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Review Article

Anti-cancer Potential

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Exploring the Anti-cancer Potential of Amrutham Ghrita: A Review

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Cancer, a leading cause of mortality worldwide, is largely attributed to modern lifestyles and environmental toxins. Current treatment options, such as chemotherapy and radiotherapy, are expensive and associated with adverse effects. In the context of Ayurveda, the concept of management of Dushivisha (i.e., cumulative toxicity) offers a promising approach to cancer management. This review focuses on Amrutham Ghrita, a classical Ayurvedic formulation, and its potential anticancer properties. Our analysis of various research papers reveals that the constituents of Amrutham Ghrita, exhibit immunomodulatory, antioxidant, and works against complications arises due to chemotherapy. The results suggest that Amrutham Ghrita may be a novel, cost-effective, and safe adjuvant therapy for management caused by complications aroused due to chemotherapy. This review provides a foundation for future research in this area highlighting the potential of Ayurvedic medicine in addressing the global burden of cancer.

Keywords: Cancer, Ayurveda, Dushivisha, Amrutham Ghrita, immunomodulatory, antioxidant

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Introduction

Cancer is a major concern, officially labelled the most dangerous diseases by the World Health Organization. Only 5-10% of all cancer cases can be attributed to genetic diseases or defects, whereas the remaining 90-95% rapid increase is tied to our modern lifestyles.**[1]** In today's lifestyle individuals are frequently exposed to numerous toxic substances, primarily those with carcinogenic properties. Air pollutants due to harmful chemicals and diverse range of environmental toxins such as occupational exposure and lifestyle choices, play a significant role in inducing the risk of cancer. Minimizing exposure is crucial for prevention and public health, but up to some extend prevention of exposure is not possible. Cancer is caused by changes to certain genes that alter cellular functions. It's the result of environmental exposures that mutate DNA. These exposures may include substances, such as the chemicals in tobacco smoke, radiation, or other carcinogenic substances, infiltrate the body via air, water, radiation, drugs, and cosmetics and gets deposited in body.**[2]**

Radiotherapy and Chemotherapy are only line of treatment for cancer in modern science, which is expensive as well as associated with various adverse effects on health that may in turn causes various forms of cytotoxicity. In context of *Ayurveda* and modern science after analyzing and studying etiological factors and pathology of cancer, these contexts can be considered under term *Dushivisha* (i.e., cumulative toxicity). Carcinogen accumulated in body may not manifest immediate symptoms but rather lay dormant within body, enveloped by kapha, for numerous years. Over time, this leads to gradual viti. of all *Doshas* (fundamental energies) and *Saptadhatus* (Seven essential dhatu).**[3]**

Management of cancer will be efficient, cost effective as well as with minimum adverse effects by following treatment protocol of *Dushivisha* (i.e., Cumulative toxicity) Under *Vishachikitsa*, various *Agada Yogas* are mentioned by A*charyas* which has multiutility in the management of various disorders. After analysing the *Phalashruti* (indication) the appropriate *Yoga* must be chosen as per the *Yukti* of *Vaidya*. *Amrutham Ghrita* is a formulation/ *Agada Yoga* described by in *Ashtanga Sangraha-Uttaratantra -Vishaprathishedha Adhyaya.* As per the reference, it is *Sarvavishapaham* and *Mrutasanjivanam* (The revival of the dead, the swan of all poisons). The ingredients are *Vacha (Acorus calamus* Linn*), Kakamachi (Solanum Americanum.* Mill*), Jatamamsi (Nardostachys jatamansi), Kadabhi (Celastrus paniculatus. Willd), Prathyakpushpi (Achyranthus aspera. Linn), Shirisha (Albizia lebek (L.) Benth)*, *Ghrita*, *Gomutra* (cow urine).**[4]** While analysing the properties, research on the efficacy of *Amrutham Ghrita* in various chronic disorders or severe conditions is necessary to prove its relevance in current era.

Aim and Objectives

To do a review analysis of efficacy of *Amrutham Ghrita* in Carcinoma

Methodology

The reference of *Amrutham Ghrita* is taken from *Ashtanga Sangraha – Uttartantra***[4]**

Research data has been collected from various research articles by *Ayurvedic* scholars published on various websites

1. Vacha

Botanical Name: *Acorus calamus* Linn.

