

## Chapter 13

# In Vitro Antioxidant and In Vitro Cytotoxic Potentials of *Anacardium occidentale* Linn. Against Hep G2 Cell Lines

**G. Shobana**

*Srimad Andavan Arts and Science College, Trichy, India*

**N. Agnel Arul John**

*Srimad Andavan Arts and Science College, Trichy, India*

**G. Hariharan**

*Srimad Andavan Arts and Science College, Trichy, India*

**G. Sridharan**

*Srimad Andavan Arts and Science College, Trichy, India*

### **ABSTRACT**

*Cancer is a disease in which there is an uncontrolled multiplication and spread, within the body, of abnormal forms of the body's own cells. The Ethanol extract (EEAO) of *Anacardium occidentale* Linn was used for In-Vitro anticancer screening against HepG2 cell lines. Preliminary phytochemical analysis of the test drug was carried out and it revealed the presence of Tannin, Terpene, Quinone, Coumarin, Phenol. The results revealed that the extracts have significant Antioxidant potentials. In- vitro cytotoxic assay such as tryphan blue dye exclusion, MTT and LDH releasing assays were carried out against liver cancer cell line (HepG2). The results showed that the ethanol extract of *Anacardium occidentale* L. has potent anticancer potentials. From the study it was concluded that the ethanol extract of *Anacardium occidentale* L. showed significant free radical scavenging and anticancer activity against HepG2 cell line.*

## INTRODUCTION

Cancer is a disorder marked by the unchecked proliferation of aberrant cells, independent growth signals, persistent angiogenesis, an inflammatory microenvironment, and ultimately tissue invasion and metastasis. After cardiovascular diseases, cancer is the second most common cause of death in the majority of developed nations. The primary cause of cancer, a potentially deadly illness, is environmental factors that alter genes that code for essential cell regulatory proteins. As a result of the aberrant cell behavior, large masses of abnormal cells are produced, which demolish the normal tissue around them and have the ability to spread to important organs, resulting in widespread disease, usually affecting the patient very soon.

Globally, hepatocellular carcinoma (HCC) is the second largest cause of cancer-related death and the sixth most common type of cancer. Approximately 11.75% of stomach cancers and 1.68% of all cancer cases in Egypt are represented by HCC (Ferlay *et al.*, 2015 and Spach DH and Kim HN, 2017). Apoptotic failure is a feature of many humanoid tumors, and it can cause the development of cancer cells from normal cells (Arican *et al.*, 2014). Surgery, chemotherapy, laser therapy, radiation therapy, and To treat cancer, a variety of therapies are employed.. Even with many promising therapies, drug resistance contributes to a large number of chemotherapy treatment failures (Patwekar *et al.*, 2023). After a century of advancements in medicine and diagnosis, notable advances within the discipline of CIT, or cancer immunotherapy have increased the odds of persistence for those with malignancy. More and more unique immunotherapeutic treatments are being employed, such as oncolytic virotherapy, cellular immunotherapeutic drugs, immunomodulatory treatments, and cancer vaccines (Patwekar *et al.*, 2024).

Curative resection, trans arterial chemoembolization, radio embolization, radiofrequency ablation, liver transplantation, and systemic targeted drugs such as sorafenib are among the HCC treatment options (Best *et al.*, 2017). These treatments are expensive and have a high risk of fatal side effects, such as anemia, fatigue, pain, and emotional distress, as well as cell death (apoptosis), even though the short-term survival rate for HCC patients has increased (Karaman *et al.*, 2014). In order to fight such a terrible disease, it is essential to develop novel, efficient treatments.

Statistics show that more than 60% of people worldwide and about 80% of people in developing nations treat their illnesses with traditional remedies and medicinal plants (Shrestha and Dhillion, 2003). Numerous earlier studies have demonstrated the critical role that medicinal herbs play in the treatment of cancer, aiding in the management of the disease and triggering the death of cancerous cells. Plants are the necessary sources of recent chemical entities appropriate for antitumor drug discovery and development, and lots of plant species already getting used to treat or anticipate the event of cancer. Multiple researchers have known completely different species of plants that have demonstrated antitumor properties. Complementary and alternative medicine, or CAM, or herbal treasures, offers a variety of novel phytochemicals that may prove useful in treating liver-related imbalances associated with HCC, both clinically and preventively. A number of common foods and herbs may act as preventative measures against liver cancer. Research has demonstrated that using conventional medicines in conjunction with more effective chemotherapy and radiation therapy can improve survival rates, postpone the progression of tumors, and enhance overall quality of life.

Certain plants have demonstrated their antitumor properties against humans, including *Podophyllum hexandrum*, *Phyllanthus amarus*, *Annona atemoya*, *Andrographis paniculata*, *Boerhaviadinsa*, *Piper longum*, and *Terminalia chebula*. Certain chemicals found in these plants may be responsible for some

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