

Qualitative Analysis and Antioxidant Potential of Nellikai Decoction

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Abstract

Cancer is a major health problem in the world wide. The symptoms and root cause were different in each person. In the present situation the life style modification and climatic changes play key root of the disease. During ancient days the patients were treated with internal and external medicines to eliminate toxins from the body. Nellikai decoction showed the presence of different types of phytoconstituents and antioxidant has the effect on cancer and acts as good source in the initial stage of treatment.

Keywords:cancer,Nellikai decoction,Kalanchi,Phytoconstituent,Antioxidant,Cytotoxicity

Introduction

Cancer is a serious metabolic disease, causing uncontrolled division and survival of transformed cells. A host of molecules, factors and condition have been designated as underlying causes for the inception and progression of the disease (Arun Upadhyay, 2020).Cancer occurs by a series of successive mutations in genes so that these mutation change cell functions. Chemical compounds have an obvious role of forming gene mutations and cancer cells. Cancer is the second leading cause of mortality world wide, the prevalence of cancer has actually increased. In addition, smoking involves several carcinogenic chemical compounds that leads to cancer (Aizawa et al.,2016).The mortality rate as per 2021 is 60.44 per 10,000 population in India (Jena et al.,2024).Nellikai decoction and extracts are rich in bioactive compounds with significant antioxidant,anti-inflammatory and anti-diabetic properties (Po-Hsien Li,2022).Natural products have proven to be promising anti-cancer agents due to their diverse chemical structures and bioactivity. Medicinal plants contain bioactive compounds, such as flavonoids, alkaloids, terpenoids and polyphenols which exhibit various anticancer properties. There are still challenges in the development and use of natural products as anticancer drugs, such as the need for further research in to their

mechanisms of action, possible drug interactions and optimal dosage (Andrej Jenca et al., 2024).

Materials and Methods

The Nellikai decoction is formulated by using 1 to 25 Kalanchi (1 Kalanchi=5gm.) of medicinal plant parts of thippili, Nellikai, Kadukai, Kadartengay, Kiraththandu, Jadamanjil, Veppampattai, Karamjiragam, Seenthil, Kottamalli, Omam, Jathipathiri, Illavangam, Athimathuram, Chitarathi, Adathoda, Nerunjil, Mukkulikkirai, Kattuppakkal, Kattukirambu, Karkadashingi, Katukurohini, Karpurappul, Gopuramtangi, Korai, Chathakuppai and Kekkuvitai were collected from the western Ghats. The collected medicinal plant parts were sun dried for one week and then powdered by using mortar and pestle. The collected ingredients of dried and crushed medicines mixed with water was allowed to boil until it reduces to 750ml was sieved by using cotton cloth and stored in earthen pot for further scientific assessment. The Phytochemical present in the Nellikai decoction and different solvent was done according to the standard procedure of Harborne, (1973) and hydroxyl radical scavenging activity (Halliwell et al., 1987).

Result and Discussion

Nellikai decoction is an internal cancer medicine. Twenty seven medicinal plants were used in different combination of Kalanchi for decoction preparation *Piper longum*, *Terminalia chebulla*, *Lodoclea maldivica*, *Nigella sativa*, *Carum copticum*, *Myristica fragrans*, *Cinnamomum verum*, *Rhus succedanea*, *Cyperus rotundus* (1 Kalanchi), *Azadirachta indica*, *Tinospora cordifolia*, *Coriandrum sativum*, *Glycyrrhiza glabra*, *Portulaca quadrifida*, *Ludwigia octovalvis*, *Cymbopogon citratus* and *Carum carvi* (2 Kalanchi), *Alpinia speciosa*, *Adathoda vasica*, *Tribulus terrestris*, *Momordica dioica*, *Veratrum viridii*, *Andrographis echinodes* and *Anthemum graveolens* (3 Kalanchi), *Amaranthus gangeticus* (4 Kalanchi), *Nardostachys grandifolia* (5 Kalanchi) and *Emblica officinalis* (25 Kalanchi) are the ingredients used for the preparation of Nellikai decoction (Table - 1).

