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A COMPARATIVE STUDY OF DIFFERENT PARTS OF *PSORALEA CORYLIFOLIA* OBTAINED IN DIFFERENT SOLVENT EXTRACTS AGAINST PATHOGENIC BACTERIA

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Key words: *Psoralea corylifolia, Solvent extracts, Antibacterial activity.*

Abstract - Medicinal plants are the local heritage with global importance and world is endowed with a rich wealth of medicinal plants. Plants have a great potential to be effective against the growth of pathogenic bacteria. In the present investigation, a comparative study is performed using different parts (seeds, tender stem and leaf) of *Psoralea corylifolia* obtained in different solvent extracts (methanol, petroleum ether and aqueous) against pathogenic bacteria (*Proteus vulgaris, Salmonella typhi, Kleibsella pneumonia* and *Pseudomonas aeruginosa*). The antibacterial activity of these extracts was done against bacteria by agar disc diffusion method. Among the three extracts of various plant parts, methanol extract of leaf showed maximum inhibition against *Salmonella typhi* followed by *Pseudomonas aeruginosa*. The findings also suggest that methanol extracts of tender stem of Psoralea corylifolia also show great effectivity against bacterial infections.

INTRODUCTION

Plants have been an integral part of human civilization. Medicinal plants have also been relied upon by over 80% of the world population for their basic health care needs (Mwambete, 2009). In recent years, several diseases and microbial infections, caused by the members of the family Enterobacteriaceae have shown considerable resistance to a number of antimicrobial agents, such as penicillin, ampicillin, and flouroquinolones among many others(Okeke, *et al*., 2007)There is an increasing trend in the emergence of resistance to antimicrobial agents, not only due to the poor quality drugs, patient non-compliance, and irrational use of antimicrobial agents, but also to spontaneous mutations within the microbial populations (Ndugulile *et al*., 2005). So reliable natural resource with little side effects are needed to control anti-human pathogenic invaders specially bacteria (Fazal *et al*., 2012). Medicinal plant extracts and active phytochemical contents with known antimicrobial efficiency can be of pronounced implication in therapeutics (Sukanya *et al*., 2009). Plant based antimicrobial agents are found in leaves, bark, stems, roots etc. (Ahmad *et al.* 2012). Thus plant extracts and plant compounds could serve as alternatives in anti-effective therapy of diseases caused by multidrug resistant organisms (Purkayastha and Dhahiya, 2012).

A systemic screening of traditional medicines may result the discovery of novel effective compounds. The need of the hour is to screen a number of medicinal plants for promising biological activity (Chanda *et al*., 2011). According to WHO reports, about 80% of world population is taking interest in indigenous medicinal plant remedies (Pirzada *et al*., 2009).

The same approach is made in the present investigation, where different parts of *Psoralea corylifolia* have prepared in different solvent extracts to evaluate the efficacy of the plant against various pathogenic bacteria.

MATERIALS AND METHODS

Plant materials: Leaves and tender stem of *Psoralea corylifolia* were obtained from the plants grown in

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Table 1. Solvent and aqueous extract of leaf showing antibacterial activity

Organism	Leaf Extract											
	Methanol				Petroleum Ether				Water			
	Zone Diameter (mm)	Mean	Standard Error	5% Sig-nifica-nce	Zone Diameter (mm)	Mean	Standard Error	5% Sig-nifcai-nce	Zone Diameter (mm)	Mean	Standard Error	5% Sig-nifica-nce
Proteus vulgaris	13	13.25	0.0426	0.083	-	-	-	-	-	-	-	-
	13				-				-			
	14				-				-			
	13				-				-			
Salemonella typhii	20	21.5	0.8622	1.69	8	8.25	0.053	0.104	7	6.75	0.059	0.116
	22				8				7			
	22				9				6			
	22				8				7			
Klebsiella pneumonae	9	8.5	0.06	0.117	16	15.5	0.045	0.088	-	-	-	-
	8				15				-			
	9				15				-			
	8				16				-			
Pseudomonas aerugenosa	15	15.5	0.076	0.15	-	-	-	-	8	7.75	0.064	0.125
	17				-				8			
	15				-				7			
	15				-				8			

the college garden. Seeds were purchased from the local medicinal plant agency in Nagpur city. Leaves, tender stem and seeds were washed, air dried and then powdered in mixer grinder and stored in air tight bottles.

Preparation of solvent extracts: Solvent extraction was prepared by taking 20g of powder in 200 mL of solvent in a conical flask. For best extraction, a soxhlet extractor was used for 48 hours. After this, extracts was concentrated through rotator evaporator which was then stored at 4 ^{o}C (Chanda, *et al*., 2011).

Test organisms: In present investigation, four bacterial cultures were used. They were *Proteus vulgaris* (MTCC 96), *Salmonella typhi* (MTCC 98), *Kleibsella pneumonia* (MTCC530) and *Pseudomonas aeruginosa* (MTCC741) were obtained from Microbial Type Culture Collection, Institute of Microbial Technology (IMTECH), Chandigarh. All were maintained on nutrient agar slants and were stored at 4^{o}C as well as -80 ^{o}C by making their suspension in 10% glycerol (Yebpella *et al*., 2011).

