

The Antimicrobial and Anti-Inflammatory Effects of Silver Nanoparticles Synthesized from *Cotyledon orbiculata*

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INTRODUCTION

Cotyledon orbiculata, commonly known as pig's ear, is an important medicinal plant used in traditional medicine in South Africa. It is used to treat many ailments, including skin eruptions, abscess, inflammation, boils and acne [1]. Medicinal plants have been a huge source of therapeutic drugs currently used in modern medicine [2]. Medicinal plants have also been used in the synthesis of nanomaterials, especially metallic nanoparticles. Nanomaterials produced in this way are more biocompatible and thus more suitable for biomedical applications [3]. This study aimed to synthesize silver nanoparticles using *C. orbiculata* aqueous extract and to investigate the antimicrobial, anti-inflammatory and wound healing properties of the synthesized nanoparticles as well as the plant extract.

METHODOLOGY

The *C. orbiculata* extract was used to synthesize silver nanoparticles which were then characterized using various biophysical methods which include, UV-Vis, DLS and HRTEM. The antimicrobial activity of the extract and nanoparticles were evaluated against skin pathogens (*Staphylococcus aureus*, *Staphylococcus epidermidis*, Methicillin resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa* and *Candida albicans*). The immunomodulatory activity of the extract and nanoparticles were evaluated by determining their effects on cytokine production in THP-1 macrophages. Cytokine (TNF-alpha, IL-1 beta, and IL-6) levels were measured using the enzyme linked immunoassay. The wound healing activity of the nanoparticles and the extract was assessed on cell cultures using the scratch assay [1].

RESULTS

C. orbiculata aqueous extracts were able to successfully synthesize spherical silver nanoparticles, which are 20-40nm in size. Antimicrobial activity of silver nanoparticles was higher than that of the extracts. The nanoparticles exhibited good antimicrobial activity, with the highest activity observed against *P. aeruginosa*. The nanoparticles also inhibited cytokine secretion in lipopolysaccharide-treated macrophages, suggesting good anti-inflammatory activity [1]. While both the nanoparticles and the extract showed activities that indicate potential good wound healing properties, the activities of the nanoparticles were more superior.

DISCUSSION AND CONCLUSION

It can be concluded that *C. orbiculata* synthesized nanoparticles possess antimicrobial, anti-inflammatory, and possible wound healing properties. These nanoparticles can therefore be of great importance in the development of new antimicrobial, anti-inflammatory and wound healing treatments.

REFERENCES

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KEYWORDS

Cotyledon orbiculata; nanotechnology, antimicrobial activity, anti-inflammatory, wound healing