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## **CANCER– AN INTEGRATIVE APPROACH BY AYURVEDA**

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### **ABSTRACT**

Cancer is one of the most dreadful disease of the 20th century and spreading further with continuous and increasing incidence in 21st century. An integrated approach is needed to manage cancer. An alternative solution to western medicine embodied with severe side effects is the use of Ayurvedic preparations to arrest the insidious nature of the disease. Ayurveda, a science of long life, almost 6000 years old, can serve as a “goldmine” for novel drugs used for centuries to treat chronic diseases. Thousands of ayurvedic preparations are being screened worldwide to validate their use as anti-cancerous drugs. Hence, the broad aim of this article is to provide a general outline on description of cancer’s causes, pathogenesis and therapeutic management from an ayurvedic perspective underlying its scientific principles involved in treating these conditions with the use of natural products.

**Keywords:** Cancer, Ayurveda, Etiology, Pathogenesis, Treatment of Cancer.

### **INTRODUCTION**

In the last few years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. It is considered as an adversary of modernization and advanced pattern of socio-cultural life dominated by Western medicine. Multidisciplinary scientific investigations are making best efforts to combat this disease, but the sure-shot, perfect cure is yet to be brought into world medicine. More than 50% of all modern drugs in clinical use are of natural products, many of which have been recognized to have the ability to include apoptosis in various tumour cells [1]. Recently, a greater emphasis has been given towards the research on complementary and alternative medicine that deals with cancer management. The broad aim of this article is to provide a general outline on descriptions of cancers and their management from an ayurvedic perspective underlying its scientific principles involved in treating these conditions with the use of natural

products. This article reviews the available literature regarding researches on anti-cancerous ayurvedic herbs and also includes a summary of treatment strategies for various cancers. It is written with an intention to raise awareness and encourage implementation of ayurvedic therapies for combating cancer and suggesting an integrated approach in cancer management and treatment. Learning from the past, examining the present and advancing to the future, Because large population use ayurvedic medicine worldwide, there is an urgent need for additional, carefully conducted, high-quality intensive research to evaluate its efficacy and to develop this discipline to meet ever-new challenges of modern medicine in the field of oncology.

### **Ayurvedic concept of cancer**

Although there is no illness listed in Ayurveda as Cancer, there are disorders mentioned in Ayurvedic Texts which shows great similarity to Cancer. Modern medicine describes Cancer as the deformation of tissues and their undesired growth. Ayurvedic Texts describes the symptoms and their respective treatments for overcoming the diseased condition. ‘Karka Roga’ is a synonym to the word ‘Cancer’ disease. The disease shows similarities with following diseases described in Ayurveda as Dushta Shotha, Dushta

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Vrana, Dushta Granthi, Dushta Arbud, Dushta Vidradhi, Dushta Visarpa, Dushta Nadivrana, Dushta Mansapradoshaja Vikara etc [21-25]. The above mentioned conditions that develop in certain parts of the body are very similar to those of Cancer, although all types of Shotha may not be cancerous. Impure or imbalanced doshas, Vata, Pitta or Kapha or infested Shothas could lead to Cancer. If care is not taken to cure the Shotha and if the causes which cause them are not taken care of, then these causes leading to Shotha may further lead to Cancer. Leukemia or Cancer of the blood – in ayurveda we have found the following similarities - Rasa – Rasagata Jwara, Rakta Dhatu Jwara (Fever), Raktadhatu Paka, Anaemia (Pandu), Bleeding disorders (Raktapitta), Sannipatik Jwara, Raktaj Krumi. Charaka [2] and Sushruta [3] samhitas, well known Ayurvedic classics, describe cancer as inflammatory or non-inflammatory swelling and mention them as either Granthi (minor neoplasm) or Arbuda (major neoplasm).

### Fundamental classification

Ayurvedic classification of neoplasm depends on various clinical symptoms in relation to Tridoshas.

- I. I: Diseases that can be named as clear malignancy, which includes arbuda and granthi, e.g. mamsarbuda (melanoma) and raktarbuda (leukaemia), mukharbuda (oral cancer), etc.
- II. II: Diseases that can be considered as cancer, such as incurable ulcers with e.g. tridosajulmas (abdominal tumors like carcinomas of the stomach and liver or lymphomas).
- III. III: Diseases with the possibility of malignancy, e.g. Visarpa (erysipelas), asadhyakamala (incurable jaundice) and nadi vrana (sinusitis) [4,5,20,28].

