



## Review Article

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### A REVIEW ON INTEGRATING MODERN INVESTIGATIVE MODALITIES IN AYURVEDIC ONCOLOGY: A TRANSLATIONAL APPROACH TO ARBUDA

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#### ABSTRACT

Arbuda Vyadhi in Ayurveda bears clinical similitude with malignant tumor or cancer in modern medicine. Since cancer remains one of top causes of death globally, it requires multidisciplinary strategy for management. Although Ayurveda provides thorough examination which is mentioned in ancient Ayurvedic treatise, certain modern tools require in current era for diagnosis of Arbuda. By incorporating contemporary diagnostic technologies has greatly expand scope and effectiveness of Ayurvedic cancer treatment. In order to discover cancer early, accurately, localization, staging, and tracking treatment outcome, for all these information modern investigations are required. These facilitate accurate treatment planning by guiding in distinguish Arbuda from others. Furthermore, patient safety is also maintained by regular monitoring through this tool. Modern investigations like biopsy, imaging techniques (CT, MRI, PET-scan, USG, Mammography), Histopathology, Tumor markers all these used for standardized diagnosis of Arbuda. By offering outcome measurements, modern investigations greatly aid clinical research in Ayurvedic oncology, and they promote evidence-based validation of conventional treatments. It provides bridging the gap between both sciences, this integrative strategy improves therapeutic results, patient confidence and compliance. Thus, the synergy between modern investigations and traditional Ayurvedic principles significantly improves the diagnosis and management of Arbuda. It ensures a holistic and scientifically grounded approach to cancer care.

**Keywords:** Arbuda, Cancer, Investigations, Tumor marker

#### INTRODUCTION

Ayurveda is a traditional medicine in India. Ayurvedic principles primarily focused on personalized medicine. The holistic and scientific concepts of this science give emphasis to promote health and prevention of disease. There seem to be similarities between the Ayurveda and the innovative approach of predictive, preventive, personalized medicine (PPPM).<sup>1</sup>

‘Rogamado Parikshet Tatoanantaram Aushadhma’ (Cha. Su. 20/20)

In Ayurveda greater importance given to diagnosis of diseases rather than treatment.<sup>2</sup> Ayurveda science has its own Siddhanta (principles) on which it stands. Variety of principles like Samanya (similarity) and Vishesha (dissimilarity), Karya (cause) and Karana (effect) Bhava, Pancha Maha Bhuta (five element), Tri Dosha (three vitiator of body), Sapta Dhatu (seven bodily tissues), Prakruti (body constitution), Srotasa (channels).<sup>3</sup> Different types of Pareeksha (examinations) are described in Samhitas like threefold, fivefold, eightfold and tenfold examinations. All of them supports clinical diagnosis. In Ayurveda Roga Pareeksha is mainly depends on the Prakruti of an individual and disease progression. Also considering the movement of abnormal Dosha, Dhatu and Mala.<sup>4</sup>

In Ayurveda classics there is no direct concept of cancer as such, but certain clinical characteristics can be comparable to cancer. We can correlate it with Granthi and Arbuda.<sup>5</sup> Initiation of such condition is with Shotha (swelling). Tri Stambha of body (Vata,

Pitta, and Kapha) are not majorly disturbed in the benign neoplasm and are not too damaged as the body still tries to coordinate between the three systems. Malignant tumors are very hazardous condition. As it severely disturbs the coordination between three body system and vitiates body tissues, which leads to fatal morbidity. These are very detrimental as the body lose control over coordination.<sup>6</sup>

Cancer is a burning problem in today’s era and leading cause of death globally. Majority of them are of lung, stomach, colorectal, liver, and breast cancer. The cancer related death is more common in low- and middle-income countries. Genetic and environmental factors play crucial role in the diathesis of cancer. Dooshi Visha is a slow acting poison that stays in the body and gets worse anytime an aggravating factor come in contact.<sup>7</sup> Ultimately the cycle of pathogenesis began and symptoms get appears. Toxins from chemical exposure, medications, industrial waste, unwholesome dietary habits, sedentary lifestyle, etc. gradually accumulate inside the body and act as a Dooshi Visha and ultimately lead to various conditions one of them being cancer.

