Efficiency of *Moraceae* species against cervical cancer

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Abstract -Antioxidants play a crucial role to protect the damage caused by oxidative stress (OS) in living cells. Plants having different metabolites were reported to possess antioxidant as well as anticancer properties. The present investigation dealt with the analysis of anticancer properties of crude solvent extracts of fruits of *Artocarpus altilis* (Parkinson) Fosberg of Moraceae family under *in vitro* condition. Anticancer activity of the methanolic fruit extract was assessed against HeLa cell lines by MTT assay at different concentrations. The results revealed efficiency of breadfruit as a potent biological agent against cervical cancer.

1.INTRODUCTION

Oxidative stress (OS) is the imbalance between reactive oxygen species (ROS) production and its scavenging by cells. OS has been known as aimplicit contributor to the pathogenesis of several conditions including cancer, diabetes and heart disease [1]. ROS cause the damage of numerous cellular factors such as lipids, proteins and nucleic acids, especially, DNA leading to subsequent cellular death by modes of necrosis or apoptosis [2]. The damage can become more wide due to weakened cellular antioxidant defense systems. All natural systems hold antioxidant defense mechanism that protects against oxidative damages and repairs enzymes to remove damaged molecules. Yet, this natural antioxidant mechanism can be hardly efficient. Hence, dietary intake of antioxidant compounds is much necessary. Consumption of plant products such as fruits and vegetables is known to lower the threat of several diseases, such as cancer, cardiovascular diseases and stroke caused by OS [3] and these health benefits are substantially asssesseddue to the presence of phytochemicals, such as polyphenols, carotenoids and vitamin E and C [4]. Although the occurrence of phenolic compounds are generally found in both edible and non-edible herbs, cereals, fruits, vegetables, oils, spices and other plant materials [5,6], scientific information on radical scavenging capability of endemic plants limited to certain regions is still rather scarce. Therefore, the assessment of similar properties remains an enthiusiasticand useful task, specifically to find new promising sources of natural antioxidants for functional foods and/or nutraceuticals [6 & 7]. *Artocarpus altilis* is one of the highest food yielding plants, with a single tree producing up to 200 or more grapefruit-sized fruits from March to June and from July to September[8] per season and require limited care.Breadfruit is also known as a traditional starch rich crop. Synonyms of *Artocarpusaltilis* are *Artocarpus* communis and *Artocarpus incises [9*] .Over 130 compounds are identified in various organs of the tree of *Artocarpus altilis*, more than 70 of which derived from the phenylpropanoid pathway. Several studies had emphasized the antioxidant and antimicrobial potentiality of *Artocarpus altilis* along with its therapeutic properties[10]. The ability of breadfruit pulp extract to inhibit cervical cancer cell proliferation was also demonstrated by many authors. However, there are only a few reports on anticancer properties of *Artocarpus altilis* (Parkinson) Fosberg. Therefore, in this study, we evaluated the antiproliferative activity of methanolic extracts of breadfruit.

2.MATERIALS AND METHODS

2.1 Plant Material and sample preparation

Matured unripe fruits of *Artocarpus altilis* (Parkinson) Fosberg of moraceae family were collected from Kanyakumari district, Tamil Nadu, India and were made clear of latex, dust particles and sand. Then the

skin was peeled off and the pulp part was sliced off, demoistured and dried in shade. Dried material was then powdered and extracted with polar solvent methanol in a ratio of 1: 10 by cold percolation technique. The extract was then filtered, evaporated and stored at 4°C for further experimental analysis.

2.2 Determination of *in vitro* anticancer activity of *Artocarpus altilis* (Parkinson) Fosberg [11 & 12]

200µl of cell suspension was seeded in a 96-well plate and then methanolic fruit extract was added at different concentrations including 6.25,12.5,25,50 and 100µg/ml. Camptothecin at a concentration of 12.5ug/ml was used as standarad. Suitable blank and control were also maintained (Table :1). The plates were then incubated for 24 hrs at 37°C in 5% CO2 atmosphere. Following incubation, spent media was removed and MTT reagent was added to all the wells to get a final concentration of 0.5mg/mL of total volume and incubated again for 3hrs after wrapping with aluminium foil to avoid exposure to light. Further the plates were treated with 100 µl of solubilisation solution (DMSO) with the removal of MTT reagent and gentle stirring in a gyratory shaker to enhance dissolution. The intensity of purple colour then formed in proportion to the number of viable cells was measured spectrophotometrically at 570nm.

