

# Accepted Manuscript

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PII: S0882-4010(17)31482-1

DOI: [10.1016/j.micpath.2017.12.004](https://doi.org/10.1016/j.micpath.2017.12.004)

Reference: YMPAT 2640

To appear in: *Microbial Pathogenesis*

Received Date: 10 November 2017

Revised Date: 30 November 2017

Accepted Date: 1 December 2017

Please cite this article as: Alizadeh Behbahani B, Tabatabaei Yazdi F, Shahidi F, Noorbakhsh H, Vasiee A, Alghooneh A, Phytochemical analysis and antibacterial activities extracts of mangrove leaf against the growth of some pathogenic bacteria, *Microbial Pathogenesis* (2018), doi: 10.1016/j.micpath.2017.12.004.

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## Phytochemical analysis and antibacterial activities extracts of mangrove leaf against the growth of some pathogenic bacteria

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### Abstract

In this study, the effects of water, ethanol, methanol and glycerin at five levels (0, 31.25, 83.33, 125 and 250 ml) were investigated on the efficiency of mangrove leaf extraction using mixture optimal design. The antimicrobial effect of the extracts on *Streptococcus pneumoniae*, *Enterococcus faecium* and *Klebsiella pneumoniae* was evaluated using disk diffusion, minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) methods. The mangrove leaf extraction components were identified through gas chromatography/mass spectrometry (GC/MS). Phytochemical analysis (alkaloids, tannins, saponins, flavone and glycosides) were evaluated based on qualitative methods. Antioxidant activity of extracts was measured using 2,2-diphenyl-1-picrylhydrazyl (DPPH), ferric reducing antioxidant potential (FRAP) methods. Maximum antimicrobial effect was observed in *Enterococcus faecium* and highest resistance against mangrove leaf extract in *Enterococcus faecium* and *Klebsiella pneumoniae*, respectively. Increasing concentration of mangrove extracts had a significant effect ( $p \leq 0.05$ ) on inhibition zone diameter. The MICs of the mangrove leaf extraction varied from 4 mg/ml to 16 mg/ml. The optimum formulation was found to contain glycerin (0 ml), water (28.22 ml), methanol (59.83 ml) and ethanol (161.95 ml). The results showed that the highest antioxidant activity was related to optimum extract of mangrove leaf and ethanolic extract respectively. The results of phytochemical screening of *Avicennia marina* leaves extract showed the existence of alkaloids, tannins, saponins, flavone and glycosides. 2-Propenoic acid, 3-phenyl- was the major compound of *Avicennia marina*. The results of non-significant lack of fit tests, and F value (14.62) indicated that the model was sufficiently accurate. In addition, the coefficient of variations (16.8%) showed an acceptable reproducibility.

**Key words:** Mangrove leaf, Optimization, Phytochemicals, Antimicrobial.

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