Modern diagnostic tools play key role in conditions like cancer. Certain biomarkers like CA 15-3, CA 125, CA 12-5, etc. helps to look for particular genes, proteins, and other substances also called tumor markers. Imaging techniques like USG, MRI, CT scan, Mammography helps to locate the site and size of lesion. Biopsy helps to find out whether the lesion is benign or malignant in nature.<sup>8</sup>

In Ayurveda, the methods given for diagnosis have a systematic and scientific approach and also exhibit diversity. These same methods check both Prakruti (normalcy) and Vikruti (pathology) of a person. Nowadays traditional diagnostic methods having less evidence due to lack of standardization. Reason behind this is majority of them are subjective parameter, so result or outcome might be different for each investigator. The second reason is lack of experts or skillful investigator who teaches to others. So, due to these reasons people are diverted to use modern tools as investigation of choice. In Ayurveda because of more subjective criteria, there is lack of standardization which leads to inquisitiveness towards modern tools. So, integrative approach for both Ayurveda as well as modern techniques gives accurate and precise diagnosis of a disease. It also saves time and helps in early diagnosis of condition like cancer.

This study aims to explore the role of modern investigative tools such as laboratory investigations, radiological imaging, and molecular profiling in the diagnosis, monitoring, and therapeutic evaluation of Arbuda. The objective is to bridge epistemological gaps between Ayurveda and modern oncology, thereby contributing to evidence based integrative and interdisciplinary cancer care.

Classical textbooks like Charak Samhita, Sushruta Samhita and Ashtanga Hridaya consist of all the diseases that we see in today's world but in hidden form. Cancer is one among such diseases. We can correlate their symptoms with various conditions like Arbuda. Timely diagnosis is key point of concern in such a deadly disease. Integrative approaches lead to better outcome and that's why modern diagnostic tools play a major role in such situations.

Cancer is a critical concern nowadays and it is a leading cause of death worldwide. Majority of cancer are related with Lung, stomach, colorectal, liver, and breast. Genetic and environmental factors play crucial role in the diathesis of cancer. Ancient Ayurveda advocates that causative factors (Genetic & acquired in term of lifestyle changes) disturbs the functioning of Agni, and create Ama like biotoxins in the body, which alter the physiology of the Vata, Pitta and Kapha, Mamsa and Rakta Dhatus and respective Srotas and causing Kshobha to body, which initiate the process of pathogenesis within the body that may lead to develop diseases including cancer.

List of laboratory investigations for different type of cancers are as mentioned below.

#### **Bladder Cancer laboratory investigations**

Urine analysis: Microscopic examination is necessary to confirm a positive dipstick test result, which shows one to two red cells per high power field.

Urine Sediment: Haematuria is significant if more than three red cells per HPF confirmed. The presence of dysmorphic red cells suggests origin from glomerulus.

Urine Cytology and Urine Biomarkers.<sup>9</sup>

#### **Prostate Cancer laboratory investigations**

PSA Testing: PSA level normally can be correlate with age and prostate size of a person, averaging one nanogram per milliliter for men under age 50 and 3 nanogram per milliliter for men over age of sixty.

PSA free versus total ratio: If the ratio is less than 25 percentage, there is an increased risk of prostate cancer.

PSA velocity: Although it is not a useful screening test, an annual rate of change in PSA level more than 2.0 nanograms per milliliter is useful in determining the risk of perioperative death.<sup>10</sup>

#### **Renal, Pelvis and Ureter Cancer laboratory investigations**

Urine Cytology: Due to the limited yield of low-grade tumors and the possibility of synchronous bladder cancer (40 to 50 percent of cases), urine sediment analysis for malignant cells is a less accurate tool for diagnosing these cases than bladder malignancies.

#### **Ovarian Cancer laboratory investigations**

FNA or Biopsy:

As with trans-abdominal FNA or ovarian tumor biopsy, the intact mass is surgically removed with an intraoperative frozen-section diagnosis if feasible.

CA-125: is elevated in approximately 50 percent of patients with early-stage disease.

