International Journal in Management and Social Science
Volume 09 Issue 11, November 2021 ISSN: 2321-1784 Impact Factor: 7.088
Journal Homepage: http://ijmr.net.in, Email: irjmss@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal

ASSESSING THE ANTICANCER EFFICACY OF A SELECT GROUP OF MEDICINAL PLANTS

RAJMEET SINGH
RESEARCH SCHOLAR, SUNRISE UNIVERSITY, ALWAR, RAJASTHAN

DR. GURVINDER PAL SINGH
RESEARCH SUPERVISOR, SUNRISE UNIVERSITY, ALWAR, RAJASTHAN

ABSTRACT

Although oxygen is necessary for life, its high reactivity also makes it potentially dangerous.The main aim of the study is Assessing the anticancer efficacy of a select group of medicinal plants**.** All experimental data is presented as a mean SD. All experimental data was analysed using one-way ANOVA, and then the various parameters across the groups were compared using Tukey's HSD multiple comparison tests.Diseases of all kinds have long been treated using plants. Nowadays, the hunt for alternative plant-based medications is driven by the scientific confirmation of many such medical characteristics of plants.

Keywords: medicinal, Diseases, medications, confirmation

1. INTRODUCTION

Although oxygen is necessary for life, its high reactivity also makes it potentially dangerous. It may respond to free radicals, potentially harmful chemicals that, when produced, target healthy cells of the body and lead to a wide range of degenerative illnesses and pathological situations, including ageing, cardiovascular disease, inflammation, and cancer. Ionizing radiation and environmental stress may cause the body to produce free radicals at unusually high levels. Moreover, several environmental pollutants may cause the body to produce more free radicals, including cigarette smoke, metal residues, and excessive atmospheric oxygen. Reactive oxygen species (ROS) are oxygen-containing free radicals that are mostly produced by living organisms (ROS). The body produces several distinct forms of ROS, including hydrogen peroxide, hydroxyl radical, the superoxide anion radical, hypochlorite radical, nitric oxide radical, singlet oxygen, and other lipid peroxides. Cell mutations may be triggered by these compounds when they react with proteins, enzymes, and nucleic acid, all of which are found in the cell's membrane. Antioxidants are molecules that may eliminate the harmful effects of free radicals by combining with them.

2. LITERATURE REVIEW

Kausar, Farzana& Kim, Kyung-Hwan & Farooqi(2021) The traditional medicine of Pakistan's Himalayan area is well-known for its extensive usage of medicinal herbs. The goal of this research is to determine whether or not Prunuscornuta and Quercussemicarpifolia have any anticancer or antibacterial properties. For the anticancer activity, human cancer cell lines were used (HepG2, Caco-2, A549, MDA-MB-231, and NCI-H1437 carcinoma cells), whereas for the antimicrobial activity, the agar-well diffusion technique was used. Alveolar and renal primary epithelial cells were also used in toxicity tests. At first, we used maceration procedures to get various extracts out of n-hexane, chloroform, ethyl acetate, butanol, and methanol. Preliminary phytochemical screening identified secondary metabolites such alkaloids, tannins, saponins, flavonoids, glycosides, and quinones. Inhibitory action against Acinetobacterbaumannii (16 mm) and Salmonella enterica was found in a chloroform extract of P. cornuta (PCC) (14.5 mm). P. cornuta (PCN) n-hexane extract showed a 15 mm and 15.5 mm antibacterial action against Acinetobacterbaumannii and Salmonella enterica, respectively. Quercussemecarpifolia (QSM) methanolic extracts were shown to have high antibacterial inhibitory action against Acinetobacterbaumannii (18 mm), Escherichia coli, and other bacteria (15 mm). As with the QSN and QSE extracts, A. baumannii was effectively inhibited by both, with a 16 mm zone of inhibition. PCM and QSN have proved to be very effective against the Rhizopusoryzae strain, inhibiting its mycelial growth by 16 and 21 millimetres, respectively. Additionally, the development of breast (MDA-MB-231) and lung (A549) cancer cells was significantly inhibited by the extracts of P. cornuta and Q. semicarpifolia, with corresponding decreases in cell viability of 19-30% and 22-39%.

