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Review Article

A case study – Regulation and functional mechanisms of cancer cells and control its activity using plants and their derivatives

*Palaniselvam Kuppusamy, Mashitah M. Yusoff, Gaanty Pragas Maniam, Natanamurugaraj Govindan**

Mammalian Cell Technology Laboratory, Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak 26300, Gambang, Kuantan, Pahang, Malaysia

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ABSTRACT

Novel exploiting to the understanding of conventional medicine was followed by the findings of many unique secondary metabolites and its biological property and is highly required for treating of many endemic diseases. The plants have been a long background in ethno pharmacological knowledge for treatment of endemic and non-endemic diseases. Such plants are traditionally used in different form of paste, extraction and powder to treat seasonal diseases. Nowadays main uses of some medicinal plants have been a great deal with cure and control various chronic diseases such as cancer, AIDS, hepatitis, neurogenic disorders and acute kidney diseases. Cancer is molecular dysfunction and disarrangement in DNA base pairs it leads to change the human physiological and biochemical behavior of the system. Apoptotic mechanisms are regulating by two distinct pathways in which basic creeds perform in common to all eukaryotes. The key components in apoptosis especially mitochondrial intracellular organelles are identified (DNA, protein and ATP, Ca^{2+}). These components control the next cellular binder step and participate in effecting cell suicide mechanisms. The diverse aspects of mitochondria involved in apoptosis include dealing with other proceedings such as release of protein or enzymes to effective for cell death. In these mechanism plants and related natural products using alternative therapeutic management, very less toxicity and cost benefits. Plant extracts and its biomass has revealed the existing of various pharmacologically active compounds like steroids, polyphenols, polysaccharides, saponins, alkaloids, tannins and terpenoids. The reliable natural products are acting as high sources for anticancer drugs. The natural derived compounds are the prolongation of life span of the zeolites and decrease of malignancy cell formation in the cellular system.

1. Introduction

The key challenging property and functional behavior of cancer cells having tremendous secret action in cellular and functional characteristics. The breaking surreptitious thing of

* *Corresponding author*. Tel.: +60 142918824, +60 95492465 (office); fax: +60 95492766.
E-mail address: natanam80@gmail.com (N. Govindan).

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the cancer related node is still not yet to be found. Still the scientific community are searching the mechanism of cell modification, biochemical-molecular pathway changes and genome expression. A sudden change of single or two more base pairs in a DNA will leads to form of solid tumor or malignant deposit. Observably the mechanism of tumor development requires advance molecular genomic studies and therapeutic drug molecules action is needed much more. Particularly in the malignant tumor are invasive, metastasis, mutagenic DNA modification, methylation and different genomic and proteomic expression. These are present in the major clinical challenges in which treatment of cancer.[1,2] Even though the progress that understands of the mechanisms of carcinogen originating to modify the structural and functional property of DNA. The modern investigation of tumor by the identification of some biochemical substances, hormones and enzymes are involved signal transduction pathways. That compound may induce the cellular oncogenes and suppress/arrest the normal function.[3,4] Over the past decade, there has been an increasing in the demand of drug development against cancer and related diseases. The plants have played a vital role in the treatment of chronic and acute diseases for the very long centuries ago. Nowadays natural products have been highly focused as an important tool for drug development and medicinal chemistry for production of less side effect drugs.[5,6] The plant and its derivatives of chemical compound especially alkaloids, saponins polyphenols, terpenoids and tannins natural product studies suggest that reducing the cancer risk factor with low impact of side effects.[7,8] Plants are mainly used as rapid progress in prevention and treatment of particularly for the cancers and related malignant diseases even though have not been particular site of action and mechanisms, where there is still strongly green chemistry drugs are needed for more active remedies.[9] Conventional and modern methods are mainly plant and their products are considered to be one of the prospective sources for the anticancer agents with less adverse effect. Also other various sources of marine producers such as fungi, bacteria, seaweeds and algae are produces various bioactive compounds. That has been considered for their ability to treat and reduce the risk number of acute diseases and chronic diseases.[10] Plant purified metabolites and its synthetic nanodrug molecules have been evaluated in clinical trials and marketed.[11,12] On the basis, the present review focused on the potential of the anticancer effects of plant based compounds and its molecular behavior of malignant cell is also being compiled.

2. Metastatic behavior of cancer cell line

The tumor cell population or individual cell lines have differential accumulation of genetic changes and biochemical behavior contributes to the reported cases. Phenotype differences in malignant tumor cells have been well studied in morphology, development and gene expression of benign and malignant cells. Cancer cells have a multiple genetic alterations in the molecular dogma, especially the post-transcriptional mechanisms including frequent mutational changes in p53, caspase genes and miRNA transcriptional factors. Recently human breast cancer characterized its gene structure to study the metastatic behavior of cancer. The central part of MUC5B is composed of three alternating domains: i) the highly conserved domain is called CYS domain ii) a subdomain denoted is R domain, it fully made of repetitions and irregular repeat of 29 amino acid codons, it contains rich in Ser, Thr and Pro iii) a conserved sub domain has 111 amino acid it is called as R-end domain also repeated four in four times, the alternating CYS/R/R end domain build a large composite repeating unit of 528 amino acids.[13] Other important findings to examine the main role that NK cells play in the regulation of metastatic spread of human tumour cells in host system. The development of tumour metastasis is regulated by a variety of tumour suppressor genes and/oncogene, including tumour suppress or gene nm23. The nm23 gene mainly characterized by its reduced expression of metastatic melanoma cell line compared with the other metastatic cell line. Hence nm23 gene contain eight number of gene family instead of nm23 − H1 is highly studied involving in cell proliferation differentiation and development. Recent literature were showed that the tumor cell behavior especially malignant cell secretes some messenger compounds in which attract neutrophil to activate protein kinase. It can degrade the extracellular matrix leading to tumor metastasis.[14,15]

3. In-vitro antiproliferation mechanisms

The plant combination (*muthu marunthu*) has been showed one of the common and notable features in poor growth rate of tumor cells. Also the *muthu marunthu* is combination plant biomass did not show any alteration of normal growing cells. The glycoproteins such as hexose, hexosamine, sialic acid and fucose are controlling the level in plasma by the treating of *muthu marunthu* (different plant extracts were formulated in various concentrations) fibrosarcoma rats. Hence *muthu marunthu* has very good controlling capacity on the biochemical events during tumor progression, without inducing any toxic effects for normal metabolism.[16] The aqueous extract of *Iresine herbstii* was synthesized silver nanoparticles was performed by green synthesis and plant mediated nanoparticles showed potent cytotoxicity against HeLa cancer cells. Plant synthesized silver nanoparticles have induced over above 80% death of HeLa cell at a treatment of moderate concentration level is 300 mg/ml. The AgNPs are revealed a prominent activity of arrest metabolic function of fibroblast cells (IMR-90) at 400 mg concentration.

The *Persea americana* Nigerian traditional plant extracts were used for the treatment of anticancer studies. The plant extracts contains polar compounds that were responsible for suppress the division of cancer cells. Since it is well known that the phytochemicals have been shown to induce cell cycle which it may cause apoptosis program. The secondary metabolites are affect the differentiation and proliferation of cells by the control of intracellular (ROS) reactive oxygen species on the electron transport chain and other metabolic pathway. These cytotoxic natural products play a vital role in breast and osteo cancer. The influences of anticancer activity were valid by *Elaeis guineensis* methanol extract against MCF-7 and vera cell line through by MTT assay. The presence of apoptotic