Human epididymis protein 4 (HE4): It is useful in diagnosing recurrent or pro aggressive disease or in the evaluation of a suspicious adnexal mass.

Carcinoembryonic antigen (CEA): The levels of CEA may be raised in malignancies (particularly mucinous carcinomas) of the ovary, GI tract, breast, pancreas and thyroid.

CA 19-9: It is a mucin protein that may be elevated in ovarian cancer but is also positive in gastric cancers. It may be recurrence in a patient with CA19-9 biomarker positive ovarian cancer.<sup>11</sup>

#### **Stomach Cancer laboratory investigations**

Cytology: Exfoliative cytology positive in 80 percent of patients; false-positive result in less than 2 percent.

Tumor markers: Increased serum CEA (more than 5 nanogram per deciliter) in 40 to 50 percent of patients with metastases and 10 to 20 percent of patients with surgically respectable disease.

Gastric analysis: Normal in 25 percent of patients. Hypochlorhydria in 25 percent of patients. Achlorhydria following histamine or betazole in 50 percent of patients.<sup>12</sup>

#### **Pancreas Cancer laboratory investigations**

Imaging studies: Most useful tests are USG or CT scanning followed by ERCP (Endoscopic retrograde cholangio pancreatography). This combination will correctly diagnose or rule out cancer of the pancreas in more than and equal to 90 percent of cases.

Histology: Ultrasound guided needle biopsy has reported sensitivity of 80 to 90 percent false positives are rare.

Tumor markers: Serum markers for tumor in carcinoma of the pancreas, CA 19-9 has PPV (positive predictive value) equal to 59 percent and NPV (negative predictive value) is 92 percent, there is no difference in sensitivity between local disease and metastatic disease.

Serum amylase and lipase: These may be slightly increased in early stages (less than ten percent of cases) principles may contribute to its prevention and management.

Glucose tolerance: The curve is of the diabetic type, with overt diabetes in 20 percent of patients with pancreatic cancer.

Serum LAP (leukocyte alkaline phosphatase): Increased (more than 300 Unit) in 60 percent of patients with carcinoma of the pancreas due to liver metastases or biliary tract obstruction. It may also be increased in chronic liver disease.<sup>13</sup>

### Cancer Biomarkers

Biomarker is a one type of examination to look for certain genes, proteins, and other substances also called as tumor markers. It can provide information about cancer. Each person's cancer has unique pattern of biomarkers. Some biomarkers like CA 15-3, CA 125, CA 12-5, etc. used to detect different types of cancers.<sup>14</sup>

### Cancer Imaging

Cancer imaging refers to various technologies used to detect, diagnose, monitor, and plan treatment for cancer. Common modalities include.

- MRI (Magnetic Resonance Imaging): Soft tissue contrast for brain, spine and prostate, etc.
- CT (Computed Tomography): Cross sectional images for size, shape, location of tumor
- PET Scan<sup>15</sup> (Positron Emission Tomography): Detect active metabolic area
- Ultrasound: Identify lump, cysts and fluid-filled structures
- X-ray: Initial screening for solid tumors
- Mammography: Initial screening for breast tumor/ lump
- Endoscopy/Biopsy: Direct visual and tissue examination<sup>16</sup>

Different imaging modalities which are used in Arbuda assessment, their Ayurvedic understanding mentioned in (Table 1).

### Biopsy techniques and cancer grading

Biopsy is a procedure to remove a piece of tissue or a sample of cells from body so that it can be tested in a laboratory. Types of biopsies are mentioned below,<sup>17</sup>

- Needle biopsy
- Surgical biopsy
- Incisional biopsy
- Excisional biopsy
- Aspiration biopsy
- Fluid biopsy
- Bone marrow biopsy

### Ayurvedic Perspectives on Cancer

Cancer word itself create apprehension to a people. It emerged due to metabolic variations. In Ayurveda treatise Acharya mentioned Vata Dosha Karmas, among them one of Karma is cell division. Vata Dosha in its aggravation state with Kapha Dosha in suppression states, due to both Doshas interaction which result in

proliferation of cells. As Vyadhi Vargikarana (classification) one of the classifications of disease is Ekadeshaja (localized) and Sarvadeshaja (generalized). This particular condition is of Ekadeshajavridhi (growth at particular part). In that place abnormal cell division takes place and various conditions like benign and malignant tumors derive.

