Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.6, No.7, 2016

Evaluation of Antimicrobial Potential of Ethnomedicinal Plant: Ficus hispida L.

Dhawale P.G.* Ghyare B.P.
Research laboratory, Department of Botany, Phulsing Naik Mahavidhyalaya, Pusad, Distt.Yavatmal (MS), India

Abstract
Medicinal plants have been a valuable source of natural active phytoconsituents that play an important role in treatment of many human diseases. In the present study, stem (St), leaf (Lf), root (Rt), and fruit (Ft) of *Ficus hispida* L. was evaluated for its antibacterial potential. The Soxhlet extraction was done by using three different solvents viz., acetone, methanol and water. The antimicrobial activity was evaluated by an agar disc diffusion method against four bacterial strains viz., *Staphylococcus aureus* (NCIM 5345), *Escherichia coli* (NCIM 2931), *Enterobacter aerogenes* (NCIM 5139), *Pseudomonas aeruginosa* (NCIM 5029) and two fungal strains viz., *Fusarium proliferatum* (NCIM 1103), *Fusarium oxysporum* (NCIM 1281).The methanol extracts showed better antimicrobial activity than acetone and aqueous extracts. This may be because of the difference in the presence of phytoconsituents present in them.
Keywords: *Ficus hispida*, ethnomedicinal plants, antimicrobial activity, herbal medicine, phytochemicals.

Introduction

The potential of higher plants as source for new drugs is still largely unexplored. Among the estimated 250,000-500,000 plant species, only a small percentage has been investigated phytochemically and the fraction submitted to biological or pharmacological screening is even smaller. Historically pharmacological screening of compounds of natural or synthetic origin has been the source of innumerable therapeutic agents. Random screening as tool in discovering new biologically active molecules has been most productive in the area of antibiotics (Gerhartz, *et al*.1985 and Kroschwitz *et al*.,1992). Even now, contrary to common belief, drugs from higher plants continue to occupy an important 130 drugs, all single chemical entities extracted from higher plants, or modified further synthetically, are currently in use, though some of them are now being made synthetically for economic reasons (Newman *et al*., 2000). India is a varietal emporium of medicinal plants and is one of the richest countries in the world as regards to genetic resources of medicinal plants. All known types of agro climatic, ecological and edaphic conditions are met within India. The biogeographic position of India is unique which makes India rich in all the three levels of biodiversity (Krishnaraju *et al*., 2006). Some studies focusing on the investigation of traditional Indian medicinal plants have resulted in the identification of new sources of therapeutic agents (Ahmad *et al*., 2001).

Medicinal plants represent a rich source of antimicrobial agents. Plants are used medicinally in different countries and are a source of many potent and powerful drugs (Srivastava *et al*., 1996). A wide range of medicinal plant parts is used for extract as raw drugs and they possess varied medicinal properties. The different parts used include root, stem, flower, fruit, twigs exudates and modified plant organs. While some of these raw drugs are collected in smaller quantities by the local communities and folk healers for local used, many other raw drugs are collected in larger quantities and traded in the market as the raw material for many herbal industries (Uniyal *et al*., 2006). Although hundreds of plant species have been tested for antimicrobial properties, the vast majority of have not been adequately evaluated (Balandrin *et al*., 1985).

Plants are recognized for their ability to produce a wealth of secondary metabolites and mankind has used many species for centuries to treat a variety of diseases. The curative properties of herbs lie in secondary metabolites with *in situ* functions including growth regulation, inter and intra-specific interactions and defense against predators and infections. Many of these natural products have been shown to present interesting biological and pharmacological activities and are used as chemotherapeutic agents or serve as the starting point in the development of modern medicines (Verpoorte *et al.,* 1998, 2000). Herbs are safe, less toxic, economical and a reliable key natural resource of drugs all over the world (Cragg *et al.,* 1999). Many infectious diseases have been known to be treated with herbal remedies throughout the history of mankind. In addition, in developing countries, synthetic drugs are not only expensive and inadequate for the treatment of disease, but are also faced with adulteration and side effects. Therefore, there is a need to search new safe infection fighting strategies to control microbial infection. Natural products, either as pure compounds or as standardized plant extracts, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. There is a continuous and an urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases (Rojas *et al*., 2003). Therefore, researchers are increasingly turning their attention to folk medicine, looking for new leads to develop better drugs against microbial infections. The increasing failure of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has led to the screening of several medicinal

plants for their potential antimicrobial activity. Thus, plants can be investigated for their antimicrobial efficacy.

Material and Method
Several seasonal surveys will be made to collect the plant material for the experimentation.

