International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Studies on an Antibacterial Capability of Helicteres Isora

Rupali B. Patil[1], Dipak T Ghangale[2]

[1]Assistant Professor, Department of Chemistry K.S.K.W. Cidco College, Nashik
Email: *rupali25878@gmail.com*

[2]M.Sc. Environmental Science K. S. K. W. Cidco College, Nashik

Abstract: ***Antibiotics played a key role in development of the modern, pharmaceutical industry. Using the commercial antimicrobial drugs soon came up with their limitations, side effects thus making the medical practitioners to think about alternative medical branch. Since ancient times, herbs and their essential oils have been known for their varying degrees of antimicrobial activity. Present study focuses on potential medicinal properties of Helicteresisora, which are used by the people as a folk remedy for various health problems .Fruits of this plant is extracted in four solvents. Antibacterial sensitivity was conducted by well plate method using Sterile Mueller Hinton agar. Antimicrobial activity is measured against Microbial Strains of E. coli, S. aureus, P. aeruginosa, klebsiella pneumonia. Zone of inhibition were observed which are measured in mm. Antibacterial capability pattern of all four strains in different solvent extracts were studied.***

Keywords: Murudsheng, Common pathogenic bacteria, Organic solvent extraction, Well plate method, Zone of Inhibition

1. Introduction

Bacteria are recognized as the most potent source for various infectious and transmittable diseases. Infectious diseases are the world's leading cause of premature deaths killing almost 50,000 people every day. The use of antimicrobial drugs often considers one of the wonders of modern world. It had achieved dramatic effect on practice of medicine. But antibiotics and it's use had a disaster side effect on human body due to Drug-drug interaction, Drug related toxicity Allergies (Hyper sensitivity), Excessive cost, Drug resistance. Some adverse effects of the antibiotics chloramphenicol induce anaemia, Sulphonamide is toxic cause epidermal necrosis. Oxacellin, induce hepatitis in HIV patients. Diseases causing microbes have become resistance to antibiotic therapy. Clinical use of antibiotics has got its own limitations. Since ancient times, herbs and their essential oils have been known for their varying degrees of antimicrobial activity. Plants have been utilized as medicines for thousands of years.

The H. isora (Murul Sheng), a traditional medicine, belongs to family sterculiaceae is a sub – deciduous shrub or small tree of having spreading habit with stem 1-5 inches in diameter, reaching a height of 5 to 15 feet. Species is native to Asia and Australia. It occurs throughout India from Jamuna Eastwards to Nepal, Bihar and West Bengal, and southern India and Andaman Island. It occurs as undergrowth, especially as a secondary growth in forest. The plant is commonly called as "Mrigashringa" in Sanscrit, is an important medicinal plant described in indigenous system of medicine. Its root juice is claimed to be useful in cough, asthma, stomach affections, diabetes and cure scabies when applied topically. Fruits are demulcent, mildly astringent and useful in griping and flatulence. Aqueous ethanol and butanol extracts of H. isora root has been reported to possess significant antihyperglycemic activity in both alloxan- and glucose- induced hyperglycaemic rats at a dose of 250 mg/kg. The fruits of it have been use in the indigenous system of medicine in India for the treatment of griping bowels and diarrheal diseases (*Krishnarju et al 2006).*

2. Related Work

Antibiotics played a key role in development of the modern, pharmaceutical industry. However, Florey, Ernst chain & their colleagues was paramount in initiating the antibiotic Era (*Florey. H. W. 1949).*The roots and bark of Helicteresisora are expectorant, demulcent, hypoglycaemic and useful in colic, scabies, gastropathy, diabetes, diarrhoea and dysentery *(Singh et al, 1985, Kirtikar and Basu, 1995, Prajapati et al 2003, Kumat et al 2006).*The fruits are astringents, refrigerant, stomatic, vulnerary and useful in griping of bowels, flatulence of children and antispasmodic *(Chopra et al, 1956, Pohocha and Grampurohit, 2001).*The literature survey reveals the presence of flavones, triterpenoids, phytosterols, saponins, phlobatannins and sugar *(ScarpatiM. L. et al, 1958, Kelley C. J. et al, 1975).*The fruit extract of H. isora possess weak anti HIV activity *(WuT-S et al, 1998)*The ethanolic root extract possess a cyctotoxicity in the human nasopharyngeal carcinoma cell culture assay *(Nagai Y. et al, 1995).*The fruit also found to possess significant antispasmodic activity *S.Venkatesh et al* studied on Antimicrobial activity of Helicteresisora Root. *Y. S. Banginwar et al* evaluated antibacterial potential of helicteresisora l. fruits against enteric bacterial pathogens. The fruit aqueous extracts of H. isora showed prominent antibacterial activities against E.coli, Staphylococcus epidermidis, Salmonella typhimurium and Proteus vulgaris; moderate activity against Enterobacteraerogenes, Staphylococcus aureus, Salmonella typhi and least activity against Pseudomonas aeruginosa.