In Sushruta Samhita he mentioned about six stages of pathogenesis for disease formation. Six stages are Sanchaya (initial stage of localized neoplastic changes), Prakopa is transformation of primary growth into metastatic growth, Prasara is metastasis, Sthana Samsraya is complete metastasis and secondary growth. Vyakti is clinical signs and symptoms observed clearly, and in Bheda its stage in which differentiation can be done via histopathological examination.<sup>18</sup> (Figure 1)

Tumors are having different types but mainly classify into two types that is benign tumors and malignant tumors.<sup>19</sup> There are differentiating characteristics in both of them as below (Table 2).

### Environmental and Dietary Factors in Cancer Development

Ayurveda science believes that the main cause of Vyadhi is Adharma, or Prajnaparadha is the primary cause of the Dushti (vitiation) of Vayu (air), Uduka (water), Desha (land), and Kala (time). Polluted terrain in Dooshita Desha is one of the aggravating elements of Dooshi Visha.

Seasons that are unfavourable and pollution leads to the accumulation of smog, which subsequently results in respiratory and skin disorders. Accordingly, the food industry employs a lot of chemicals, including food colouring compounds that might cause cancer, to store and preserve the food. The usage of unnecessary medications for medical purposes may also fall under this category.

### Ayurvedic Insights on Toxins and Treatment

Dooshi Visha Janya Vikara is becoming increasingly prevalent, as its effects depend on the presence of Dooshi Visha at various Dhatus levels. Among these conditions is cancer, which Ayurveda must consider as an etiological factor when diagnosing diseases such as cancer. This is particularly relevant in the case of many tumors that have no apparent cause. The ideas of Gara Visha (concomitant poison) and Dooshi Visha (latent poison) are comparable to toxins which are low potent and cause a variety of illnesses, including cancer. Therefore, treatments of these must be tried while treating cancer. Pathya-Apathya plays a significant part in the management of cancer, just like all other Ayurvedic treatments, thus it should be closely adhered to in addition to treatment.<sup>20</sup> (Figure 2).

Table 1: Imaging modalities and their relevance

Modality	Application in Arbuda Assessment	Ayurvedic Correlation
Ultrasound (USG)	Initial screening for soft tissue masses, cystic vs. solid differentiation	Snigdha vs. Ruksha nature of swelling
Computed Tomography (CT)	Detailed cross-sectional imaging for tumor size, location, and metastasis	Mapping Srotas involvement and Dhatus disruption
Magnetic Resonance Imaging (MRI)	Superior soft tissue contrast, useful in brain, spine, and pelvic tumors	Evaluating Majja Dhatus and Shukra related pathologies
Positron Emission Tomography (PET)	Functional imaging to assess metabolic activity and treatment response	Correlates with Agni and Ama dynamics in tumor metabolism
X-ray	Basic skeletal and thoracic evaluations	Useful in Asthi Arbuda and Urahstha conditions

Table 2: Difference between benign and malignant tumors

Features	Benign Tumors	Malignant Tumors
Growing	Slow growing	Fast growing
Capsulated	Yes	Non capsulated
Invasive	Non invasive	Invasive and infiltrate
Metastasis	Non	Yes
Shape	Smooth/oval/lobulated/regular	Nodular/stellate/irregular
The pain	Painful	Painless
Skin	No skin dimpling	Skin dimpling
Nipple	No nipple retraction	Nipple retraction
Prognosis	Good	Bad
Damage to human body	Relative smaller	Relative bigger

