

RESEARCH NOTE

Studies on antibacterial property of supercritical carbon dioxide extract of *Prosopis juliflora* leaves against food borne pathogens

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This study was aimed at evaluating antibacterial potential of the *Prosopis juliflora* leaf extract in attempt to identify potential natural sources for synthesis of new drug. The *Prosopis juliflora* leaf extracts obtained by supercritical fluid extraction were assessed for their antibacterial property against *Escherichia coli*, *Salmonella enterica* and *Staphylococcus aureus* using disc diffusion method and showed an inhibitory zone diameter of 13.90, 14.47 and 14.53 mm, respectively which indicates that supercritical fluid extract shows best result having zone of inhibition greater than that of the soxhlet extraction process (5.10, 5.20 and 5.10 mm). It can be concluded that the *Prosopis juliflora* could be a potential source for antibacterial agents in medical applications.

Key words: Antibacterial, Disc diffusion, Pathogen

Plants have always been a source of natural product for the treatment of various disease. Scientific interest in medicinal plant has burgeoned in recent times due to increased efficiency of new plant derived drugs and rising concerns about the side effects of modern medicine. *Prosopis juliflora* is a shrub or small tree in the family Fabaceae. This herb is well-known in the folkloric system of medicine because of its ethno botanical importance. The crude extracts of various parts and purified chemical components have been found to possess antimicrobial, insecticidal and different pharmacological activities (Singh *et al.*, 2011).

The present study was carried out in the Department of Agricultural Microbiology, UAS Raichur, Karnataka, in 2017. In this experiment, antimicrobial property of *Prosopis juliflora* was tested against three food borne pathogens via *Escherichia coli*, *Salmonella enterica* and *Staphylococcus aureus*.

The supercritical carbon dioxide extraction system (Thar; SFE 500 system) was used for extraction of *Prosopis juliflora* leaf extract (Liza., 2010). The independent variables selected for the study were supercritical fluid (SC-CO₂) pressures of

100, 150 and 200 bar and temperatures of 40, 50 and 60 °C at constant dynamic extraction time of 90 min Table 1. Soxhlet Extraction Method using SOCS- PLUS apparatus (Pelican Equipments; SCS-08) with hexane as solvent (Malapit, 2010).

In vitro screening of antibacterial activity SC-CO₂ extracted *Prosopis juliflora* leaf extract by disc diffusion technique (Talreja, 2010). Sterile paper discs measuring 6 mm diameter, which absorb about 0.1 ml of the solution were employed for test in test samples. All test Petri plates were kept at 5 °C for 40-50 min so as to allow the diffusion of the substances and then incubated at 35-37 °C for 18 h. Experiment was carried out in three replicates. The inhibition zones formed

Table 1. Treatment combinations for supercritical fluid extraction of *Prosopis juliflora* leaf extract

Treatments	Temperature (°C)	Pressure (bar)
T ₁	40	100
T ₂	40	150
T ₃	40	200
T ₄	50	100
T ₅	50	150
T ₆	50	200
T ₇	60	100
T ₈	60	150
T ₉	60	200
T ₁₀	85	Normal

T₁₀ = Control - Soxhlet extraction carried out at 85 °C for 90 minutes

by the *Prosopis juliflora* leaf extract were measured including diameter of paper disc.

The antibacterial activity of SC-CO₂ extracted *Prosopis juliflora* leaf extract at different temperature and pressure combinations against the bacterial pathogens. From the Fig. 1., it is observed that the zone of inhibition of extract were in the range of 5.10 to 13.9 mm for *Escherichia coli*, 5.20 to 14.47 mm for *Salmonella enterica* and 5.10 to 14.53 mm for *Staphylococcus aureus*. The results of present investigation was in agreement with that of Thakur *et al.* (2014) and Odhiambo *et al.* (2015).

The highest zone of inhibition was recorded at pressure of 200 bar and temperature of 50 °C treatment in all the test pathogens. This might be due to the fact that 200 bar, temperature of 50 °C is the optimum and best SC-CO₂ extraction condition for obtaining the highest extract and increased the density of the CO₂ thereby increasing the solvent strength and solubility of the antimicrobial component in CO₂ (Liza *et al.*, 2010).

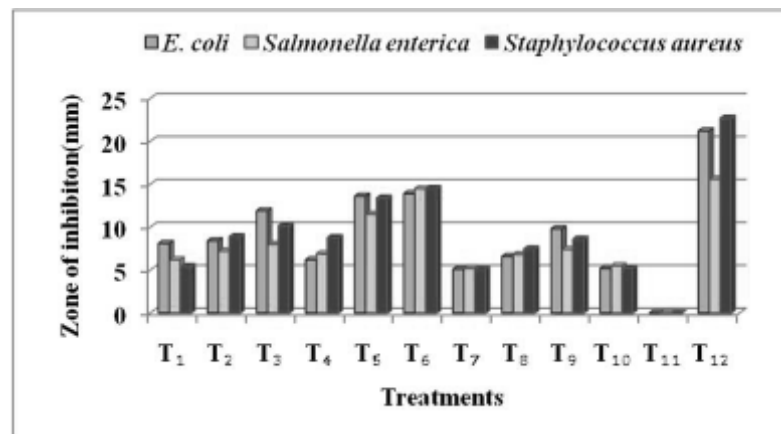


Fig. 1. In-vitro screening of SC-CO₂ extracted *Prosopis juliflora* leaf extract for antibacterial activity

Conclusion

In the present study an attempt has been made to decipher the antibacterial activity of *Prosopis juliflora* leaf extract obtained by supercritical fluid extraction. The extract of *Prosopis juliflora* leaves contain compounds such as alkaloids, tannin, phenols, steroids and flavonoids which may be responsible for antibacterial activity. The leaf extracts of *Prosopis juliflora* may be used as remedy against various food borne pathogens without any side effects. The results support the idea that *Prosopis juliflora* plant extracts could be a promising source of potential antibacterial agents in medicinal applications and eco friendly.

References

- Liza, M. S., Abdul, R. R., Mandana, B., Jinap, S., Rahmat, A., Zaidul, I. S. and Hamid, M. A., 2010, Supercritical carbon dioxide extraction of bioactive flavonoid from *Strobilanthes crispus* (Pecah Kaca). *J. Fd. Bioprod. Process*, 88: 319-326.
- Malapit, C. A., 2010, Report on the extraction of moringa oil from moringa oil seeds. *J. Lipid Sci.*, 1(1): 1-5.
- Odhiambo, R. S., Patrick, K. G., Helen, K. L., Gathu, N. C., Kimani, N. F., Waithaka, W. R. and Kipyegon, C., 2015, Antibacterial activity of ethanolic extracts of *Prosopis juliflora* against gram negative bacteria. *European J. Exp. Biol.*, 5(11): 43-46.
- Singh, S., Swapnil and Verma, S. K., 2011, Antibacterial properties of alkaloid rich fractions obtained from various parts of *Prosopis juliflora*. *Int. J. Pharma Sci. Res.*, 2(3): 114-120.
- Talreja, T., 2010, Screening of crude extract of flavonoids of *Moringa oleifera* against bacterial and fungal pathogen. *J. Phytology*, 2(11): 31-35.
- Thakur, R., Singh, R. and Pooja, S., 2014, Evaluation of antibacterial activity of *Prosopis juliflora* (SW.) DC. leaves. *African J. Tradit. Complement Altern. Med.*, 11(3): 182-188.