3.RESULTS AND DISCUSSION

Cancer is a killers disease worldwide and the remedies identified are all threatening in nature. In this quest, we investigated the anticancer activities of breadfruit to find a natural solution. Antiproliferative activity of methanolic breadfruit extract established in the present study, revealed a steady decrease in the viability of cells with increase in the concentration of sample. The IC50 value was determined by using linear regression equation Y =Mx+C, where, Y = 50, M and C values were derived from the viability graph and the resulted IC50 value is 84.07µg/ml against the standarad IC 50 value of 15ug/ml (Fig:1) Dependence of cell proliferation based on extract concentration and the ability of *Artocarpus altilis* to inhibit cervical cancer cell proliferation was quantitatively reported [13]. Methanolic breadfruit extract at different concentrations showed anticancer activity ranging from 10ug/ml to 50ug/ml [14]. In the present work, apoptosis was most noted with maximum concentration 100ug/ml. Similarly, Ganeson *et al'*s report also suggest maximum inhibition of cell growth at maximum sample concentration. Therefore, both the results indicated the antiproliferative nature of breadfruit at higher concentration.

Table 1: Details of drug treatment with different concentrations against HeLa cell lines.

Sl.No	Test Compounds	Cell Line	Concentration treated to cells
1	Control	HELA	No treatment
2	Standard (Camptothecin)	HELA	12.5µg/ml
3	Blank	-	Only Media without cells
4	Methanolic breadfruit extract	HELA	5(6.25,12.5,25,50 and 100µg/ml)

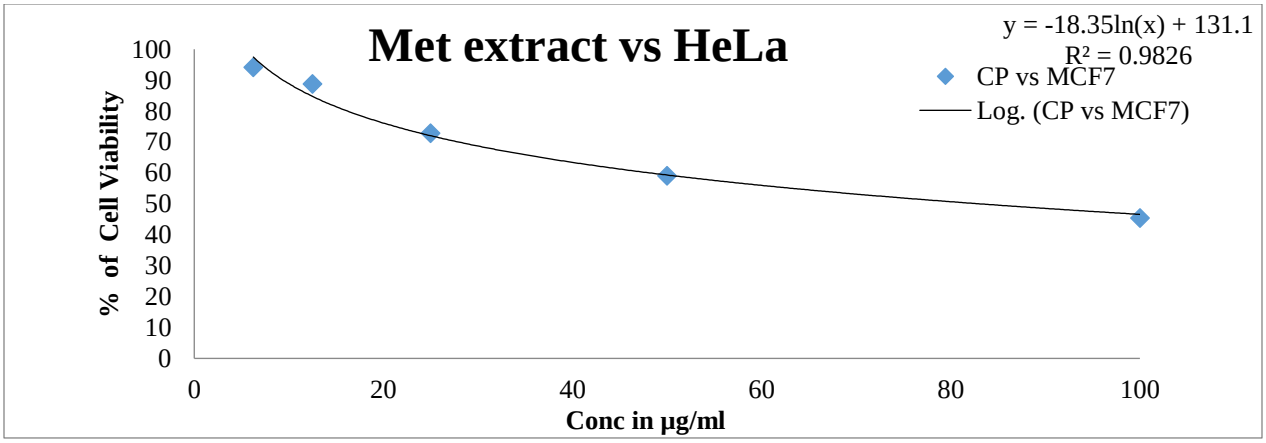

Fig 1: Scatter graph showing the % of cell viability of methanolic breadfruit extract with different concentrations ranging from 6.25ug/ml to 100ug/ml on HELA Cell line

4.CONCLUSION

The results of this study indicated that the pulp of *Artocarpus altilis* encompasses anticancer activity which may be attributed to the presence of various bioactive compounds and hence can prevent the initiation of free radicals by stabilizing them to participate in any deleterious reactions. Yet, future investigations are required to isolate and analyze the chemical constituent responsible for its biological activity. Purification of important secondary metabolites and subsequent structural studies can aid in isolation of active compounds from this medicinally important plant. Therefore, the present study provides scope for scientific studies to fully exploit the medicinal properties of breadfruit to support the traditional claims as well as exploring some new and promising leads.

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