Greenwell, M &Rahman, Pattanathu (2015) Cancer is a devastating illness that affects people everywhere. There is always a need for more effective treatments and preventative measures against this fatal illness. As a result of their perceived lower toxicity in comparison to conventional therapies like chemotherapy, scientists and researchers are shifting their focus to molecules produced from natural sources. Secondary metabolites found naturally in plants are being studied for their potential anticancer effects, which might eventually lead to the creation of novel therapeutic medications. New technologies are developing as a result of the success of these chemicals as standard medications for cancer therapy. Nanoparticles for nano-medicines are one emerging technology with the potential to improve the efficacy of plant-derived therapeutics against cancer by regulating the release of the molecule and exploring other routes of administration. The need for medicinal plant extracts and the features that make them attractive candidates for future anticancer therapies are discussed in this study.

Solowey, Elisha &Sallon, Sarah &Paavilainen(2014) Traditional medicine has relied on plants for treatment since the dawn of humankind. Molecules found and extracted from plants, or their synthetic derivatives, make up the bulk of chemotherapeutic medications used to treat cancer. We postulated that entire plant extracts chosen for their ethnobotanical uses would include

numerous compounds with anticancer activity that would be very efficient in killing human cancer cells. Three different whole plant extracts (ethanol extraction) were tested for their effects on human tumour cells in this research. Urticamembranacea (Urticaceae), Artemesiamonosperma (Asteraceae), and Origanumdayi post (Lamiaceae) extracts were used (Labiatae). Several human tumour cell lines and primary cultures produced from patient biopsies showed sensitivity to all three plant extracts, with cytotoxicity increasing with increasing dosage and decreasing with increasing time. The plant extracts were selective in their killing ability, since they had no impact on initial cultures of healthy human cells. The entire plant extracts induce cell death by apoptosis. A rat model of breast adenocarcinoma indicated that extract 5 from plant (Urticamembranacea) has potent anticancer properties. According to our findings, whole-plant extracts have potential as anticancer agents.

Gaidhani, Sn& Singh, Arjun & Kumari (2013) The focus of cancer research has recently shifted to the development of novel medications derived from natural resources for the treatment of cancer. Sthauneyaka (Taxusbaccata L.), as well as Triphalaghrita, Khadirarista, Madhusnuhirasayana, Mahatriphaladyaghrita, and Panchatiktaguggulughrita, are only some of the medicinal plants and chemical compositions recommended for the treatment of cancer and tumours in Ayurveda writings. Using the Sulforhodamine-B (SRB) assay, the anti-proliferative activities of hydro-alcoholic extracts of some standardised plant materials were evaluated against a panel of 14 human cancer cell lines spanning a variety of tissues (lung, pancreas, colon, cervix, oral, bladder, prostate, breast, leukaemia, etc.). WithaniasomniferaDunal. showed action against two cell lines, whereas Cedrusdeodara (Roxb.) ex Lamb. and Berberisaristata (Roxb.) ex DC. exhibited highest anticancer activity against three cell lines. Other plants proven to be effective against a single cell line are PicrorhizakurroaRoyle ex Benth. and Piper longum L. These findings support the use of Ayurveda medicinal plants as the anti-neoplastic medicines described in Ayurvedic scriptures. Further research is required to determine their mode of action and identify the anticancer chemicals responsible for this effect.

3. METHODOLOGY

3.1 Collection of plant samples

In all, we brought in four plant samples from various parts of Assam, India. For the most part, an ethnomedicinal survey, the availability of samples, a literature-based study, and the traditional usage of these plants by the people of Assam to treat a wide range of illnesses informed the selection of plant samples. Barpeta, Assam, India (N26.33'37E091.00'99) was the location where fresh fruits of G. morella (Gaertn.) Desr. were gathered. Specimens were examined by taxonomists at the North East Indian Ayurveda Research Institute in Guwahati, Assam, India. IASST/BCCS/HNO112/2012 voucher specimens were submitted.

3.2 Statistical analysis

All experimental data is presented as a mean SD. All experimental data was analysed using one-way ANOVA, and then the various parameters across the groups were compared using Tukey's HSD multiple comparison tests. When the probability ratio (P ratio) was less than 0.05, it was deemed significant. GraphPad Prism 6 was used for all the statistical analyses.

4. RESULTS

4.1. Selection of plant having highest antioxidant activity

Antioxidant activity was evaluated using the DPPH free radical assay, the reducing power assay, and the total antioxidant capacity assay on methanolic extracts of the fruits and leaves of four plants: GarciniamorellaGaertn.) Desr., Anthocephaluscadamba (Roxb.) Miq., Cuscutareflexa (Roxb.), and Wrightiaarborea (Dennst.) Mabb. Extracts from each sample were first dissolved in their designated solvents. All four extracts (GF, AC, CR, and WA) were observed to suppress DPPH free radical activity in the experiment. Statistical analysis revealed a substantial (*P 0.05) difference between WA and the control in terms of DPPH-inhibiting action. The other extracts were shown to have free radical scavenging properties comparable to the gold standard. Yet as can be shown in fig 4.1 A, the extracts' DPPH free radical scavenging activity follows this pattern: GF > AC > CR > WA. Free radical scavenging activity was higher for GF across all dosages.