### Etiology

Cancer in each person differs according to the person's exposure to pathogens and genetic constitutions which make each of them to react differently. The factors responsible for the vitiation of doshas are discussed here [6]. Vata aggravating factors: excessive intake of bitter, pungent, astringent, dry foods and stressful conditions. b. Pitta aggravating factors: excessive intake of sour, salty, fried foods and excessive anger. c. Kapha aggravating factors: excessive intake of sweet, oily food and sedentary nature. d. Rakta aggravating factors: excessive intake of acid or alkali containing foods. Fried and roasted foods, alcoholic beverages, sour fruits are some examples. Excessive anger or severe emotional upset, sunbathing or working under scorching sun or near fire and hot conditions, etc. are some other causes [7]. Mamsa aggravating factors: excessive use of exudative foods like meat, fish, yoghurt, milk and cream. Behaviours leading to exudation like sleeping during the day and overeating are some of the causes for pathogens invading the fatty tissues. f. Medo aggravating factors: excessive intake of oily foods, sweets, alcohol and lazy attitude [7,8].

### Pathogenesis of tumors

According to Ayurvedic principles, the disease cannot be named on its own because it differs between person to person in terms of illness, clinical presentation and also the treatment required [5].

In arbuda, the decreased state of dhatwagni (deranged metabolism) will result in excessive tissue growth. Vata can be correlated with the anabolic phase of growth whereas kapha to the catabolic phase. Cancer originates due to a metabolic crisis, i.e. aggravation of vata forces and suppression of kapha forces, both interacting with one another resulting in proliferation. Sushruta has proposed six stages in the pathogenesis of all diseases but his concept suits more to the pathology of the tumor than pathogenesis itself.

1. Sanchaya: early stages of localized neoplastic changes.
2. Prakopa: transformation of primary growth into metastatic tumors.
3. Prasara: metastasis.
4. Sthanasamsraya: complete metastasis and secondary growth.
5. Vyakti: clinical signs and symptoms are expressed.
6. Bheda: the stage where differentiation of growth occurs on the basis of histopathology [6].

### Diagnosis of the Disease (Vvadhivinischava) from Ayurvedic Perspective

Signs & symptoms of:-

- Malignant Wounds / Ulcers (Dushta Vrana)
- Malignant Nodes (Dushta Granthi)
- Malignant Tumours (Dushta Arbuda)
- Spreading Cellulitis (Dushta Visarpa)
- Malignant Abscess (Dushta Vidradhi)
- Malignant Sinuses (Dushta Nadivrana)
- Malignant abscess of Vitiated Mansa Dhatu (Dushta Mansapradoshaja Vikara) [9].

Stages (Avastha):-

- Embedding in deeper and deeper tissues & vitiating them (Dhatugata)
- Loss of tissues (Dhatupaka)
- Unripped (Aama)
- Semi - ripped (Pachyamana)
- Ripped i.e. Acutely Tender (Pakwa)
- Malignant Sinuses (Dushta Nadivrana)
- Malignant abscess of Vitiated Mansa Dhatu (Dushta Mansapradoshaja Vikara) [9]

### Treatment of Cancer

The treatment is divided as:-

- Panchakarma (Shodhana Chikitsa)
  - Palliative Treatment (Shamana Chikitsa)
  - Rejuvenation Therapy (Rasayan Chikitsa)
- A. Panchakarma (Shodhana Chikitsa) - It eliminates the vitiated doshas from the body. Common Indications –

Vitiation of Doshas should be at large extend [2,3].

- i) Emesis (Vamana)
- ii) Purgation (Virechana)
- iii) Medicated enema (Basti)
- iv) Nasal Medication (Nasya)
- v) Bloodletting (Raktamokshana)

#### B. Palliative Treatment (Shamana Chikitsa)

Shamana Chikitsa of Cancer includes strengthen of Digestive power, promoting digestion, giving strength to Body tissues (Dhatu), rejuvenating the body tissues & controlling spread of the disease by controlling Dhatugata & Dhatupaka Avastha, Mitigating 3 dosha (Tridosha - Shamak) according to dominance of doshas, Dhatvagni - Deepan :- Improving Metabolic Activities (dhatvagni) specially Rasa - Rakta & Mansa dhatvagni, Controlling Dhatugata Avastha:- (The nature of doshas of embedding in deeper & deeper tissues & vitiating them), and Prevention of Dhatupaka Avastha by Pittashamak & Raktaprasadak treatment [21,22].

