

Phytochemical Profiling, Antimicrobial, Antiproliferative and Apoptotic Effects of *Stemodia viscosa* Roxb. of Western Ghats Region, India

Alfredi A. Moyo,^[a] Kishor S. Jagadhane,^[a] Sneha R. Bhosale,^[a] Devashree N. Patil,^[c] Vinod B. Shimpale,^[b] and Prashant V. Anbhule*^[a]

The present study shows the chemical profile, antimicrobial, antiproliferative, and apoptotic effects of *Stemodia viscosa* extracts. Thirteen bioactive compounds were identified in the 80% ethanolic extract by GC/MS analysis. The acetone extract exhibited a higher content of flavonoids and phenols of 805.10 μg QE/mg DW and 89.31 μg GAE/mg DW extracts, respectively. Furthermore, the acetone extract possessed the highest antioxidant activity ($\text{IC}_{50} = 9.96 \mu\text{g/mL}$). The 80% ethanolic extract exhibited significant antimicrobial activity; the highest activity was observed against *Staphylococcus aureus*

with a zone of inhibition of 25 ± 0.51 mm, MIC value of 4 mg/mL, and MBC value of 8 mg/mL. The antiproliferative results revealed the presence of anticancer activity with an $\text{IC}_{50} = 91.562$ and $74.362 \mu\text{g/mL}$ against the B16F10 skin and COLO205 colon cancer cells, respectively. The flow cytometric analysis shows that the plant extracts cause cancer cell death through the induction of apoptosis. Our findings confirmed that *Stemodia viscosa* is a potential source of biologically active compounds.

Introduction

Medicinal plants have been used for centuries in different cultures and traditional healing systems around the world as a source of healing.^[1,2,5,6] These plants contain natural chemical compounds such as alkaloids, flavonoids, terpenoids, and phenolic which possess pharmacological effects on the animal and human body.^[3,4] The compounds can interact with physiological processes and help alleviate symptoms or treat various illnesses and diseases. The specific parts of the plant, such as leaves, flowers, roots, stems, or bark, are used for medicinal purposes.^[7] They are often prepared and administered in various forms, including teas, infusions, decoctions, tinctures, poultices, powders, and extracts.^[8] The use of medicinal plants as primary treatments has been incorporated into traditional medical systems such as Unani, Traditional Chinese Medicine (TCM), Ayurveda, and Indigenous healing practices.^[9,10]

The importance of medicinal plants is multifaceted and can be examined from different perspectives. Medicinal plants have played a crucial role in human history and cultural practices, many ancient civilizations relied heavily on plants for their

medicinal needs.^[11] Traditional healing systems, which are still practiced today, have deep roots in the use of medicinal plants.^[4] These plants have been passed down through generations, and their usage forms an essential part of cultural identity and heritage.^[11] Medicinal plants have been a primary source of medicine for many people, especially in rural and developing regions where access to modern healthcare facilities may be limited or expensive.^[12] According to the WHO, in developing countries, about 80% of the population still uses traditional drugs made of plant extracts for various purposes particularly for management of medical conditions.^[2,13] In these areas, people rely on traditional plant-based remedies to treat common ailments and maintain their well-being.^[8] Medicinal plants serve as a valuable resource for the discovery and development of new drugs, many modern pharmaceuticals have been derived from plant compounds or inspired by traditional remedies.^[14,15] In recent times, the study of medicinal plants has gained significance in the field of chemistry of natural products and pharmacognosy which focuses on the discovery, characterization, and development of drugs from natural sources.^[16] Researchers continue to explore medicinal plants to study their chemical composition, identify bioactive compounds, study their mechanisms of action, and develop effective and safe new drugs or herbal formulations based on this knowledge.^[14]

Stemodia viscosa Roxb is a highly valued aromatic herb with a long history of traditional medicinal use in different regions of the Western Ghats in India. Local communities have utilized this herb for centuries to treat various infectious diseases and ailments. In Nasaki District, Maharashtra, India, the heated leaves of *S. viscosa* are specifically employed in the treatment of early stages of leprosy according to traditional practices.^[17] Similarly, in Vodadora District, Gujarat, India, a rubbing medi-

[a] A. A. Moyo, K. S. Jagadhane, S. R. Bhosale, P. V. Anbhule
Medicinal Chemistry Research Laboratory, Department of Chemistry, Shivaji University, Kolhapur- 416004, Maharashtra-India
E-mail: pva_chem@unishivaji.ac.in

[b] V. B. Shimpale
Department of Botany, The New College, Kolhapur, 416004 Maharashtra-India

[c] D. N. Patil
Department of Biotechnology, Shivaji University Kolhapur, India-416004, Maharashtra-India

Supporting information for this article is available on the WWW under <https://doi.org/10.1002/cbdv.202300332>