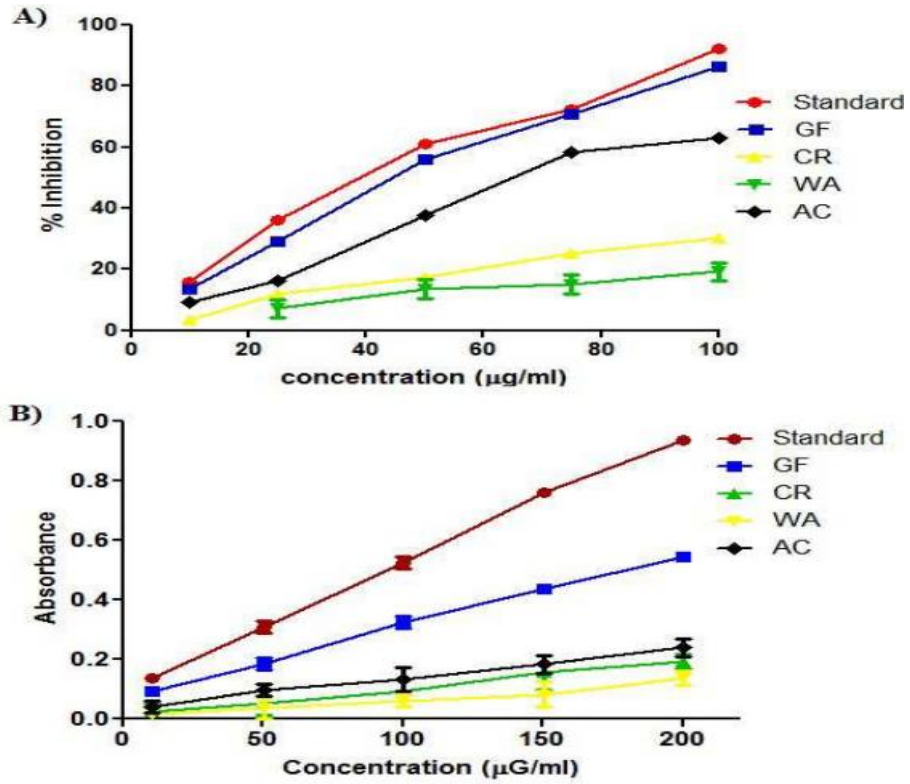

Fig 4.1. Evaluation of the ability of various crude extracts to quench DPPH free radicals and function as a reducing agent

Table 4.1. Total antioxidant capacity of different extract

Slno.	Plantsamples	Totalantioxidant(nmol ascorbicacidequivalents)
1)	GF	741±5.72
2)	CR	156.2±5.46
3)	WA	56.87±3.75
4)	AC	123.12±2.96

4.2. Selection of plant having highest anticancer activity

Cancer cell lines MCF7, MDAMB231, SKBR3, and DLA were tested in vitro with crude methanol extracts from four different plants: Garciniamorella fruit, Anthocephaluscadamba leaves, Wrightiaarborea leaves, and Cuscutareflexaroxb entire plant. Drugs were administered to

all the other cancer cell lines for 24 hours, except DLA. Nevertheless, just 3 hours of treatment were applied to the DLA cell lines. The MTT test, as described in, was used to measure the cytotoxicity of the extracts. Crude extracts of several plants showed a wide variety of activity in in vitro condition against various cancer cell lines, as was shown in the preliminary screening (Fig 4.1.). All of the cancer cell types tested showed the greatest sensitivity to the cytotoxic effects of G. morella fruit (GF). All three subtypes of breast cancer cells were equally susceptible to its effects. Anticancer activity against MCF7, MDAMB231, and SKBR3 was observed in the methanol extracts of Anthocephaluscadamba and Cuscutareflexaroxb (table 4.1). On the other hand, Wrightiaarborea (Dennst.) Mabb. (WA) showed very little anticancer activity in our tests on breast cancer cell lines. Nevertheless, GF showed much stronger cytotoxic activity than the other extracts on the test cell lines. Three separate experiments found that the IC50 for GF against MCF-7, MDAMB-231, SKBR3, and DLA to be 37.95, 48.07, 35.81, and 203.84 g/ml, respectively (Table 4.3). G. morella was therefore chosen for further anticancer testing.