Helicteresisora L. has shown medicinal importance. H. isora is also known as the Indian screw tree. It demonstrates various health benefits, including anticancer activity *(Varghese et.al., Rattanamaneerusmee et.al.)* antibacterial

and antiplasmid activities. *(Shriram Vet.al.)*And cardiac antioxidant and antiperoxidative potency*(Kumar et.al.)* (*Prajapati et al, 2003). Badgujar et al, (2006)* had studied antimicrobial activity of Stem bark of H. isora and showed antimicrobial activity against S. aureus, Bacillus subtilis, P. aeruginosa and E. coli. In the present study, the fruits extracts also showed similar antibacterial activities against these pathogens. *Bonjar et al, (2004)* showed anti-Candida albicans activity of fruits of H. isora.Helicteresisora Linn. has been used for treating various ailments such as diarrhea, sore ear, snake bite, eczema, diabetes, flatulence which reflects its ethanobotanical, pharmacological relevance *(Mohan et al., 2015)*

Fruit is used in ripping of bowel, flatulence and stomach problems in Santa district of Madhya Pardesh*(Diwedi et al., 2006)*. Fruit is also used for gastrointestinal disorder and on a snake bite in the Marunduvalmalai, Western Ghats, Tamil Nadu.

3. Experimental Method

1) Preparation of media:
Mueller Hington Agar was weighted and dispense in D/W & autoclaved at 15 Ibs pressure at 121^0 c for min.For antimicrobial assay well plate technique were used. *(John v. Bennett & et al)*

2) Preparation of materials:
Petriplates, cork borer, micropipette tips, foreceps, test tubes, and saline test tubes were autoclaved at 15 lbs pressure at 121c for 15 min.

3) Preparation of Inoculum:
Two or three well isolated colonies of same morphology are selected from overnight grown nutrient agar plate: loopful of growth is transport to test tube containing 5 ml of sterile saline. The correct density of turbidity standard is verified by using colorimeter. The absorbance at 660nm should be 0.1, this corresponds to 10-6 – 10-8 cells/ml.

4) Preparation Plant extracts:
Four organic solvents Ethanol, Methanol, acetone, Petroleum ether are used for extract

The 100gm dried fruits of H. isora plant are weighted and coarsed into fine powder using mixer and kept in a 500 ml beaker. Methanol is added and kept in a room temperature for 24 hours with shaking the beaker periodically. After 24 hr. Incubation the extract were filtered and kept in water bath at 45˚C.till the solvent evaporate. Same procedure repeated for other three solvents.

Sensitivity testing was conducted by well plate method. Solvent extract used as source for testing antibacterial activity. Sterile butts of media are prepared and inoculated with 1 ml suspension of certain microorganism. This butts are poured into sterile plates and allow to solidify.• After solidification, with the help of sterile cork borer(8mm) four wells are made in each plate.50 microliter extract was added in each well. The well filled with solvent was kept as a control. Plates are transferred to incubator at 37˚C

4. Results and Discussion

After 24 hours of incubation, zone of inhibition were observed which are measured in mm and are as follows.

Table 1

Microorganisms	Organicsolvent (ZOI inMM)			
	Ethanol	Methanol	PetroleumEther	Acetone
E.coli	9	12	12	16
S. aureus	9	NI	12	13
P. aerogenosa	9	8.5	NI	10
K. pneumoniae	10	8.5	8.5	11

NI = No Inhibition
ZOI= Zone Of Inhibition

Figure 1: Grinded in mixer

Figure 2: Four solvent extract obtained

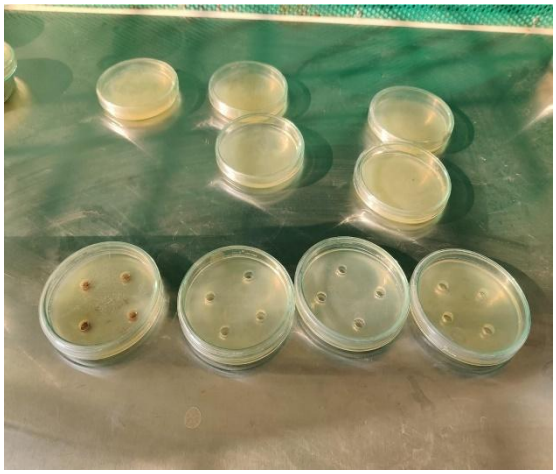

Figure 3: 8mm well are made in agar plate

The observation table 1 indicate the antimicrobial sensitivity pattern, in which all four microbial strains include E. coli, S. aureus, P. aeruginosa, klebsiellapneumoniae. Shows inhibition of growth against all four extract of H. isora. Ethanol extract show antimicrobial activity against all four strains.Methanol extract does not shows any activity against S. aureus.Petroleum ether extract does not shows any activity against P. aerogenosa. The extract in acetone show maximum zone of inhibition as compared with others.