Table 1: Anti-cancerous of *Vacha*

Cancer	Form	Results
Human gastric cancer cell line (AGS).[5]	The ethanolic and methanolic extracts and essential oil of the rhizome	The growth of AGS cells was inhabited by the extracts and essential oil and the extracts inhibited the angiogenesis in HUVEC cells.
Glioblastoma (U251 cells) (Brain tumor)[6]	(β)-asarone (240 and 360 μM)	Apoptosis (YO-PRO-1 and PI staining). Inhibition of the expression of hnRNP H1, hnRNPA2/B1 and cathepsin D.
Glioblastoma (U251 cells)[6]	(β)-asarone (360 μM)	Arrest the cell cycle in G0/G1 phase and promoting autophagy possibly through P53/Bcl-2/Belin-1andP53/AMPK/mTOR signal transduction pathway.
Colon cancer (LoVo cells)[6]	(β)-asarone (200 and 400 μM)	Reduction in the rate of cell viability (MTT assay).Down-regulation of mitochondrial membrane potential (MMP).

Prostate cancer (LNCaP cells)[6]	Ethanolic extract of A. calamus root (250, 500 and 750 µg/ml)	Reduction in the cell viability (XTT assay). Induces apoptotic cell death
Prostate cancer (PC-3 cells)[6] Neuroblastoma (IMR-32 cells) Cervical cancer (HeLa cells) Synovial cancer (SW982 cells) Breast cancer (MCF-7 cells)	Nitro derivatives of (β)asarone (1.56–200) µM	Reduction in the cell viability (MTT assay).
Macrophage cancer[6] (P338D1 and J774 cells)	Novel lectins from Acoris species (1.0-10) µg/ml	Reduction in the cell viability (3H-thymidine incorporation).

2. Kadabhi

Botanical Name: *Celastrus paniculatus* Wild

Table 2: Anti- cancerous effect of *Kadabhi*

Cancer	Form	Result
Breast cancer cells (MCF-7 cells)[7]	Cytotoxic constituents β-dihydroagarofuranoid sesquiterpenes	Shows Apoptosis and Autophagy against breast cancer cells

3. Shirisha

Botanical Name: *Albizia lebek(L.)Benth*

Table 3: Anti-cancerous effect of *Shirisha*

Cancer	Form	Result
Ehrlich ascites carcinoma (EAC) in Swiss albino mice (in vivo) HeLa and A549 cell lines (in vitro)[8]	Ehrlich ascites carcinoma (EAC) in Swiss albino mice and its cytotoxic effect against HeLa and A549 cell lines in vitro.	ALEE showed direct cytotoxicity on EAC cells in a dose-dependent manner. ALEE exhibited a significant decrease in the body weight, tumor volume, viable cell count, tumor weight, and elevated the life span of EAC tumor-bearing mice.
DLA bearing mice[9]	Hydroalcoholic extracts of Albizia lebbeck	Showed significant antioxidant, anticancer and hepatoprotective activity.
Breast cancer cell line (MCF 7)[10]	Methanol bark extract of A. lebbeck	Showed Cytotoxic activity of on MCF 7 (Human breast cancer) cell lines

4. Prathyakpushpi

Botanical Name: *Achyranthus aspera* Linn.

Table 4: Anti-cancerous effect of *Prathyakpuahpi*

Cancer	Form	Result
Dalton's Lymphoma (DL) cells by MTT assay DL induced Balb/c mice[11]	Achyranthes aspera L. methanolic leaf extract	Anticancer effects on Dalton's Lymphoma via regulation of PKCα signaling pathway and mitochondrial apoptosis.
Pancreatic cancer cells aasay[12]	Achyranthes aspera leaves extracted in methanol (LE) on human cancer cells in vitro.	LE selectively suppressed the transcription of metalloproteases (MMP-1 and -2), inhibitors of MMPs (TIMP-2) and angiogenic factors (VEGF-A and VEGFB). Contains potent anti-proliferative compound with specific activity against pancreatic cancer.

5. Jatamamsi

Botanical Name: *Nardostachys Jatamansi*

Table 5: Anti-cancerous effect of *Jatamansi*

Cancer	Form	Result
estrogen receptor (ER)-positive (MCF-7) ER-negativebreast carcinoma (MDA-MB-231) cells[13]	Nardostachysjatamansi Methanol extract (NJM)	In MTT assay, NJM exhibited the highest antiproliferative activity (IC50: 58.01 ± 6.13 and 23.83 ± 0.69 µg/mL in MCF-7 and MDA-MB-231 respectively).
Hepatocellular Carcinoma(HCC) [14]	Nardostachysjatamansi root extract (NJRE)	Attenuates Tumor Progression in Hepatocellular Carcinoma via Inhibition of ERK/STAT3 Pathways.

