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STUDY OF ANTIBACTERIAL ACTIVITY OF CRUDE EXTRACT OF LEAVES OF *Carica papaya*

BHAWANA PANDEY[a1], VARSHA CHANDRAKAR[b] AND BHAGYASHREE DESHPANDE[c]

[abc]Department of Biotechnology and Microbiology, Bhilai Mahila Mahavidyalaya, Bhilai Nagar, Chhattisgarh, India

ABSTRACT

The antimicrobial properties of plants have been investigated by a number of studies worldwide and many of them have been used as therapeutic alternatives because of their antimicrobial properties. Plants are the cheaper and safer alternative sources of antimicrobials. The study deal with the antibacterial activity of aqueous, ethanol and ethyl ether extract of leaves of *Carica papaya* through agar well diffusion assay against *Pseudomonas vesicularis, E. Coli, Salmonella typhi and Sterptococcus faecalis*. In all extract highest zone of inhibition shows against *P.vesicularis*(16.63) and minimum against *E.coli* (6.9). In ethanol extract highest zone of inhibition shows against *P.vesicularis*(15.13) and minimum against *E.coli* (7.73). In water extract highest zone of inhibition shows against *P.vesicularis*(13.46) and minimum against *E.coli* (6.69). In ethyl ether extract highest zone of inhibition shows against *P.vesicularis*(16.63) and minimum against *E.coli* (7.43). The results obviously justified the importance of topical application of papaya leaf extracts to treat the human infection causing bacteria as a traditional practice.

KEYWORDS: *Carica papaya*, Antibacterial activity, Extraction, MIC, Well Diffusion Method

The use of and search for drugs and dietary supplements derived from plants have accelerated in recent years. Ethno pharmacologists, botanists, microbiologists, and natural-products chemists are combing the Earth for Phytochemical and "leads" which could be developed for treatment of infectious diseases. Plants are rich in a wide variety of secondary metabolites, such as tannins, terpenoids, alkaloids, and flavonoids, which have been found in vitro to have antimicrobial properties. This review attempts to summarize the current status of botanical screening efforts, as well as in vivo studies of their effectiveness and toxicity. The structure and antimicrobial properties of phytochemicals are also addressed. It is estimated that there are 250,000 to 500,000 species of plants on Earth (Borris, 1996). *Carica papaya* belongs to the family Caricaceae. It is distributed throughout Asia, Nigeria etc (Afolayan, 2003). *Carica papaya* contains many biochemically active Compounds such as chymopapain and papain (James, 1983). It is widely used as antibacterial agents. Traditional healers have long used plants to prevent or cure infectious conditions. Many of these plants have been investigated scientifically for antimicrobial activity and a large number of plant products have been shown to inhibit growth of pathogenic bacteria. A number of these agents appear to have structures and modes of action that are distinct from those of the antibiotics in current use, suggesting that cross-resistance with agents already in use may be minimal (Soulsby, 2005). The present work is based on the effect of herbal medicine or natural products on different bacterial infection caused by different pathogenic bacteria. The present investigations were, therefore, proposed in evaluate the efficacy of the crude extract of leaves of *Carica papaya* against pathogenic microbes.

METHODS & MATERIALS

Plant material

The leaves of *Carica papaya* were collected from Bhilai C.G., India. A herbarium sheet was prepared. The leaves were dried in shade to avoid the deterioration of phyto constituents and made into a coarse powder by using a grinder.

Preparation of leaves Extract of *Carica papaya*

The powdered leaves of *Carica papaya* were subjected to soxhlet extraction (Continuous Hot Extraction) using Ethanol, Ethyl Acetate and Water as solvent.

Phytochemical Screening of extract

Phytochemical Screening (Khandelwall, 2009) was performed on all three extract.

Bacterial Strains

The various organisms used in the present study include *Staphylococcus faecalis*, *Escherichia Coli, P. vesicularis and S. typhi*. These organisms were maintained on nutrient agar slopes and the organisms were confirmed by biochemical test.

Antimicrobial Activity of Extracts

Well diffusion method

The agar well diffusion method technique (Bauer *et al.,* 1966) was used to determine the

[1]Corresponding author

antibacterial activity of the plant extracts. The test solution was prepared in Di methyl sulfoxide (DMSO).