Table 3: Ayurvedic and modern diagnosis of Arbuda

Aspect	Ayurvedic diagnosis (Arbuda)	Modern diagnosis (Cancer)
Examination methods	Shadvidha, Astavidha Pareeksha	Clinical exam, palpation, symptom history
Pulse analysis	To detect Dosha imbalance	Not used
Inspection	Darshana Pareeksha	Visual inspection, endoscopy, imaging
palpation	Sparshana Pareeksha	Physical examination of tumor characteristics
Stool and urine analysis	Mala and Mutra Pareeksha	Lab tests, urinalysis, fecal occult blood test
Other signs	Akruti, Jihva, etc	Weight loss, fatigue, pain, organ specific symptoms
Pathological basis	Imbalance of Doshas, Dhatu vitiation, especially Mamsa, Rakta, Meda	Genetic mutations, cell cycle dysregulation, metastasis
Types of tumors	Mamsarbuda, Raktarbuda	Benign, malignant, carcinoma, sarcoma, lymphoma etc.
Imaging tools	Not applicable traditionally	X-ray, MRI, CT-SCAN, PET-SCAN ULTRASOUND
Biopsy	Not applicable traditionally	Gold standard for diagnosis and grading of cancer
Treatment focus	Balancing Dosha, detoxification, Rasayana therapy	Surgery, chemotherapy, radiation, immunotherapy

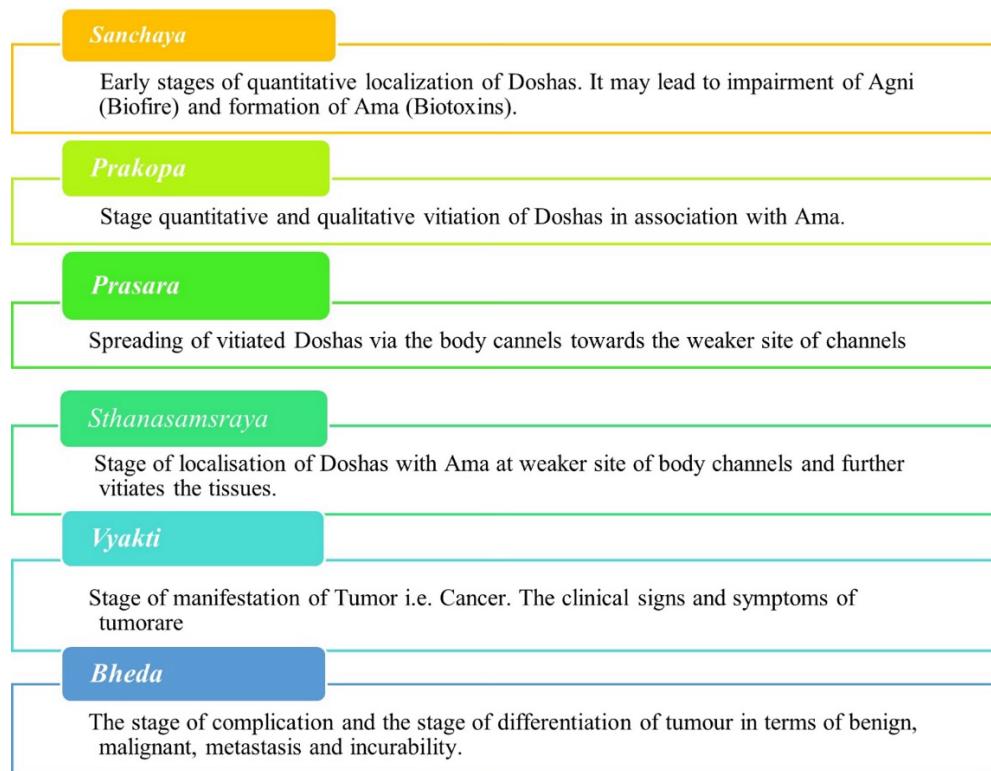


Figure 1: Sequential events of Pathogenesis in Ayurveda



Figure 2: Pathophysiology of Dooshi Visha

## DISCUSSION

Cancer word is not explained in Ayurvedic lexicons, but the Arbuda Vyadhi concept is very close to pathology of cancer. It is caused by genetic factor and variety of environment factors. Arbuda term can be used for malignant cancer and the metastasis inside various body parts is indicated as Adhyarbuda (overlying tumor) and Dwi-Arbuda (two tumor together). It vitiates Tridosha, Rakta, Mamsa and Meda Dhatus and form complex pathogenesis. Then it is localized at Kha-Vaigunya (defect in body channel) and form Arbuda, which has staging similar to cancer. Plenty of examination given by Acharyas for clinical diagnosis of a condition. But it lacks somewhere in today's era of doctors.