Collection of Plant Materials:
Collection will be carried out from forest localities from Yavatmal district. Identification will be made with the help of standard floras (Karthikeyan and Kumar, 1993, Kamble and Pradhan, 1988, Naik, 1998 and Singh *et al.*, 2001).

Preparation of Powder and Extract of Various Parts of Selected Plant :
The collected plant material will be shade dried and mechanically powdered and stored in an airtight container. Various extracts will be prepared according to the methodology of Sadashivan and Manickam (2005), will be subjected to our entire studies. The shade dried plants parts will be allowed to pulverization to get coarse powder. The coarse powder material will be subjected to Soxhlet extraction separately and successively with acetone, methanol and aqueous extracts. These extracts will be concentrated to dryness in flash evaporator.

Antimicrobial Activity:
Antimicrobial activity will be carried by using antibiotic sensitivity Agar (Hi-Media) by disc diffusion method (Elizabeth, 2005) against four bacterial strains viz., *Staphylococcus aureus* (NCIM 5345), *Escherichia coli* (NCIM 2931), *Enterobacter aerogenes* (NCIM 5139), *Pseudomonas aeruginosa* (NCIM 5029) and two fungal strains viz., *Fusarium proliferatum* (NCIM 1103), *Fusarium oxysporum* (NCIM 1281).

Results And Discussion:
Antimicrobial activity methanol, acetone and aqueous extract of all part of plant extracts was tested with four bacterial strain- *E. aerogenes, P. aerogenosa, E. Coli, S. aurius* and two fungal strain- *F. oxysporum* and *F. proliferatum* (table no.1). Methanol extract shows better antimicrobial activity than acetone and aqueous extract. Methanol extract of stem and root shows higher zone of inhibition for *F.oxysporum* than other microbes, methanol extract of leaf and fruit shows higher zone of inhibition for *E. aerogenes* . Aqueous extract of stem a shows higher zone of inhibition for *P. aerogenosa* than other microbes, aqueous extract of leaf and fruit a shows higher zone of inhibition for *F. oxysporum* than other microbes. Acetone extract of stem and fruit shows higher zone of inhibition for *F. proliferatum* than other microbes, acetone extract of leaf shows higher zone of inhibition for *E. aerogenes* and *F. oxysporum* than other microbes, acetone extract of root shows higher zone of inhibition for *P. aerogenosa* and *F. proliferatum* than other microbes (Fig 1.1,1.2,1.3,1.4). This is because of the difference in the presence of phytoconsituents present in them.

Table 1 : Antimicrobial activity of *Ficus hispida* extracts.

Sr.No.	Name of microorganisms	Extracts	Diameter of zone of inhibition in mm			
			St	Lf	Rt	Ft
1	*E. aerogenes*	Aq	6	6	10	11
		Ac	10	13	6	12
		Me	6	15	10	15
2	*P. aerogenosa*	Aq	9	6	10	8
		Ac	10	11	12	11
		Me	13	14	12	13
3	*E. Coli*	Aq	7	10	6	6
		Ac	11	12	6	6
		Me	11	14	6	12
4	*S. aurius*	Aq	7	6	8	11
		Ac	10	10	11	12
		Me	10	11	11	13
5	*F. oxysporum*	Aq	6	12	10	12
		Ac	12	13	11	13
		Me	15	14	16	14
6	*F. proliferatum*	Aq	6	8	10	11
		Ac	14	10	12	14
		Me	14	12	15	14

Note : St - Stem , Lf – Leaf , Rt – Root , Ft – Fruit , Aq – Aqueous , Ac – Acetone , Me – Methanol

