

INHIBITORY POTENTIALS OF *TINOSPORA CORDIFOLIA* LEAF EXTRACTS AGAINST PATHOGENIC BACTERIA AND COLON CANCER CELL LINE

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Herbal alternatives are being preferred over synthetic medicines nowadays, owing to the side effects exhibited by them. Preliminary investigations of the inhibitory potentials of *Tinosporacordifolia* leaf extracts against pathogenic bacteria and colon cancer cells were analysed in the current study. Phytochemical analysis showed the presence of various secondary metabolites in the crude leaf extract. Upon studying the antibacterial efficiency of the extracts, the ethyl acetate and methanolic extract showed maximum inhibition against *Staphylococcus aureus* and *Aeromonas hydrophila*. 68% of HT29 cells treated with the ethyl acetate extract displayed cytotoxicity. A ladder-like pattern was observed after DNA fragmentation assay was performed, hinting at the apoptosis induced by the ethyl acetate extract.

Key words: Antibacterial, Anti-cancer, DNA fragmentation, Cytotoxicity

INTRODUCTION

Plants are invaluable sources of pharmaceutical products (Sadqui *et al.*, 2006) and are recognized for their ability to produce a wealth of secondary metabolites. Mankind has used many species for centuries to treat a variety of disorders (Olatide 2005). The complex secondary metabolites produced by plants have found various therapeutic uses in medicine. The early history of modern medicine contains descriptions of plant-derived phytochemicals, many of which are still in use for treatment (Rishon 2008). Traditional medicine refers to the knowledge, application, approach and belief in incorporating plant or animal based properties in remedies, singularly or in combination, for the purpose of treating or preventing disease as well as to maintain the well-being of an individual (Mouli *et al.*, 2009). *Tinosporacordifolia* (Guduchi) is a widely used plant in folk and ayurvedic systems of medicine (Kavitha *et al.*, 2009). It is distributed throughout tropical Indian subcontinent ascending from Himalayas down to the southern part of peninsular India at an altitude of 300m asl. It is also reported in neighboring countries like Bangladesh, Pakistan and Sri Lanka (Preeti 2011). The leaves are membranous, cordate and heart in shape.

The plant is well known, Indian, bitter and prescribed for fevers, diabetes, dyspepsia, jaundice, urinary problems, skin diseases, and chronic diarrhea and dysentery. It has been also indicated useful in the treatment of heart diseases, leprosy, helmenthiasis and rheumatoid arthritis. The starch obtained from "guduchisatva" is highly nutritive, digestive and used in many diseases (Kirtikar *et al.*, 1933). The bitter principle present shows antiperiodic, antispasmodic, anti-inflammatory, anti-fertility and antipyretic properties (Dahanukar *et al.*, 1988). *T.cordifolia* has been reported to treat throat cancer in humans (Nisha *et al.*, 2005). This plant also possesses antimicrobial activity against many pathogenic organisms (Verma *et al.*, 2011). Cancer is the second leading cause of

death (Hoyer *et al.*, 2005), where one in four deaths is due to cancer. Cancer is a major public health burden in both developed and developing countries. It was estimated that there were 10.9 million new cases, 6.7 million deaths, and 24.6 million persons living with cancer (Parkin *et al.*, 2002). The use of plant products in the treatment of cancer has been of recent interest (Bauer 2000). In the current study, the leaf extracts of the plant was subjected to phytochemical studies and its antibacterial and anticancer properties were recorded.

MATERIALS AND METHODS

Plant Material Collection

The fresh leaves of *Tinosporacordifolia* were collected from Irular Tribal Women Welfare Institute, Thandrai, Chengalpeta, Chennai, Tamil Nadu, India. The plant specimen was identified by Dr. Narasimhan, Department of Botany, Madras Christian College, Chennai. The collected plant leaves were allowed for shade drying for 4 days completely. The dried samples were powdered with electrical blender and made into coarse powder and used for further extraction.

Cell Line

The colon cancer cell line HT 29 was procured from National Centre for Cell Line Sciences (NCCS) Pune.

Sequential extraction

About 50 gm of dry sample was weighed and macerated with 200 ml of hexane separately and kept overnight in shaker. The extract was collected after filtration using Whatman No:1 filter paper and was stored. Another 200 ml of ethyl acetate was added to the residual mixture and incubated in shaker for 24 hours and the extract was collected again using a Whatman No:1 filter paper. This procedure was repeated once again with methanol and the extract was evaporated (Manjimalai 2011), which was used for further phytochemical analysis, antimicrobial activity and anticancer activity.

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