Table 4.2. Checking for cancer-fighting potential in unprocessed extracts

Plant extracts	MCF 7	MDAMB231	SKBR3	DLA
GF	+++	+++	+++	+++
AC	++	++	++	++
WA	+	+	+	-
CR	++	++	++	+

Table 4.3. The median IC50 concentration of the plant extracts we gathered against several cancer cell lines

		IC_{50}inμg/ml		
Extracts	**MCF7**	**MDAMB231**	**SKBR3**	**DLA**
GF	37.95± 3.12	48.07±2.15	35.81±1.42	203.84±4.6
AC	132.27±4.17	147.5 ±3.76	144.23±3.13	280.89±4.1
CR	104.6± 2.65	150.31±5.42	107.06±4.23	400.64±6.3
WA	181.15±4.52	409.83±5.78	384.47±6.1	-

4.3. Selection of G. morella plant for further study

G. morella fruit extract shown strikingly higher efficacy in preliminary antioxidant and anticancer screening tests (4.1 and 4.2.). As a result, the G. morella plant was chosen for future research. Antioxidant and anticancer screenings were performed on samples of both the leaves and bark of this plant to determine which section of the plant had the greatest concentration of these compounds.

4.4. Evaluation of G. morella's fruit, bark, and leaves for antioxidant and anticancer activities

4.4.1. G. morella fruit exhibited highest antioxidant activity

Antioxidant tests were performed on methanol extracts of G. morella fruit (GF), bark (GB), and leaves (GL) to determine their relative potency.

The ability of several G. morella extracts to scavenge DPPH free radicals is shown in Fig. 4.2. We tested the in vitro antioxidant activity of methanol extracts of G. morella fruit, leaf, and bark at doses of 10, 25, 50, 75, and 100 (g/ml). The DPPH-scavenging activities of the three crude methanol extracts examined were very different from one another, although the amount of the potential revealed was dose-dependent. Figure 4.2 shows that among the three samples, the G. morella fruit (GF) extract had the strongest DPPH radical scavenging activity. G. morella's broad activity was indicated by a comparative investigation of the reductive potential of various plant components. There was, however, a correlation between extract content and reduction power, and this correlation held true across all plant species tested. The higher reduction ability of GF is graphically shown in Fig. 4.2. Based on a comparison of their lowering power activities, several extracts were determined to rank as follows: BHT > GF > GL > GB.

Fig. 4.3 shows the range of effectiveness of G. morella extracts in inhibiting lipid peroxidation. At 100 g/ml, GF methanol extract inhibited lipid peroxidation more effectively than any other extract including the gold standard BHT. Using the same methodology, we found that G. morella leaf and bark extracts had total antioxidant potentials of 183.2 ± 2.76 and 145.2 ± 3.65 nmol ascorbic acid equivalents, respectively. Yet, as indicated before, GF had a total antioxidant value of 741 ± 5.72 nmol ascorbic acid equivalents. Hence, GF was shown to have a greater total antioxidant capacity than both GL and GB ($p<0.05$).

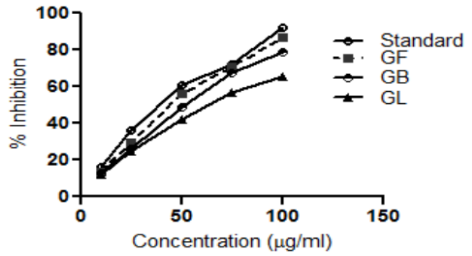

Fig 4.2 The ability of Garciniamorella extracts to quench DPPH radicals

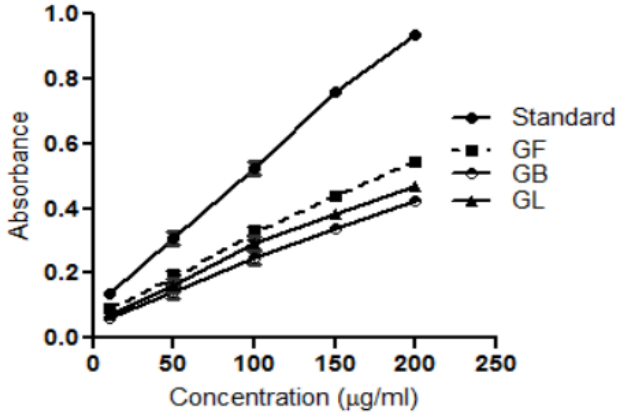

Fig 4.3Many G. morella extracts have been shown to have power-reducing action.