Fig. 1.1: Antimicrobial activity of stem extract of *F. hispida*

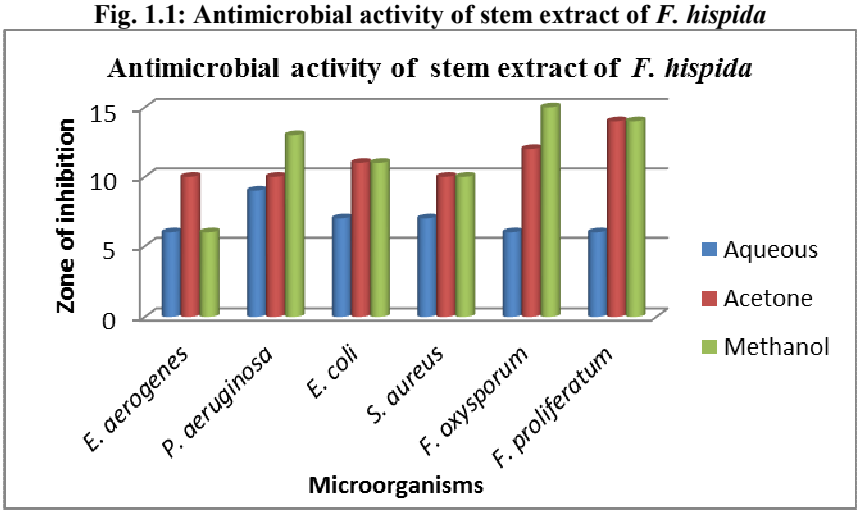


Fig. 1.2: Antimicrobial activity of leaf extract of *F. hispida*

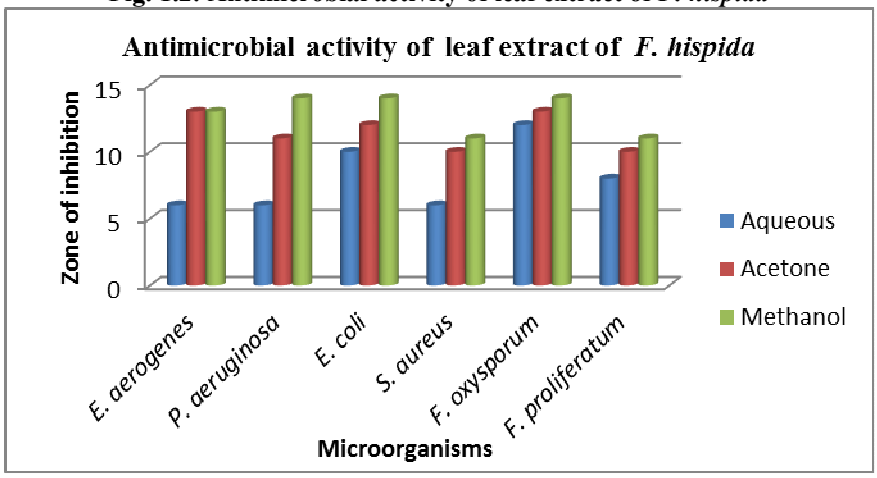


Fig. 1.3: Antimicrobial activity of root extract of *F. hispida*

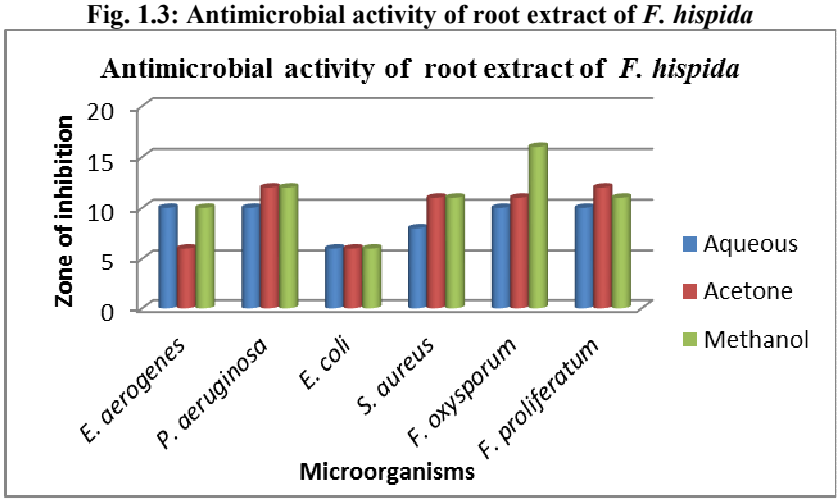
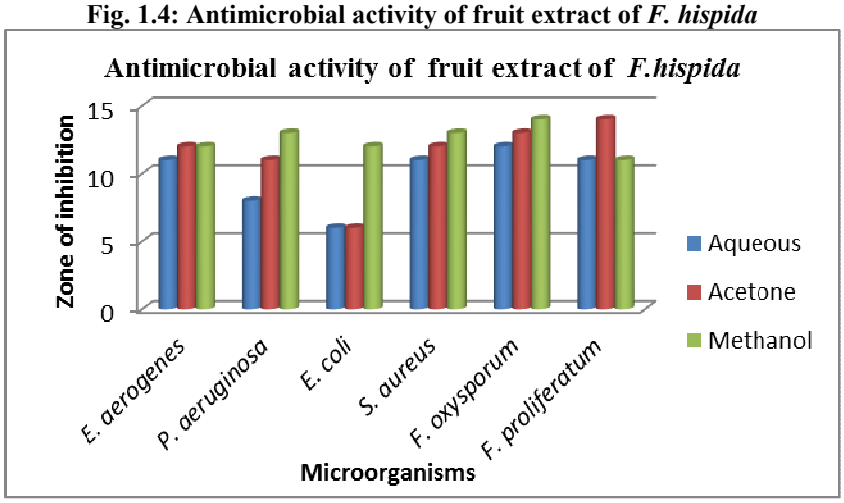