#### C. Rasayan Chikitsa (Medicines) (immunotherapy)

Rejuvenation to affected organ (Rasayana):- Depending upon strength of the patient and vitiated doshas. Medicines are given in various pharmaceutical forms like single herbs, herbal mixtures, various Guggulu, tablets, Medicated ghee, Kalpa (sugar base medicines), Alcoholic beverages (Asava & Arishta) [2,3,22].

#### Surgery

When medical treatment practices fail, then the case is left to surgeons. Surgical cancer management in Ayurveda include the principles of fomentation by means of external application, cleansing by internal medication, treatment to liquefy the contents of the swelling, opening the tumor surgically for evacuation of its contents, cauterization to avoid recurrence and post operative care for healing the wound. Cauterization with alkalis and acids and other surgical procedures were performed with herbal and mineral medicines. Arbuda is excised completely from its deep root seat and cauterization done to destroy any of the remaining cell particles [19,36].

#### List of some Ayurvedic herbs used as Anticancer

Herbs which are widely used and scientifically proven of their anticancer properties, are present under, Agar (*Aquilaria agallocha*), Agnimantha (*PremnainTEGRIFOLIA*), Amla (*Emblica officinalis*), Ashwagandha (*Withania somnifera*), Bala (*Sida cordifolia*), Basil (*Ocimum sanctum*), Bilva (*Aegle marmelos*), BrihatKantakari (*Solanum indicum*), Bhumiyamalaki (*Phyllanthus amarus*), Chandan (*Santalum album*), Draks (*Vitis vinifera*), Ela (*Ellateria cardamomum*), Gambhari (*Gmelina arborea*), Gokshura (*Tribulus terrestris*), Isabgol (*Plantago ovata* Husk), Jeevanti (*Leptadenia reticulata*), Kachur (*Curcuma zedoary*), Karkatakashringi (*Pistacia integerrima*), Kushta

(*Saussurea lappa*), LaghuKantakari (*Solanum xanthocarpum*), Mustak (*Cyprus rotundus*), Neem (*Azadirachta indica*), Nagkeshar (Mesuaferrea), Neelotpala (*Nymphaeaeastellata*), Pippali (*Piper longum*), Punarnava (Spreading Hagweed), SalaiGuggul (*BoswelliaSerrata*), Vasa (*Adathoda vasica*), Shatavari (*Asparagus racemosus*), Shilajit (Mineral Pitch), Shynaka (*Oroxylum indicum*), Tejptra (*Cinnamomum tamala*), Varahikand (*Dioscorea bulbifera*) [10,11,32-35], Bhunimba (*Andrographis paniculata*) [27], Guggul (*Commiphora mukul*) [28], Turmeric (*Curcuma longa*) [29], Guduchi (*Tinospora cardifolia*) [30], Bhallataka (*Semecarpus anacardium* Linn) [31].

The medicinal plants contain many antioxidants such as vitamins (A, C, E, K), carotenoids, flavonoids (flavones, isoflavones, flavonones, anthocyanins, catechins, isocatechins), polyphenols (ellagic acid, gallic acid, tannins), saponins, enzymes and minerals (selenium, copper, manganese, zinc, chromium, iodine, etc.) [12,13]. It also appears that many plants have some of these antioxidants. Several reports state that antioxidants possess remarkable antitumour/anticancer activity. [12-14]. And Ayurvedic drugs are efficient in cancer treatment [26].

Out of 15 plants screened by CCRAS, 9 plants shown anticancer activity against Different Cell lines.[15] The 15 drugs are Kantakari, Yastimadhu, Daruharidra, Pippali, Shunthi, Kutaki, Guduchi, Vidanga, Devdaru, Ashwagandha, Amalaki, Bhumyamalki, Vacha, Kanchnar, Haritaki. And 9 plants shown effect on some cell lines are *Berberis aristata* ( DWD cell line-Oral tissue, A549 - Lung tissue, A2780 - Ovarian tissue), *Piper longum* ( colo 205-colon), *Picrorhiza kurroa* (colo 205- colon), *Cedrus deodara* ( pc 3 – prostate, A2789 – ovary, MCF7 - breast ), *Withania somnifera* ( A 549 – Lung, K 562 - Leukemia), *Phyllanthus embelica* ( DU 145 – Prostate ), *Acorus calamus*( DU 145 – Prostate ), *Bauhinia variegata* ( DU 145 – Prostate ), *Terminalia chebula* ( DU 145 – Prostate, K562 - Leukemia ) [15].

