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Evaluation of antimicrobial, cytotoxicity effects and antioxidant potential of *Stemodia verticillata* (Mill.) Hassl extract

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ABSTRACT

The aim of this study was to evaluate the antimicrobial, cytotoxic, and antioxidant activities of *Stemodia verticillata* extract. Antimicrobial activity was assessed using agar well diffusion assay and Broth microdilution method, cytotoxicity effects using the 3-(4, 5-dimethylthiazol-2-yl) -2, 5-diphenyltetrazolium bromide assay, the 2,2-diphenylpicrylhydrazyl and ferric reducing antioxidant power assays were used to measure antioxidant. The various bioactive components were identified with the gas chromatography-mass spectrometer (GC-MS) technique. The highest antimicrobial activity was observed against *Staphylococcus aureus* with a minimum inhibitory concentration (MIC) of 4,000 µg/ml and a minimum bactericidal concentration of 16,000 µg/ml. In comparison, the least activity was observed for *Aspergillus niger* with a MIC of 16,000 µg/ml and minimum fungicidal concentration of 64,000 µg/ml. The cytotoxicity results revealed the presence of anticancer activity with an IC_{50} of 79.03 µg/ml against COLO205 colon cancer cell lines. The highest antioxidant activity was exhibited by acetone extract (IC_{50} = 29.112 µg/ml), followed by 80% ethanolic extract (IC_{50} = 34.72 µg/ml). The quantitative phytochemical analysis indicated that acetone and 80% ethanolic extracts contained higher amounts of flavonoids and phenolic compounds. Furthermore, five major bioactive compounds were identified by GC-MS. The Findings from the present investigation represent the high potency of *S. verticillata* extract as a source of more valuable bioactive compounds for developing future phytotherapeutic products.

INTRODUCTION

Infectious diseases are contagious illnesses or diseases brought on by pathogenic microorganisms, such as bacteria, fungi, viruses, protozoans, and helminthes (Shukla *et al*., 2014). In low-income societies, it is one of the primary causes of fatalities and morbidity (WHO, 2018a, 2018b). The diseases can cause suffering and death of the people but also have significant economic impacts that are not often recognized (Lindahl and Grace, 2015). The emergence and increasing rates of antimicrobial resistance to modern antibiotics are the main challenges to eradicating microbial infections, and the worst aspect is the development of antimicrobial resistance as a natural protective process among microorganisms; even rational use of antibiotics provides for antimicrobial resistance development (Review on Antimicrobial Resistance, 2016). The World Health Organization (WHO) has identified several priority pathogens against which newer antimicrobials should be developed to simplify the search for appropriate antimicrobials; these include *Mycobacterium tuberculosis*, *Escherichia coli*, *Candida albicans*, *Streptococcus pneumoniae*, *Enterobacter* spp., *Staphylococcus aureus*, and *Streptococcus pneumonia* and others (WHO, 2017). Most of these microorganisms have the capacity to produce biofilms, which are mostly made of DNA, proteins and polysaccharides. The biofilms created by these pathogenic bacteria and fungi are of serious concern because they give the underlying microbes a broad range of resistance (Bakkiyaraj *et al*., 2013). Novel agents are therefore required to combat these drug-resistant pathogens.

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