Fig. 1.4: Antimicrobial activity of fruit extract of *F. hispida*



Conclusion

The results of present investigation clearly indicate that, the plant rich in secondary metabolite. They show antibacterial and antifungal activity for selected strains. Thus the plants under investigation showed their medicinal potential and can be a source of useful drugs. More phytochemical research work is required for isolation, purification and characterization of biologically active compounds. Since the plant, *Ficus hispida* is useful in traditional medicine for the treatment of various ailments; it is need of time to standardize the plant for development of quality control parameters.

Aknowlegment

The authors express sincere thanks to Dr. S. G. Motke, Principal, Phulsing Naik Mahavidhyalaya, Pusad for providing necessary facility for this research work.

References

Ahmad, I., Beg, A. Z. (2001). Antimicrobial and phytochemical studies on 45 Indian medicinal plants against multi-drug resistant human pathogens. *Journal of Ethnopharmacology* ; 74:113-123.

Balandrin, M.F., J.A. Klocke, E.S. Wurtele and W.H. Bollinger, (1985). Natural plant chemicals: Sources of Industrial and Medicinal materials. Science, 228: 1154-1160.

Cragg, G.M., Boyd, M.R., Khanna, R., Kneller, R., Mays, T.D., Mazan, K.D. (1999). International collaboration in drug discovery and development: the NCI experience. *Pure and Appllied Chemistry* ; 71(9):1619-1633.

Gerhartz, W.,Yamamota, Y.S.,Campbell, R. P. and Rounsaville, J.F. (1985). Ullmann's Encyclopedia of Industrial.

Elizabeth, K. M. (2005). Antimicrobial activity of *Terminalia bellerica. Indian J Clin Biochem.* 20(2): 150–153.

Harborne, J. B. (1998). Phytochemical Methods. 3rd Edn. Chapman & Hall Publication, London.

Kamble, S. Y. and Pradhan, S.G. (1988). Flora of Akola District Maharashtra. Botanical Survey of India, Calcutta.

Karthikeyan, S. and Kumar, A. (1993). Flora of Yavatmal District, Maharashtra. Botanical Survey of India, Calcutta.

Kokate, C. K., Purohit , A. P. and Gokhale , S. B. (2005). Pharmacognosy. Nirali Prakashan, Pune.

Krishnaraju, A.V., Rao, T.V., Sundararaju, D., Vanisree, M., Tsay, H.S., Subbaraju ,G.V.(2006). Biological screening of medicinal plants collected from Eastern ghats of India using *Artemia salina* (brine shrimp test). *International Journal of Applied Science and Engineering* ; 4(2):115-125.

Kroschwitz, J.I. and M. Howe-Grant, 1992. Kirk- Othmer encyclopedia of chemical Technology, 2: 893. 5.

Naik,V. N. (1998). Flora of Marathwada.Vol.I&II,Amrut prakashan, Aurangabad.

Newman, D.J., Cragg, G.M. and Snader, K.M.(2000). The influence of natural products upon drug discovery. Nat. Prod. Res., 17: 215-234.

Rojas, R., Bustamante, B., Bauer, J., Fernandez, I., Alban, J.L.(2003). Antimicrobial activity of selected Peruvian medicinal plants. *Journal of Ethnopharmacology* ; 88:199-204.

Sadashivan, S. and Manickam, A. (2005). Biochemical Methods. 2nd Edn., New Age International (P) Ltd., Publisher New Delhi.

Singh, N. P., Lakshminarasimhan, P., Kartikeyan, S. and Prasanna, P. V. (2001). Flora of Maharashtra State. Vol. II, Botanical Survey of India, Calcutta.

Srivastava, J., Lambert J.and Vietmeyer, N. (1996). Medicinal plants: An expanding role in development. World Bank Technical Paper. No. 320.

Uniyal, S.K., Singh, K.N., Jamwal P. and Lal, B.(2006). Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalayan. J. Ethnobiol. Ethnomed., 2: 1-14.

Verpoorte, R.(1998). Exploration of nature's chemodiversity: the role of secondary metabolites as leads in drug development. *Drug Discovery Today*; 3:232-238.

Verpoorte, R.(2000). Pharmacognosy in the new millennium: lead finding and biotechnology. Journal of Pharmacy and Pharmacology; 52:253-262.