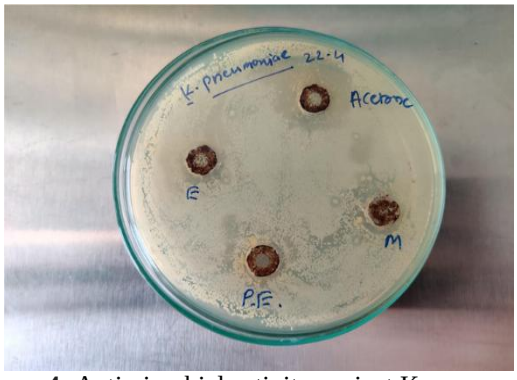

Figure 4: Antimicrobial activity against K. pneumonia

Figure 5: Antimicrobial activity against S. aureus

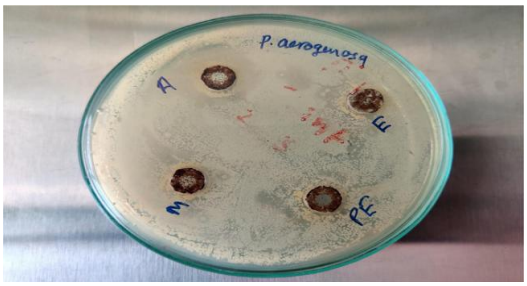

Figure 6: Antimicrobial activity against P. aerogenosa

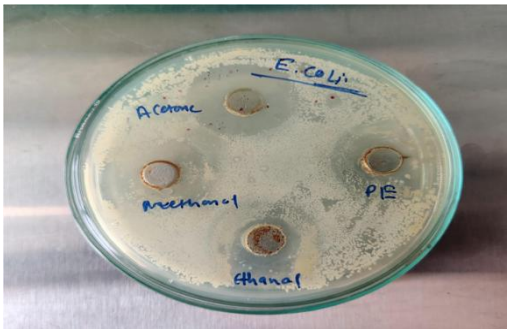

Figure 7: Antimicrobial activity against E. coli

5. Conclusion

From present study it can be conclude that, The four solvent extract of Helicteresisora have antibacterial potential against E.coli, S. aureus, P. aeruginosa and K. Pneumoniae. Acetone extract of Helicteresisora showed maximum antibacterial activity when compared with other three solvent extracts i.e. Methanol, Petroleum ether and Ethanol. Acetone is better solvent for extraction of active compound from Helicteresisora because, the extract in acetone show maximum zone of inhibition when compare with other solvent used for extraction.

The solvent extract of Helicteresisora show least activity agaist P. aeruginosa and K. Pneumoniae. It is clear from the results that, antimicrobial activity is due to the presence an active biomolecules present in the plant.

6. Future Perspectives

It is clear that Helicteresisora plant's fruits used by people against diarrheal diseases showed antibacterial activities. Although the nature and number of active antibacterial principles involved in fruit paste of Helicteresisora are not clear in present research, but the broad spectrum activity of fruit paste especially on enteric pathogens is promising. The present study suggests that fruit of Helicteresisora are antibacterial against enteric and diarrheal bacterial pathogens. The result of present study may form the basis of further investigation to isolate bioactive compounds. Separation, identification and purification of active compound by chromatographic technique can be done. Further cytotoxicity testing, lead development and clinical trials can be conducted. The mode of action of drug molecule to be investigated. Formulation of extract for clinical use as well as its antiviral sensitivity pattern can be studied