Determination of antibacterial activity: The antibacterial activity of different solvent extracts were determined by Disc diffusion method in Muller Hinton Agar in terms of diameter of zone of inhibition (Bakeht *et al*., 2011). The test strain (200µL) were inoculated onto the media and sterile discs (7mm in diameter) soaked in solvent extracts were introduced into the media and then plates were incubated for 24 hours at 37 ^{o}C. Microbial growth was observed by measuring the diameter of zone of inhibition.

RESULTS AND DISCUSSION

The antimicrobial activity of different solvent extracts like methanol, petroleum ether and water were obtained by using different source material of *Psoralea corylifolia* plant by soxhlet method.

Table 2. solvent and aqueous extract of tender stem showing antibacterial activity

Organism	Tender Stem											
	Methanol				Petroleum Ether				Water			
	Zone Diameter (mm)	Mean	Standard Error	5% Significa-nce	Zone Diameter (mm)	Mean	Standard Error	5% Significa-nce	Zone Diameter (mm)	Mean	Standard Error	5% Significa-nce
Proteus vulgaris	-	-	-	-	-	-	-	-	9	8.75	0.051	0.099
	-				-				9			
	-				-				8			
	-				-				9			
Salemonella typhii	9	8.5	0.06	0.117	-	-	-	-	-	-	-	-
	8				-				-			
	8				-				-			
	9				-				-			
Klebsiella pneumonae	-	8.75	0.051	0.099	7	.7.25	0.056	0.109	-	-	-	-
		-			7	-				-		
	-				8				-			
	8				7				-			
Pseudomonas aerugenosa	10	9.5	0.057	0.111	-	-	-	-	-	-	-	-
	9				-				-			
	10				-				-			
	10				-				-			

In cold extract of different parts with various solvents, methanol extract of leaf showed maximum inhibition i.e. 21mm in diameter on *Salmonella typhi* followed by *Pseudomonas aeruginosa* showing 15mm in diameter, *Proteus vulgairs* (13 mm) and *Kleibseilla pneumonia* (9 mm) as shown in Table 1. Methanol extract of tender stem showed better effectivity against *Salmonella typhi*, *Kleibseilla pneumonae, Pseudomonas aeruginosa* in seed extract zone of inhibition was observed only with *Proteus vulgairs* and *Salmonella typhi* as shown in Table 2 and 3 respectively.

Petroleum ether extract of leaf showed significant activity i.e 8mm and 16mm zone of inhibition against *Salmonella typhi* and *Kleibseilla pneumonia* as shown in Table 1 followed by seed extract only where 9 and 7mm of zone was recorded for the same bacteria respectively shown in Table 3 and only zone of 7mm against *Kleibseilla pneumonae* by using tender stem shown in Table 2. There was no such good response recorded against *Proteus vulgairs* with all plant parts used during the study.

The screening showed that *Psoralea corylifolia* is greatly effective against Gram negative bacteria. Similar results were obtained by (Parekh and Chanda, 2007; Enwuru *et al*., 2008; Shahwar and Muhammad, 2009). But in contrast to this view, (Yaghoubi *et al*., 2007) showed that plants are most effective against Gram positive bacteria. In study conducted by Chanda *et al*., 2011 *P. corylifolia* was most potent and showed activity against 4 out of 5 bacterial strains used in the study. Kiran *et al*., 2011 also showed the potentiality of *P. corylifolia* against fungal infections. It is also supported by the investigation carried by Barvealia *et al*., 2009, where methanolic extracts found to be effective and thus helpful in treating various fungal diseases in plants.

Several higher plants and their

Table 3. Solvent and aqueous extract of seed showing antibacterial activity

Organism	Seed Extract											
	Methanol				Petroleum Ether				Water			
	Zone Diameter (mm)	Mean	Standard Error	5% Significance	Zone Diameter (mm)	Mean	Standard Error	5% Significance	Zone Diameter (mm)	Mean	Standard Error	5% Significance
Proteus vulgaris	8	8.75	0.1	0.196	-	-	-	-	-	-	-	-
	8				-				-			
	10				-				--			
	9				-				-			
Salemonella	10	10.75	0.047	0.092	10	9.75	0.049	0.096	-	-	-	-
typhii	11				9				-			
	11				10				-			
	11				10				-			
Klebsiella	-	--	-	-	7	7.5	0.064	0.127	8	8.25	0.053	0.104
pneumonae	-				8				8			
	-				8				9			
	-				7				8			
Pseudomonas	-		-	-	-	-	-	-	9	9.5	0.057	0.112
aerugenosa	-				-				10			
	-				-				10			
	-				-				9			

constituents have shown success in plant disease control and effective against human pathogenic microbes. It proved to be harmless unlike the side effects of other drugs or antibiotics. The present investigation supports this thought and clears that *P. corylifolia* is potent against various pathogenic bacterial populations.

