded by the chloroform fraction of the stem against the same pathogenic strain *P. Aeruginosa*. Furthermore, the ethyl acetate fraction of the leaves showed a maximum of 15 mm zone of inhibition followed by root 12 mm and stem 11 mm zone of inhibition against *P. Aeruginosa*.

All the crude extract fractions showed a minimum zone of inhibition against *S. typhi* and *E. coli* except the methanolic fractions has maximum zone of inhibition against all the applied pathogen strains. As a whole in all the four fractions relatively high zone of inhibition was recorded by the root fractions against the four bacterial strains.

For the qualitative investigation of crude phytochemicals, the protocol of Harborne¹¹ and Iqbal Hussain¹² was followed. Most the extracts showed the presence of Phenols, Tannin, Alkaloids, Saponins and Flavonoids (Table 2).

CONCLUSION

Medicinal plants find wide application in the maintenance of human health. *Taraxicum officinale* is an important herbal medicinal plant used for different types of ailments. Keeping in view their importance, the resulted data obtained from the anti-bacterial activity of different crude extracts has provided scientific data baseline both for the herbal industries, local practioners, pharmaceutical consumers and for the researcher. Furthermore, to the best of our knowledge it is the

first report on the anti-bacterial activity and phytochemical analysis of *T. officinale*

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REFERENCES

1. Wichtl M, Bisset NG, Herbal drugs and phytopharmaceuticals. Medpharm, Stuttgart 1994; 596–600
2. Kisiel W, Barszcz B. Further sesquiterpenoids and phenolics from *Taraxacum officinale*. *Fitoterapia*, 2000; **71**; 269–273
3. Akashi T, Furuno T, Takahashi T, Ayabe SI. Biosynthesis of triterpenoids in cultured cells, and regenerated and wild plant organs of *Taraxacum officinale*. *Phytochemistry*, 1994; **36**(; 303–308
4. Hook I, Mc Gee A, Henman M. *Int J Pharmacog*, 1993; **31**(1); 29.
5. Evans WC. *Pharmacognosy* 2005; 15thed, p.454, 458, 473.
6. Sofowora A. *Medicinal Plants and Traditional in Afirica*: John willy. New York, (1982) 289
7. Iwu M M, Duncan A R, Okunji C O. New antimicrobials of plant origin. *In J. Janick* (Ed). *Prospective on new crops and new uses*. ASHS press, Alexandria. V.A. 1999; 457–462.
8. Westh H, Zinn CS, Rosdahl VT. *An international*

- multicenter study of antimicrobial consumption and resistance in *Staphylococcus aureus* isolated from 15 hospitals in 14 countries. *Microbe Drug Resist*, 2004; **10**; 169-176.
9. Hanna K. Examination of antibacterial and antifungal activity of selected non- antibiotic products. *Acta Pol Drug Res*, 2008; **65** : 779-782.
 10. Lee D, Kim H, Park Y. Gram-positive bacteria specific properties of silybin derived from *Silybum marianum*. *Arch Pharm Res*, 2003; **26** ; 597-600.
 11. Harborne JB. *Phytochemical methods*, London. Chapman and Hall, Ltd.pp. 1973: 49-88.
 12. Iqbal Hussain, Riaz Ullah, Rooh Ullah, Muhammad Khurram, Naseem Ullah, Abdul Baseer. Phytochemical analysis of selected medicinal plants. *African J Biotechnol*, 2011; **10**(38); 7487-7492