#### List of some other Ayurvedic Drugs used as Anticancer

**RasKalpas** – Raudra Ras, Shiva Gutika, Poorna Chandroday Ras, Vasant Kusumakar Ras, Karpur Ras, Kanaksundar Ras, Sarvangsundar Ras, Chaturmukh Ras, Somanath Tamra Bhasma, Suvarna Parpati, Sarveshwar Parpati, Rassindur, Manikya Ras, Mall Sindur, TamraSindur, Madhumalini Vasant, Lakshmvilas Ras, Panchvaktra Ras, Gandamalakandan Ras, Nityanand Ras.

**Ghruta/Medicated Ghees (G)** – Bhallatak Ghrut, Mahabhallatak Ghrut, Panchtikta G., Mahatikta G., Mahakalyanak G., Guggulutiktak G., Varunadi G., Triphala G, Ashwagandha G.

**Decoction (Kwatha) (K)** – Panchvalkal Kwath, Dhanyak K., Erand K., Patrang K., TriphalaK., BanapshaK., SurasadiGana K.

Other – Kanchanar Guggul, Panchtikta Ghrut Guggul, Sarivadyasav, Draksharishta, Saraswatarishta [16].

### Some Preparations used in ayurvedic anticancer treatment [17]

1. The mixture of *Terminalia chebula*, grape juice and sugar cane juice has been used. Resveratrol, a natural product derivative from grape juice has been proved to possess cancer chemo preventive activity.
2. The paste comprising of *Baliospermum montanum*, *Plumbago zeylanica*, *Euphorbia nerifolia*, *Calotropis procera*, *Jaggery*, *Semecarpus anacardium* applied over the tumours.
3. Paste is prepared from the barks of *Madhuca indica*, *Syzygium cumini*, *Arjuna*, *Terminalia arjuna* and *Salix caprea* and prescribed for local application.
4. The Barleria prionitis oil prepared with whole plant is indicated for external application during acute stages of cyst in blood vessels.
5. The Paste made up of *Prosopis cineraria* seeds, *Raphanus sativa*, *Moringaoleifera*, barley and mustard with sour buttermilk were applied locally for disintegrating cysts.
6. The paste of *Moringa oleifera* seeds, *Solanum xanthocarpum*, *Sinapis dichotoma*, *Holarrhena antidysenterica* and *Nerium odorum* roots prepared with buttermilk is used for arbuda tumours.
7. *Curcuma domestica* - The *Curcuma domestica* powder in combination with *Symplocos racemosa*, *Soymida febrifuga*, is mixed with honey and this is used as an external remedy.

### Tumor sub types Classical treatment procedures

**Vatikagranthi** –*Helloborus niger*, *Tinospora cordifolia*, *Clerodendron serratum*, *Aegle marmelos*, *Hoya viridiflora*, *Elephanto pusscaber*, *Soymida febrifuga* and *Gynandropis pentaphylla* were applied locally.

**Paittikagranthi**- *Terminalia chebula* powders with either grape or sugarcane juice were used orally. The paste of *Glycyrrhiza glabra*, *Eugenia jambolana*, *Terminalia arjuna* or *Calamus rotang* were used of external application.

**Kapajagranthi** - Paste of *Capparis spinosa*, *Capparis sepiaria*, *Agati grandiflora*, *Lagenaria vulgaris*, *Premnaherbacea*, *Pongamia glabra*, *Musa sapientum* and *Randia dumetorum* used in local application.

### Ayurvedic treatment minimizes toxicities of Chemotherapy

Though Cancer Chemotherapy is highly effective in many Cancers, in Modern medical science, toxicities of Chemotherapy are severe in many patients, Chemotherapy medicines produce side – effects like Diarrhoea, Loss of appetite, Anorexia, Vomiting, Constipation, Stomatitis, Burning sensation, Fever, Weakness, Loss of weight, Alopecia. It mainly hamper gastrointestinal tract. In this condition, Ayurvedic line of treatment improves appetite, promotes digestion & relives associated symptoms like Nausea, Vomiting, Loss of appetite, Stomatitis, Diarrhoea,

Constipation, Hyperacidity. The sideeffects of Chemotherapy are remarkable reduced with Ayurvedic treatment & patient can tolerate Chemotherapy. Some Ayurvedic medicines have cooling property. Thus patients get relief in Burning sensation in chest, palms, soles & eyes. It improves blood count & removes toxicities in blood are also beneficial. Diet like rice, moong dal, boiled vegetables, vegetable soup, fresh sweet fruits, cow's milk, cow's ghee, buttermilk, butter is recommended during the course of Chemotherapy.