Table 1: Composition of Nellikai Decoction

Sl. No	Botanical Name	Quantity
1.	<i>Piper longum</i>	1 Kalanchi
2.	<i>Emblica officinalis</i>	25 Kalanchi
3.	<i>Terminalia chebulla</i>	1 Kalanchi
4.	<i>Lodoclea maldivica</i>	1 Kalanchi
5.	<i>Amaranthus gangeticus</i>	4 Kalanchi
6.	<i>Nardostachys grandifolia</i>	5 Kalanchi
7.	<i>Azadirachta indica</i>	2 Kalanchi
8.	<i>Nigella sativa</i>	1 Kalanchi
9.	<i>Tinospora cordifolia</i>	2 Kalanchi
10.	<i>Coriandrum sativum</i>	2 Kalanchi
11.	<i>Carum copticum</i>	1 Kalanchi
12.	<i>Myristica fragrans</i>	1 Kalanchi
13.	<i>Cinnamom verum</i>	1 Kalanchi
14.	<i>Glycyrrhiza glabra</i>	2 Kalanchi
15.	<i>Alpinia speciosa</i>	3 Kalanchi
16.	<i>Adathoda vasica</i>	3 Kalanchi
17.	<i>Tribulus terrestris</i>	3 Kalanchi
18.	<i>Protulaca quadrifida</i>	2 Kalanchi
19.	<i>Momordica dioica</i>	3 Kalanchi
20.	<i>Ludwigia octovalvis</i>	2 Kalanchi
21.	<i>Rhus succedanea</i>	1 Kalanchi
22.	<i>Veratei viridi</i>	3 Kalanchi
23.	<i>Cymbopogan citrates</i>	2 Kalanchi
24.	<i>Andrographis echiioides</i>	3 Kalanchi
25.	<i>Cyperus rotundus</i>	1 Kalanchi
26.	<i>Anethum graveolens</i>	3 Kalanchi
27.	<i>Carum carvi</i>	2 Kalanchi

Qualitative analysis

The earlier studies on the phytochemical analysis of Siddha Paavu decoction showed the presence of alkaloid, flavonoid, phenol, terpenoid, reducing sugar, tannin, steroid and glycoside (Suja and Williams, 2015). In the present study, qualitative analysis of Nellikai decoction showed the presence of flavonoid, terpenoid, alkaloid, phenol, tannin, steroid, saponin, reducing sugar and amino acid in all solvent extracts except glycosides in control. The aqueous extract was present in flavonoid, phenol, saponin, steroid and amino acid. The ethanol extract was present in flavonoid, terpenoid and saponin. The chloroform extract is present in flavonoid, terpenoid, saponin, reducing sugar and glycosides. The presence of methanol extracts in flavonoid, phenol, alkaloid, saponin and reducing sugar. The acetone extract was present in flavonoid, phenol, tannin and amino acid. In general qualitative analysis of Nellikai decoction showed the presence of flavonoid is present in all the tested solvent extracts in control (Table - 2).

Table 2: Qualitative analysis of Nellikai decoction and solvent extracts

Phytoconstituents	Solvent Extracts					
	Control	Aqueous	Ethanol	Chloroform	Methanol	Acetone
Flavonoid	+	+	+	+	+	+
Terpenoid	+	—	+	+	—	—
Phenol	+	+	—	—	+	+
Alkaloid	+	—	—	—	+	—
Saponin	+	+	+	+	+	—
Tannin	+	—	—	—	—	+
Steroid	+	+	—	—	—	—
Reducing sugar	+	—	—	+	+	—
Amino acid	+	+	—	—	—	+
Glycosides	—	—	—	+	—	—