The expertise is not that much as it used to be in ancient period due to different reasons. In today's era of innovative technology advancement, scientific research found out newer techniques for diagnosis of different type of cancer. So, by using them it will give timely, accurate diagnosis of cancer. It will provide detailed information about tumor. Here are some correlations of Ayurvedic diagnosis and contemporary or modern diagnosis. (Table 3)

As Acharyas explained that Pratyaksha (direct perception) having its own limitations<sup>21</sup>, and at this place modern investigation takes place its role. External examination one can do with naked eye, light etc. and confirms color, size, margin, patch, discharge, appearance and many more things. But for internal examination expert should prescribe such techniques to make diagnosis concise and perfect, also it saves time.

Arbuda is a tumor which has occurred due to imbalance of Tri Doshas by its own Vata, Pitta and Kapha Prakopaka Nidana. Dosha then combines with Ama and starts accumulating inside body. It then goes to staging from Sanchaya, Prakopa, Prasara, Sthana Samshraya, Vyakti and Bheda Avastha. It gradually develops and then starts spreading from one place to other. Cancer having same features it is uncontrolled proliferation of cells, ultimately it forms localized tumor. When it's not detected or diagnose in early stage then it starts to spread in nearby tissues via various ways if it is malignant.

For the detection of location, size, spread etc., usage of modern investigation place important role. There is abundant techniques and tools present these days to diagnose such type of conditions. From routine blood and urine analysis to advanced level techniques are present. Biomarkers, biopsy, PSA analysis, urine analysis, urine sediments, cytology, histopathology tumor marker, laboratory testing etc., numerous modern investigations which helps to detect cancer.

Biomarkers used to find particular gene involve in pathology and it helps for target specific treatment as some gene are target for chemotherapy and radiotherapy. So, it is specific for every individual. Biomarkers like CA 15-3, CA 19-9, CA 27.29 are used in different types of cancer.

Imaging techniques like CT scan, MRI, PET Scan, mammography, ultrasound etc., are used for exact location, size, stage, metastasis of cancer. As the era evolves the newer and accurate technology comes in ground and chase crucial disease diagnosis. It doesn't change the original principles of Ayurveda, but it helps to be more precise, accurate in detecting diseases.

## CONCLUSION

The use of contemporary investigative tools into Ayurvedic therapy is a viable avenue for improving cancer detection,

treatment, and monitoring. Cancer clinical diagnosis is performed by different Pareeksha, but it is not standardized since it contains subjective factors. In today's period of rising scientific technology, there is an abundance of tests on the market that have been developed via extensive study. It enables Ayurveda doctors and other medical professionals to diagnose cancer or Arbuda more easily, accurately, quickly, and early. Using these contemporary investigative methods does not undermine Ayurveda pure and true principles, but rather promotes patient well-being. An integrative strategy in such a horrible sickness can provide a better outcome for the patient.

By using these investigations, it validates Ayurvedic concept of Arbuda. Take home message from this whole study is for Ayurvedic disease Arbuda diagnosis, treatment management and for monitoring during and after treatment modern investigation plays crucial role, which makes Ayurveda more evidence base and advanced.

The study underscores the potential of Ayurveda not merely as a complementary system, but as a holistic paradigm capable of contributing to personalized oncology. Classical concepts like Dosha, Dhatus, and Srotas offer valuable insights into systemic imbalances, while modern investigations provide precision in tumor characterization, progression monitoring, and therapeutic efficacy.

This translational model enhances the credibility of Ayurvedic interventions through scientific validation, encourages interdisciplinary approach, and opens avenues for integrative protocols that respect both traditional wisdom and modern rigor. Ultimately, such synergy may lead to more accessible, culturally resonant, and ethically grounded cancer care especially in regions where Ayurveda remains a primary healthcare modality.

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