Procedure- Inoculate the different culture on Nutrient agar plate. A sterile 5mm cork borer was used to punch holes after solidification of media. The wells formed were filled with different concentrations of the extract which were labelled accordingly; 50mg/ml, 37.5mg/ml, 25mg/ml, 12.5mg/ml. The plates were then left on the bench for 1 hour for adequate diffusion of the extracts and incubated at 37°C for 48hours in upright condition. After incubation, the diameters of the zones of inhibition around each well were measured.

RESULTS AND DISSCUSSION

Qualitative Phytochemical Screening-

Table 1: Qualitative Phytochemical Screening of Extracts

S. N.	Phytochemicals	Test Perform	Ethanol Extract	Water Extract	Ethyl Ether Extract
1.	Alkoloids	Dragenodraff Test	+	+	+
2.	Carbohydrate	Molish Test	-	+	+
3.	Saponins	Chloroform and H_2SO_4	--	+	+
4.	Glycosides	Molish Test	-	+	+
5.	Phenolic Compound	Ferric Chloride and Lead Acetate	-	-	+
6.	Flavonoids	Shinoda Test	-	+	+
7.	Tanins	Neutral $FeCl_3$	-	-	-

Antibacterial Activity

All the extracts from *Carica papaya* show antibacterial activity against all tested strains. Zone of inhibition were test for concentration ranging from 12.5mg/ml to 50mg/ml. (12.5mg/ml, 25mg/ml, 37.5mg/ml, 50mg/ml). Antibacterial activity tested for well diffusion method.

Table 2: Zone of Inhibition of Ethanol Extract

Extracts Concentration (Zone of Inhibition in mm)				
Microbial Strains	**12.5 mg/ml**	**25 mg/ml**	**37.5 mg/ml**	**50 mg/ml**
P.vesicularis	12.5±0.40	14.06±0.16	14.66±0.12	15.13±0.09
Sterptococcus faecalis	10.33±0.94	12.03±0.24	12±0.14	10.4±0.24
Salmonela typhae	9.36±0.32	9.96±0.16	9.93±0.04	11.13±0.12
E.coli	8±0.24	8.3±0.16	8.9±0.28	7.73±0.23

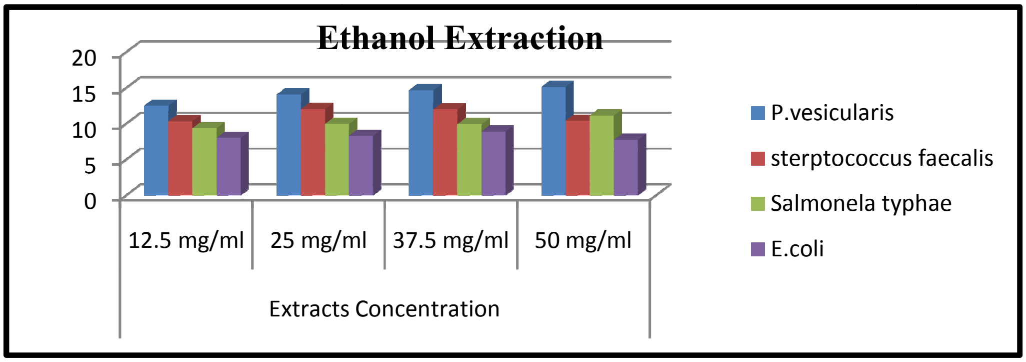
Table 3: Zone of Inhibition of Water Extract

Extracts Concentration (Zone of Inhibition in mm)				
	12.5 mg/ml	**25 mg/ml**	**37.5 mg/ml**	**50 mg/ml**
P.vesicularis	10.2±0.16	11±0	11.23±0.04	13.46±0.36
sterptococcus faecalis	10.53±0.04	11.63±0.04	13.03±0.28	10.2±0.21
Salmonela typhae	8.03±0.04	9.06±0.09	9±0	8.13±0.04
E.coli	7.66±0.04	8.73±0.52	8.56±0.04	6.9±0.08