References

[1] A.S. Kenyon,P.E. finn& T.P. Layloff (1995) rapid screening of pharmaceuticals by Thin layer chromatography, International vol. 78, No.1, 1995, PP.41-49.
[2] Badgujar V.B; Jain P.S; Pal S.C. & Patil R.R. (2006). Antimicrobial activity of stem bark of H.isora. Indian journal of natural product 22(2): 34-35, 2006.
[3] Bonjar SGH. Anti-yeast activity of some plants used in traditional herbal-medicine of Iran. J Biological Sci. 2004;4(2):212–215.
[4] Chopra R.N, Nayar S.L, Chopra I.C, Glossary of Indian medicinal plants. Publication & information Directorate, (SIR: New Delhi, 1956).
[5] Janat A.M. et. al(2008), phytocompounds of the extracts of medicinal plants & assessment of their potential antioxidant by thin layer chromatography, pp 219-228.
[6] Jorgensen J.H, Turnidge J. D, Washington J. A., Antimicrobial susceptibility test: dilution & disc diffusion methods, manual of clinical microbiology, 7th ed, ASM press 1999. 1526-1543.
[7] Kirtikar K.R. and Basu B.D., Indian Medicinal Plants, published by Lalit Mohan Basu;2nd edn,1975;1:371.]

[8] Kumar G., Murugesen A.G. & M. RajasekaraPandian, (2006) Effect of H. isora bark extract on blood glucose & hepatic experimental diabetes. Pharmazie, 61: 353-355.
[9] Krishnaraju A.V., Tayi V.N. Rao, D. Sundararaju 1, M. I Vanishree, Hsin-sheng Tsay& G. V. Subbaraju 1 (2006). Biological screening of medicinal plants collected from Eastern ghats of India Int. J. Appl. Sci. Eng 4 (2): 115-125.
[10] Kumar G, Banu G.S, Murugesan A.G. Effect of Helicteresisora bark extracts on heart antioxidant status and lipid peroxidation in streptozotocin diabetic rats. J. Appl. Biomed. 2008;6(2):89–95.
[11] Mohan Kumar R.,M. ThamacinArulappa,, S. John Britto1, K. Ruckmani 2 and An Ethnobotanical Study of Medicinal Plants Used by Ethnic People in Gingee Hills, Villupuram District, Tamilnadu, India (2015). American Journal of Ethanomedicine: 2(2):85-99
[12] Nagai Y,.Kusumi T., Tetrahedron lett.,(1997)The 39th Symposium on the Chemistry of Natural Products, Sapporo, August, 136, 1853 – 1856
[13] Pohocha, N & N. D Grampurohit (2001). Antiplasmodic activity of fruit of H. isora Linn. Phytother. Res.15: 49-52.
[14] Prajapati N. D., S.S. Purohit, A. Sharma & T. Kumar (2003). Medicinal plants of H. isora, in: A hand book of medicinal plants 1st edi, 18, 302.
[15] Rattanamaneerusmee A, Thirapanmethee K, Nakamura Y, Bongcheewin B, Chomnawang M.T. Chemopreventive and biological activities of Helicteresisora L. fruit extracts. Res. Pharm. Sci. 2018; 13(6):484–492.
[16] Scarpati M.L., Oriente G., Ric. Sci., 28, 2329-2333 (1958); Kelley C.J, Mahajan J.R., Brooks L.C., Neubert L.A., Breneman W.N., Carmack M.J., org. Chem., 40, 1804-1815 (1975).
[17] Singh K.K., S.shaha& J.K Maheshwari (1985) .Ethnobotony of H. isora Linn. inkheri district , Uttar Pradesh, J. Economic taxonomic Botany 7 (2): 487-492.
[18] ShriramVarsha, JahagirdarSheetal, C. Latha, Kumar Vinay, Prashant D, RojatkarSupada&Shitole M.G. 2010. Antibacterial &antiplasmid activities of H. isora L., Indian journal med, Res 132, 2010, pg 94-99.
[19] S.Venkatesh., K.Sailaxmi., B.Madhara Reddy, M. Ramesh, Antinoceceptive activity of Helicteresisora, fitoterapia 78;2007:146-148.
[20] Singh S.B., Singh A.H. and Thakur R., Chemical constituents of the leaves of H.isora; Indian Journal of Pharmaceutical Sciences,1984;46(4):148-149 through MAPA,1984;6(6):8406-2920.
[21] Tambekar D.H., et. al. (2008), evaluation of phytochemical & antibacterial potential of H. isoraL.fruits against enteric bacterial pathogens vol.5, pg 290-293, (2008).
[22] Varghese E, Narayanan S.S, Gopal R.V, Nair A, Chittethu A.B, Anson T.A. Anticancer activity of chloroform extract of Helicteresisora. Int. J. Pharm. Technol. 2011;3(2):2560–2564.
[23] Wisplinghoff M, Bischoff bT, Tallent S.M., seifert H., Wenzel R.P., Edmond M.B., Nosocomial bloodstream infections in U S hospitals: analysis of 24, 179 cases from a prospective nationwide surveillance study, clin infect Dis 2004, 39; 309-317.