6. Gomutra

Table 6: Anti-cancerous effect of *Gomutra*

Cancer	Form	Result
Breast cancer cell line, (MCF-7)[15]	A pharmaceutical composition comprising of at least one anticancer agent ('Taxol'- Peclitaxel) and a cow urine distillate or a dried fraction (GM-IV) obtained from cow urine distillate	Enhance the cell division inhibitory activity of the drug 'Taxol' in breast cancer cell line
Oro-Pharyngeal carcinoma Cancer near the kidney Throat cancer Breast cancer Chronic renal failure Multiple myeloma and severe waist pain[16]	Cow pathy product Amrutha Sara Kamdhenu Ark	Completely recovered 98% improvement 80% improvement Completely cured Improvement Improvement

7. Goghrita

Table 7: Anti-cancerous effect of *Goghrita*

Cancer	Form	Result
Hepatic cancer (Female Wistar rats)[17]	Goghrita	Dietary cow ghee relative to soybean oil decreased the activities of cytochrome P450 (CYP) enzymes, CYP1A1, CYP1A2, CYP1B1 and CYP2B1, responsible for activation of carcinogen in liver. The hepatic GGTP activity decreased on soybean oil diet; while in cow ghee group it remained unaffected.

Discussion

Majority of ingredients of *Amrutham Ghrita a*re having the qualities likes immunomodulatory, antioxidant and effective against complications arise due to chemotherapy.

Such as,

1. Vacha

- Inhibited growth of human gastric cancer cells (AGS) with rhizome extracts and essential oil.
- Induced apoptosis in Glioblastoma (U251 cells) and inhibited angiogenesis in HUVEC cells.
- Arrested cell cycle and promoted autophagy in Glioblastoma (U251 cells).
- Demonstrated anti-cancer effects in colon cancer (LoVo cells), prostate cancer (LNCaP cells), and other cancer cell lines.
- Nitro derivatives of (β)-asarone showed decreased cell viability in various cancer cells.
- Novel lectins from Acorus species reduced cell viability in macrophage cancer cells (P338D1 and J774 cells).

2. Kadabhi

- Cytotoxic consti. showed apoptosis & autophagy against breast cancer cells (MCF-7 cells).

3. Shirisha

- Showed cytotoxicity on Ehrlich ascites carcinoma (EAC) in mice and in vitro against HeLa and A549 cell lines.
- Hydroalcoholic extracts exhibited antioxidant, anticancer, and hepatoprotective activity.
- Methanol bark extract showed cytotoxic activity on MCF-7 (human breast cancer) cell lines.

4. Prathyakpushpi

- Methanolic leaf extract exhibited anticancer effects on Dalton's Lymphoma via PKCα signaling pathway regulation and mitochondrial apoptosis.
- Leaves extract selectively suppressed transcription of metalloproteases and angiogenic factors in pancreatic cancer cells.

5. Jatamamsi

- Different extracts showed potent effects against estrogen receptor-positive (MCF-7) and ER-negative breast carcinoma (MDA-MB-231) cells.
- Root extract attenuated tumor progression in Hepatocellular Carcinoma via ERK/STAT3 pathways.

6. Gomutra

- Enhanced the cell division inhibitory activity of the drug 'Taxol' in breast cancer cell line (MCF7).
- Reported improvements and recoveries in various cancers and health conditions.

7. Goghrita

- Decreased the activities of cytochrome P450 (CYP) enzymes, CYP1A1, CYP1A2, CYP1B1 and CYP2B1, responsible for activation of carcinogen in liver.

The management of cancer in present situation is expensive as well as associated with various adverse effects on health which may in turn cause various cytotoxicity. The quest for a novel, promising drug that not only eases the course of treatment but also enhances the quality of life for sufferers is imperative. Additionally, the attractiveness of these drugs lies in their widespread availability, affordability, and the absence of proven adverse effects. *Amrutam Ghrita* fits in all these criteria and hence can be used in all types of cancer.

Conclusion

The plant extracts, compounds, and cow urine products demonstrated promising anticancer activities against a range of cancer types**[16]**, suggesting potential therapeutic benefits. Based on review of research papers, it can be concluded that the contents of *'Amritham Ghrita'* may hold immense potential in management as well as prevention of carcinoma. The review analysis suggests that *Amrutham Ghrita* and its components have potential anticancer activities. This is a beginning stage of research, further cell line studies, pre-clinical and clinical researches are necessary to analyze the actual efficacy of *Amruthamghrita* .

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