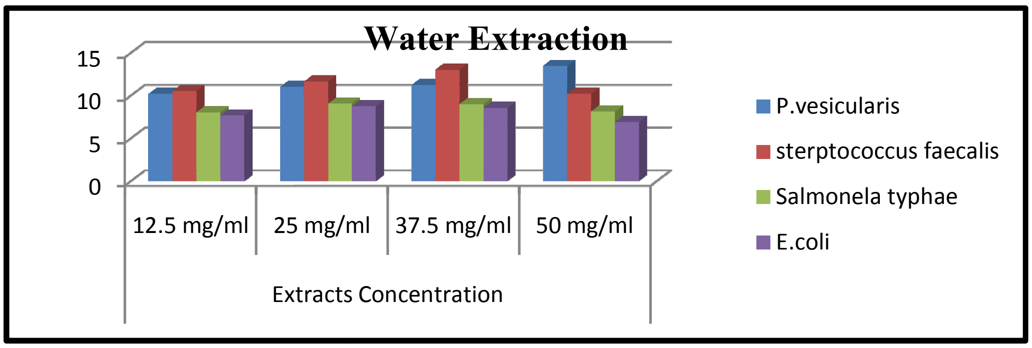
Table 4: Zone of Inhibition of Ethyl Ether Extract

Extracts Concentration (Zone of Inhibition in mm)				
	12.5 mg/ml	**25 mg/ml**	**37.5 mg/ml**	**50 mg/ml**
P.vesicularis	14.23±0.16	14.8±0.14	15.36±0.32	16.63±0.16
sterptococcus faecalis	12.43±0.30	13.23±0.16	13.96±0.09	11.93±0.28
Salmonela typhae	9.5±0.16	9.66±0.04	10.3±0.21	11.46±0.12
E.coli	7.43±0.41	9.33±0.40	10.43±0.32	11.36±0.28

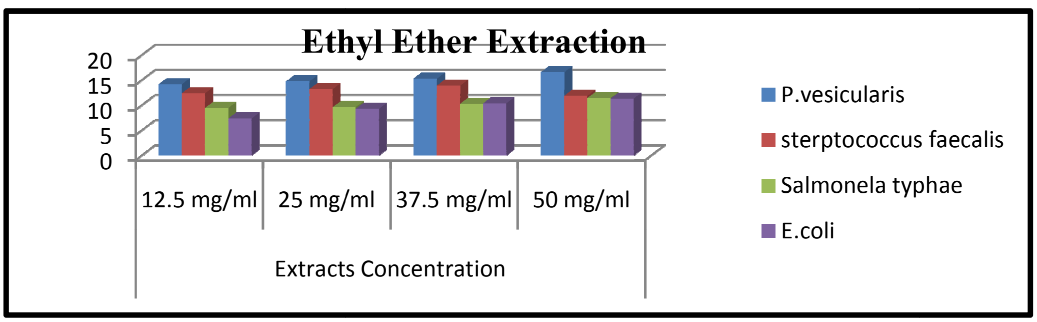
Graph 1: Zone of Inhibition of Ethanol Extract



Graph 2: Zone of Inhibition of Water Extract.



Graph 3: Zone of Inhibition of Ethyl Ether Extract.



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The antimicrobial properties of plants have been investigated by a number of studies worldwide and many of them have been used as therapeutic alternatives because of their antimicrobial properties (Adriana *et al.,* 2007). Plants are the cheaper and safer alternative sources of antimicrobials (Pretorius *et al*., 2001; Doughari *et al.,* 2007). Anibijuwon and Udeze (2009) studied the leaf and root of *C. papaya* using water and organic solvents. In this study highest activity against *Pseudomonas aeruginosa* and in our study highest activity show against *P.vesicularis*. Peter *et al.*(2014) studied the leaf and root of *Carica papaya*. In this study highest activity show against *Staphylococcus aureus, Pseudomonas aeruginosa, E. coli and Salmonella typhi*. This research indicated that papaya leaves have potential natural antibacterial compounds. Sherwani *et al.,* 2013; Omojasola and Awe, 2004 also examined the leaf extract of *Carica papaya* against plant and human pathogenic bacteria.

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