



Anti bacterial Activity of the Ethyl Acetate Extract of *Ficus racemosa* Fruit on *E.faecalis*.

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ABSTRACT

The aim of the study was to evaluate the antibacterial activity of the Ethyl acetate Extract of *Ficus racemosa* fruit against *E.faecalis*. Agar well diffusion assay as well as micro broth dilution assays were used for determination of antibacterial activity. Different concentrations of the extract (200mg/mL, 400mg/mL and 800mg/mL showed dose dependant antibacterial activity and the MBC was found to be 200mg/mL. This study suggests that the Ethyl acetate extract of *Ficus racemosa* fruit contains promising antibacterial substances which are having activity against *E.faecalis*.

Keywords: *Ficus racemosa*, *E.faecalis*, antibacterial activity, root canal failure.

INTRODUCTION

India has an ancient heritage of traditional medicine. The Materia Medica of India provides information on the folklore practices and traditional aspects of therapeutically important natural products and these products have good phytochemical and pharmacological actions.¹ *Ficus racemosa* Linn. (*Moraceae*) is a popular medicinal plant in India, which has been used in Ayurveda, for various diseases or disorders including diabetes, liver disorders, diarrhoea, inflammatory conditions, hemorrhoids, respiratory, and urinary diseases². *Ficus racemosa* is a herb. *F. racemosa* has various activities including antipyretic³, anti-inflammatory,⁴ antitussive⁵, hepatoprotective⁶, hypoglycemic,^{7,8} hypolipidemic⁹ and anti microbial activity. The fruit of *Ficus racemosa* has phytochemicals such as glauanol, hentriacontane, Beta-sitosterol, gluanol acetate, glucose, tiglic acid, esters of taraxasterol, lupeol acetate, friedelin and phytosterol¹. Literature survey shows the antibacterial activity of *F.racemosa* against *E.coli* and *S.aureus*. So, this study was carried out to find its activity against *E.faecalis*.

Root canal infections show that root canal harbors an array of microorganism and based on the type of root canal infection and severity, the microorganisms isolated may also differ.

Studies have shown that *Streptococcus mitis* and *Enterococcus faecalis* are the most prevalent microorganisms isolated from infected root canals¹⁰ and one of the main cause of endodontic treatment failure¹¹. *Enterococcus faecalis* is a Gram-positive and a facultative anaerobic bacteria. *E. faecalis*, the dominant microorganism in post treatment apical periodontitis, has often been isolated from the root canal in pure culture^{12,13}. *E.faecalis* shows antibiotic resistance, glycopeptide resistance, cephalosporins resistance, quinolone resistance¹⁴ and also hypochlorite resistance¹⁵.

E.faecalis can form biofilms¹⁶ and is known to penetrate deeply into the dentinal tubules making its complete elimination difficult¹⁷. So, plants products have much importance in future to treat root canal failure.

MATERIALS AND METHODS

Ethyl Acetate extract of *Ficus racemosa*.

Microbial Strain Used

E. faecalis ATCC

Culture Media

Mueller Hinton Agar

Standardization of Bacterial Suspension

The bacterial suspension was standardized following the CLSI guidelines and was grown in Mueller Hinton Broth (MHB, Hi-Media) for 18–24 h, followed by the matching of bacterial suspension to the turbidity equivalent to 0.5 McFarland solution (1-2 × 10⁸ CFU/mL) with the addition of sterile saline.

Agar Well Diffusion Assay

Evaluation of the antimicrobial activity of the extract was conducted according to the agar well diffusion method.^{18,19}

The different concentrations (200 mg/mL, 400, mg/mL and 800 mg/mL) of the plant extract were prepared and from this 100 µL was used for the study. 0.2% chlorhexidine was used as the control. The study was carried out in triplicate.

Minimum Inhibitory Concentration (MIC) & Minimum Bactericidal Concentration (MBC)

The MIC of the ethanolic extract of *Ficus racemosa* was determined by microbroth dilution method using 96-well microtitre plates. The MIC value of the extract was determined as the lowest concentration of the extract



that completely inhibited bacterial growth after 48 hrs of incubation at 37°C.²⁰

For the determination of MBC, a portion of liquid (5 µl) from each well that exhibited no growth were taken and then sub-cultured and incubated 37°C for 24 hrs. The lowest concentration that revealed no visible bacterial growth after sub-culturing was taken as MBC.²¹

RESULTS

In this study, different concentrations of the Ethyl acetate extract of *Ficus racemosa* fruit showed significant zone inhibition in a dose dependant manner (Table 1). Maximum zone of inhibition was found to be 35 mm at 800mg/mL (Fig 1). The MIC/ MBC were found to be 200 mg/mL.

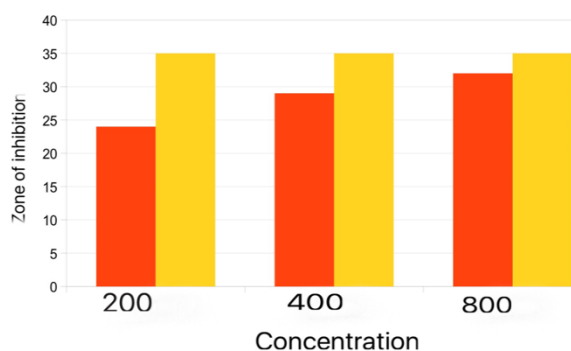


Figure 1: Graph showing the Antibacterial Activity of Ethyl Acetate extract of *Ficus racemosa* fruit against *E. faecalis*

Table 1: Zone of inhibition produced by the Ethyl Acetate extract of *Ficus racemosa* fruit against *E. faecalis*

Extract	Concentration (mg/mL)	Zone of Inhibition (mm)
Ethanolic Extract	200	24
	400	29
	800	32
Chlorhexidine	0.2 %	35

DISCUSSION

India is considered as Golden bird in terms of rich diversity of medicinal plants it posses. Since ages, hundreds of tribals residing in and around forests have acquired valuable information of the plants for healing property or value to human health. The phenolic and flavonoids contents in various fruits and vegetables reported to have antimicrobial activity²².

Medicinal plants have rich sources of antimicrobial agents used medicinally in different countries and are a source of many potent drugs used for traditional medicine.²³ Medicinal plants show antimicrobial activity by different mechanisms. They may inhibit cell wall synthesis, cause energy depletion by getting accumulated in the cell membrane, interfere with permeability of cell membrane, cause membrane disruption, modifying cellular constituents, cell damage or cell mutation.²⁴⁻²⁶

The presence of certain phytochemicals like β -sitosterol, hentriacontane,²⁷ phytosterol may be the reason for its antibacterial activity against *E. faecalis*. And the extract of the fruit is also used in leprosy, diarrhoea, circulatory and respiratory disorders and menorrhagia.²⁸⁻³⁰

The hydro alcoholic extract of *Ficus racemosa* was found effective against *Actinomyces viscosus*³¹. The extracts were also tested against *E. coli*, *Bacillus pumitis*, *Bacillus subtilis* and *S. aureus*¹.

CONCLUSION

This study suggests that the Ethyl acetate extract of *Ficus racemosa* contains promising antibacterial substances which is having activity against *E. faecalis* and may be considered for clinical purpose for management of *E. faecalis* infections.

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