Insomnia (Disturbed sleep) is a common problem during Chemotherapy. Shiropichu (Application of gauze soaked in medicated oil) is observed to be beneficial in this problem [18].

### Ayurvedic treatment minimizes toxicities of Radiotherapy

Radiotherapy produces side effects like Local burning, itching, discoloration, ulcers, rashes, Herpes, Loss of appetite, Anorexia, Stomatitis, Weakness, Loss of weight. The sideeffects of Radiotherapy are remarkable reduced with Ayurvedic treatment & patients can tolerate Radiotherapy & relieves symptoms like local burning, ulcers, rashes. Patients undergoing Radiotherapy also suffer from Loss of appetite, Anorexia & Vomiting. Mainly liquid diet like soup of green gram, rice gruel, semolina porridge, vegetable soup, fresh fruit juices, buttermilk, coconut water, medicated water are recommended. Skin discoloration is a common side effect of Radiotherapy so application of some medicated oils or ghee after completing Radiotherapy is useful to improve texture & colour of skin. Cancer patients are definitely benefited with this type of integrated approach of treatment.

### CONCLUSION AND FUTURE DIRECTIONS

It is estimated that more than 80% of the world's population cannot afford modern medicines. In addition to cost, current cancer therapies are minimally effective and exhibit toxicities that are intolerable in most cases. This review presents evidence that drugs used in Ayurvedic medicine can be used not only to prevent cancer, but also to treat cancer. These agents can enhance therapeutic effects and minimizes Chemotherapy/Radiotherapy induced toxicity. Because cancer is primarily a disease of older age, finding less toxic therapies is a major priority.

The molecular targets of chemo preventive agents are similar to those currently being used to treat cancer. Tumour cells use multiple cell survival pathways to prevail, and agents that can suppress these multiple pathways have great potential in the treatment of cancer. The evidence indicates that most of the plant-based agents used in Ayurvedic medicine do indeed suppress multiple pathways. Ayurvedic Panchkarma (Shodhana) Therapy can be beneficial for cancer management. More research is needed in order for these agents and therapies to reach their full therapeutic potential.