CONCLUSION

In the present investigation, different solvent extracts using different parts of *P. corylifolia* was evaluated for its antibacterial activity and it showed an effective results which concludes the potentiality of *P. corylifolia* against pathogenic bacterial populations.

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REFERENCES

Ahmad, N., Fazal, H., Abbasi, B.H., Anwar, S. and Basir, A. 2012. DPPH free radical scavenging activity and phenotypic difference in hepatoprotective plant. *Toxicology and Health Sci*. 102 : 129-134.

Baravalia, Y., Kaneria, M.,Vaghasiya, Y., Parekh, J. and Chanda, S. 2009. Antioxidant and antibacterial activity of *Diospyros ebenum* roxb leaf extract. *Turk. J. Bio*. 33 : 159-164.

Bakeht, J., Ali, H., Khan, M.A., Khan, A., Sayeed, M., Shafi, M., Islam, A. and Tayyab, M. 2011. Antimicrobial activity of different solvents of Linnum with disc diffusion method. *Afr. J. of Biotec*. 10 (85) : 19825-19835.

Chanda, S., Kaneria, M. And Nair, R. 2011. Antibacterial activity of *Psoralea corylifolia* L. seed and aerial parts with various extraction methods. *Res.J. of Micro*. 6 (2) : 124-131.

Enwuru, N.V., Ogbonnia, S.O., Nkemehule, F., Enwuru, C.A. and Tolani, O. 2008. Evaluation of

antibacterial activity and acute toxicity of the hydroethanolic extract of *Stachytarpheta angustifolia* (Mill) Vahl. *Afr. J. Biotechnol*. 7: 1740-1744.

Fazal, H., Ahmad, N., Abbasi, B.H. and Abbas, N. 2012. Selected medicinal plants used in herbal industries: their toxicity against pathogenic microorganisms. *Pak. Jr. Bot*. 44 (3) : 1103-1109.

Kiran, B., Lalitha, V. and Raveesha, K.A. 2011. Antifungal activity of aqueous and solvent extracts of seeds of *Psoralea corylifolia* L. against seed borne fungi of maize. *Inter. Jr. of Pharm. and Lif. Sci*. 2 (10) : 1133-1136.

Mwambete, K.D. 2009. The in vitro antimicrobial activity of fruit and leaf crude extracts of *Momordica charantia*: A Tanzania medicinal plant. *African Health Sciences*. 9 (1) : 34-39.

Ndugulile, F., Jureen, R., Harthug, S., Urassa, W. and Langeland, N. 2005. Extended Spectrum beta-Lactamases among Gram-negative bacteria of nosocomial origin from an Intensive Care Unit of a tertiary health facility in Tanzania. *BMC Infect Dis*. 5 (86) : 2334-2339.

Okeke, I.N., Aboderin, O.A., Byarugaba, D.K., Ojo, K.K. and Opintan, J.A. 2007. Growing problem of multidrug-resistant enteric pathogens in Africa. *Emerg Infect Dis. Perspective*. 13 (11) : 393-396.

Parekh, J. and S. Chanda, 2007. *In vitro* antibacterial activity of the crude methanol extract of *Woodfordia fruticosa* Kurz. flower (Lythaceae). *Braz. Jr. Microbiol*. 38 : 204-207.

Pirzada, J., Shaikh, W., Ghani, K.U. and Laghari, K.A. 2009. Study of antifungal activity and some basic elements of medicinal plant *Cressa cretica* Linn against Fungi causing skin diseases. *Res. Jr. Sci. Ser*. 41 (2) : 15-20.

Purkayastha, S. and Dahiya, P. 2012. Phytochemical screening and antibacterial potentiality of essential oil of *Psoralea corylifolia* L. *Inter. Jr. of Bio Sci., Bio Chem. and Bio Info*. 2 (3) : 188-191.

Sukanya, S.L., Sudisha, J., Hariprasad, P., Niranjana, S.R., Prakash, H.S. and Fathima, S.K. 2009. Antimicrobial property of medicinal plants against clinical and phtyopathogenic bacteria. *Afr. Jr. of Biot.* 8 (23) : 6677-6682.

Shahwar, D. and Muhammad, A.R. 2009. *In vitro* antibacterial activity of extracts of Mimusops elengi against gram positive and gram negative bacteria. *Afr. Jr. Microbiol. Res*. 3 : 458-462.

Yebpella, G.G., Adeyemi, H.M.M., Hammuel, C., Magoyma, A.M., Agbaji, A.S. and Okonkwo, E.M. 2011. Phytochemical screening and comparative study of antimicrobial activity of *Aloe vera* various extracts. *Afr. Jr. of Micro. Res*. 5 (10) : 1182-1187.

Yaghoubi, M.J., Ghorbani, G., Soleimanian, Z.S. and Satari, R. 2007. Antimicrobial activity of Iranian propolis and its chemical composition. *DARU Jr. Pharma. Sci*. 15 : 45-48.