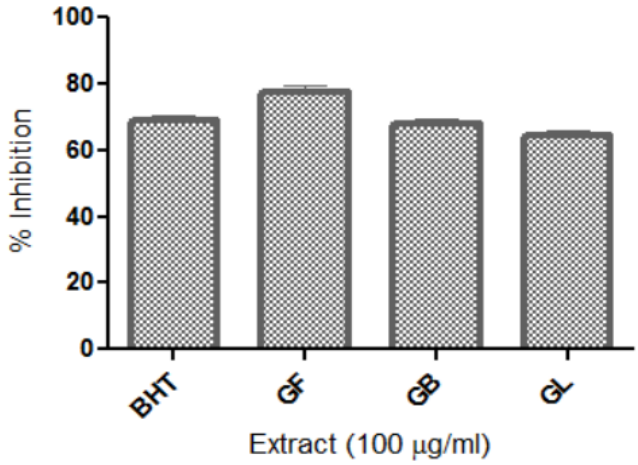

Fig 4.4Several extracts' ability to prevent lipid peroxidation. the G. morella species.

Results from an antioxidant experiment showed that G. morella fruit extract had much more promise than other options. Quantitative and qualitative phytochemical research was performed

on all three extracts to determine which of the fruit's phytochemical components are responsible for its exceptional antioxidant potential.

5. CONCLUSION

Diseases of all kinds have long been treated using plants. Nowadays, the hunt for alternative plant-based medications is driven by the scientific confirmation of many such medical characteristics of plants. Yet, the bioactivity of the plant does not originate from the plant itself. They have therapeutic value because they contain essential chemicals or bioactive compounds. Here, the antioxidant, anticancer, and anti-inflammatory properties of a medicinal plant known as G. morella were studied in depth, and their bioactive component responsible for these properties was isolated and identified by a systematic approach. A small number of Assamese medicinal plants were gathered for this investigation and first tested for their antioxidant and anticancer potential. Anthocephaluscadamba, Cuscutareflexaroxb, Garciniamorella fruit, bark, and leaves, and Wrigthiaarborea all have powerful antioxidant properties in their crude methanol extracts. Although all of the extracts showed some level of activity, the methanolic fruit of G. morella showed the most, and it was on par with the activities of the standards employed in the trials. Hence, we separated the extract and compared its antioxidant activity to that of the crude methanol extract and the fruit of G. morella. The chloroform fraction (GFCH) of G. morella fruit was shown to have the greatest antioxidant activity among the fractions and crude methanol extract.

REFERENCE

1. Kausar, Farzana& Kim, Kyung-Hwan & Farooqi, Hafiz & Farooqi, Muhammad & Kaleem, Muhammad &Waqar, Rooma& Khalil, Atif&Khuda, Fazli& Abdul Rahim, ChethikkattuveliSalih& Hyun, Kinam& Choi, Kyung-Hyun & Mumtaz, Abdul. (2021). Evaluation of Antimicrobial and Anticancer Activities of Selected Medicinal Plants of Himalayas, Pakistan. Plants. 11. 10.3390/plants11010048.
2. Greenwell, M &Rahman, Pattanathu. (2015). Medicinal Plants: Their Use in Anticancer Treatment. International journal of pharmaceutical sciences and research. 6. 4103-4112. 10.13040/IJPSR.0975-8232.6(10).4103-12.
3. Solowey, Elisha &Sallon, Sarah &Paavilainen, Helena &Solowey, Elaine &Lorberboum-Galski, Haya. (2014). Evaluating Medicinal Plants for Anticancer Activity. TheScientificWorldJournal. 2014. 721402. 10.1155/2014/721402.
4. Gaidhani, Sn& Singh, Arjun &Kumari, Suman&Lavekar, Gandhidas&Juvekar, As &Sen, Subrata&Padhi, Madan. (2013). Evaluation of some plant extracts for standardization and anticancer activity. Indian journal of traditional knowledge. 12(4). 682-687.

5. R. Takiar, D. Nadayil, and A. Nandakumar, Asian Pacific J of Cancer Prevention, 11, 1045-1049 (2010).
6. S. K. Mondal et al., Indian J Med PaediatrOncol. 34(4), 242–246 (2013). doi: 10.4103/0971-5851.125235
7. R. Nair, N. Arora, and M. K. Mallath, Oncology 91(1),18-25 (2016). DOI: 10.1159/000447577
8. T. Yu-Tang et al., Evidence-Based Complementary and Alternative Medicine, vol. 2013, Article ID 305898, 8 pages.
9. A. Goel, A.B. Kunnumakkara, and B.B. Aggarwal, BiochemPharmacol 75(4), 787-809 (2008).