## REFERENCES

1. Rosangkima G, Prasad SB. Antitumour activity of some plants from Meghalaya and Mizoram against murine ascites Dolton's lymphoma. *Indian J Exp Biol*, 42, 2004, 981-8. [PUBMED].
2. Sharma PV. Charakasamhita. Varanasi: Choukhamba Orientalia; 1981.
3. Bhisagrattha KL. Sushrutasamhita. Varanasi: Choukhamba Orientalia; 1991.
4. Prasad GC. Studies on cancer in Ayurveda and its management. *JRAS*, 3, 1987, 147–67.
5. Singh RM. An assessment of ayurvedic concept of cancer and a new paradigm of anticancer treatment in Ayurveda. *J Altern Complement Med*, 8, 2002, 609– 14.
6. Sastry JLN. Introduction to oncology, cancer in Ayurveda. Varanasi: Chaukhambha orientalia, 2001, 1–24.
7. Hartwell JL. Plants used against cancer. A survey. *Lloydia*, 32, 1969, 247–96 &78–107.
8. Pandey G. Anticancer herbal drugs of India with special reference to Ayurveda. New Delhi: Sri Stguru Publications, 2002,18-121
9. Dr. S. P. Sardeshmukh, 'Cancer-Ayurved' - Publication by Bharatiya Sanskriti Darshan Trust Publication, December, 2007.
10. Thatte U, Dhahanukar S. Ayurveda, the natural alternative. *Sci Today*, 2001, 2–8.
11. Umashanker et al. Traditional Indian Herbal Medicine Used As Antipyretic, Antiulcer, Anti-Diabetic and Anticancer: A Review, *IJRPC*, 1, 2011, 1-4.
12. Gupta VK, Sharma SK. Plants as natural antioxidants, *Nat Prod Rad*, 2006, 326-34.
13. Kaur C, Kapoor HC. Antioxidants activity and total phenolic content of some Asian vegetables. *Int J Food Sci Tech*, 37, 2002, 153-61.
14. Ray G, Hussan SA. Oxidant, antioxidant and carcinogenesis. *Indian J ExpBiol*, 40, 2002, 1213-32.
15. Report on screening of Single Herbal Drug Extracts For Potential Anticancer Activity - A Joint Project of CCRAS and Advanced Center for Treatment, Research and Education in Cancer (ACTREC) Mumbai, 2009.
16. TL Devaraj, Cancer Therapy in Ayurveda. Research publication. Varanasi: Choukhamba publishers, 1999.
17. Dipal Patel, Cancer - an Ayurvedic Perspective, *IJARPB*, 2, 2012, 179-195
18. Dr. SP Sardeshmukh. Cancer-Ayurved,<http://www.ayurved-for-ancer.org/chemotherapy.html>
19. Sankaran PS. Swellings. In: Prasad GC, Udupa KN, editors. Susruta's contribution to surgery. Varanasi: Indological Book House, 1976, 99–111.
20. Dash B, Kashyap L. Diagnosis and treatment of Galaganda, Gandamala, Apaci, granthi and arbuda. In: Dash B, Kashyap L, editors. Diagnosis and treatment of diseases in ayurveda. NewDelhi: Concept Publishing Company, 1987, 437–66.
21. Ram A. Astanga-hrdaya of vagbhata. Vol.III. Uttara-sthana. Delhi: Uppal Publishing House, 1999.
22. Kinjavadekara RS. Astangasangraha. New Delhi: Uppal Publishing House, 1998.
23. Sharma PV. Chakradatta: a treatise on principles and practices of Ayurvedicmedicine. New Delhi: Vedams Books International, 1998.
24. Murthy KRS. Sarangadharasamhita. Varanasi: Chaukambha Orientalia, 1987.
25. Murthy KRS. Bhavaprakasa of bhavamisra. Vol. II. Madhya and UttaraKhanda. Varanasi: Krishnadas Academy, 2001.
26. Sonata S. The efficacy of Ayurveda drugs on Cancer (Arbuda). Workshop oncancer souvenir. Chennai: CentralResearch Institute for Siddha, 1986.
27. Trivedi N, Rawal UM. Effect of aqueous extract of *Andrographis paniculata* on liver tumour. *Indian J Pharmacol*, 30, 1998, 318–22.
28. Dong Xiao, Shivendra V. Singh. z-Guggulsterone, a constituent of Ayurvedic medicinal plant *Commiphora mukul*, inhibits angiogenesis in vitro and in vivo, *Mol Cancer Ther*, 7, 2008, 171.
29. Ramadasan Kuttan, P. Bhanumathy, K. Nirmala, M.C. George. Potential anticancer activity of turmeric (*Curcuma longa*), Elsevier, 29, 1985, Pages 197–202
30. Matthew S, Kuttan G. Immunomodulatory and antitumouractivities of *Tinospora cordifolia*. *Fitoterapia*, 70, 1999, 35–43.
31. Sharma PV, Chaturvedi C, Bandhopadhyaya NG. A study on dosage and toxicity of Bhallataka (*Semecarpus anacardium* Linn.). *J Res Indian Med*, 1, 1966, 130.
32. Cassady JM, Chang CJ, McLaughlin JL. Recent advances in the isolation of structural elucidation of antineoplastic agents of higher plants. In: Beal JL, Reinhard E, editors. Natural products as medicinal agents. Verlag: Hippokrates, 1981, 93–105.
33. Vad BG. Study of complete regression in four cases of cancer. *The Indian Practitioner*, 26, 1973, 253–63.
34. Nayak B. Pharmacological index-Ayur medline. Bangalore: Seetharam Prasad, 2002, 447–682.
35. Bakhru HK. Conquering cancer naturally. Delhi: Chaukhamba Sanskrit Pratishthan, 2000, 1-6.
36. Singhal GD, Singh LM. The management of glandular swellings, cervically mphadenopathy, tumours and goiters. in: Singhal GD, Singh LM, editors. Operative considerations in ancient Indian surgery based on Susruta Samhita, Cikitsasthana. Varanasi: Singhal Publications, 1982, 339–56.