Antioxidant Activity

Nellikai decoction and extracts are rich in bio active compounds with significant antioxidant, anti-inflammatory and anti-diabetic properties (Po-Hsien et al.,2022).The earlier studies on hydroxyl radical scavenging of Paavu Choornam revealed minimum inhibition of $54.30 \pm 0.00\%$ to $83.02 \pm 0.01\%$ (Mary suja , 2016).In the present study Hydroxyl radical scavenging activity showed a minimum scavavenging of 54.76 ± 0.00 (25 μ l) to $69.01 \pm 0.01\%$ (100 μ l),Aqueous extract of 31.11 ± 0.00 (25 μ l) to $39.62 \pm 0.00\%$ (100 μ l),Ethanol extract of $26.23 \pm 0.01\%$ (25 μ l) to $35.14 \pm 0.00\%$ (100 μ l),Chloroform extract of $16.35 \pm 0.01\%$ (25 μ l) to $9.58 \pm 0.00\%$ (100 μ l) and standard Vitamin-C extract varied from $61.13 \pm 0.00\%$ (25 μ l) to $74.79 \pm 0.01\%$ (100 μ l) (Table -3).

Table 3 : Hydroxyl radical scavenging activity

Conc. Of extracts	Control	Aqueous	Ethanol	Chloroform	Acetone	Vitamin-c (standard)
25 μ l	54.76 ± 0.00	31.11 ± 0.00	26.23 ± 0.01	16.35 ± 0.01	5.35 ± 0.01	61.13 ± 0.00
50 μ l	58.13 ± 0.01	35.23 ± 0.02	29.78 ± 0.01	19.12 ± 0.02	7.66 ± 0.01	65.40 ± 0.00
75 μ l	63.13 ± 0.02	38.19 ± 0.00	31.65 ± 0.02	23.48 ± 0.04	8.42 ± 0.01	68.25 ± 0.01
100 μ l	69.01 ± 0.01	39.62 ± 0.00	35.14 ± 0.00	27.54 ± 0.00	9.58 ± 0.00	74.79 ± 0.01

Cytotoxicity

The aqueous (decoction) extract of Nellikai (*Phyllanthus emblica*) are generally considered safe for normal use and exhibit cytoprotective effects on healthy cells. However, at high concentrations, these same extracts can be cytotoxic (Pro-apototic) to various cancer cell lines. Other studies show that *Phyllanthus emblica* extracts protect normal fibroblast cells (L929 cell lines) and neural Pc12 cells against damage induced by oxidative stress and certain toxins (Tiejun Zhao et al., 2015), (Sairam et al., 2002). In the present study the effect of HeLa with sample showed a concentration dependent effect of Nellikai decoction. The concentration increased from 6.25 μ g/ml to 100 μ g/ml and the percentage of inhibition increased from 6.25 μ g/ml of 93.83%, 12.5 μ g of 87.5%, .25 μ g of 79.50%, 50 μ g of 66.17% and 100 μ g of 32.59%. At the concentration 100 μ g there was a decrease in cell viability of 32.59% (Table 3). In general, the total cell count of HeLa cells decreasing in the concentration of Nellikai decoction indicating an inhibitory effect on the cancer cell lines. The IC50 concentration of Nellikai decoction was found to be 73.19 μ g/ml (Table- 4).

Table 4 : Effect on HeLa with Nellikai decoction

MTT assay-Nellikai decoction with HeLa		
Culture condition	% Cell viability	IC50 conc(µg/ml)
Untreated	100	73.19
Std.control	49.15	
6.25µg	93.83	
12.5µg	87.51	
25µg	79.50	
50µg	66.17	
100µg	32.59	

Conclusion

The presence of different phytochemicals, antioxidant potential and anticancer activity of Nellikai decoction showed the pharmacological activities of the tested medicine and further assessment on gene expression and mitochondrial responsible need to be done to justify the better effect of the herbal medicine prescribed to cure cancer.

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