



Critical Review on Herbo-Mineral Formulations in Cancer: Palliative Care

Aiswarya Mohan^{1*}, Devasena K M¹, Vineeth P K², Arun Mohanan², Ramesh N V³

¹PG Scholar, ²Associate Professor, ³Professor

Department of Rasashastra and Bhaishajya Kalpana (Pharmaceuticals), Amrita School of Ayurveda, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam-690525;

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ABSTRACT:

Rasashastra [Iatrochemistry] is a branch of Ayurveda which contain herbo-mineral preparations which helps in treatment of diseases. Minerals and metallic compounds like Mica, Copper and Iron pyrites, Mercury, Gold, Zinc, Brass, gems like Ruby, Diamond, calcium compounds like Lime soda are used after proper purification. Several studies done on these formulations shows anti-cancer activity. Thus some are directly indicated in arbuda chikitsa [cancer treatment]. Arbuda chikitsa [cancer treatment] has described by acharyas in classics. In that few herbomineral preparations are mentioned like Vajra bhasma, Raudra rasa, Nithyananda rasa etc. Some compounds are used by physicians for cancer according to their logic and practical experience like Shiva gutika, Tuttha bhasma etc. some metallic compounds like gold, diamond etc. are used in chemotherapy also. Trisenox injection made of Arsenic oxide [Gouri pashana] is used in leukaemia treatment. This is a compilation of medicines which are described in classics, proved in researches and used in clinical practices.

BACKGROUND

Rasa medicine is a renowned holistic system of traditional medicine emphasizing curative and preventive measures. Rasashastra [Iatrochemistry] has developed a rich and unique treasure of drug knowledge in which use of metals and minerals is very much advocated. Cancer is one of the most life threatening diseases and possess many health hazard in both developed and developing countries, characterized by irregular proliferation of cells. Cancer kills about 3500 million people annually all over the world; it accounts more than 2-3% of the annual deaths recorded worldwide. It refers to any one of a large number of diseases characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissues. Common sites of cancer are thyroid, oral, prostate, uterus, breast, ovary, GIT, lungs and kidney. In Ayurveda cancer is correlated with term "Arbuda".

CANCER

Cancer is a deadly disease which is difficult to cure if it reaches advanced stages. So we should be aware about the stages of cancer. It has 4 stages:

- Stage I – cancer is localized to small area and hasn't spread to other tissues.
- Stage II – cancer has grown but didn't spread
- Stage III – cancer has grown larger and has spread to lymph nodes
- Stage IV – cancer has spread to other organs of the body. This is the advanced and severe stage of cancer. And it is difficult to cure.

Cancer shows several signs and symptoms and may be asymptomatic sometimes.

Common symptoms of cancer include: Fatigue, Lump or thickening felt under skin, Loss of weight, Colour changes in skin, Difficulty in breathing, Difficulty in swallowing, Muscle or joint pain, Unexplained bleeding, Night sweats, Changes in bowel habits, severe pain, fever, anaemia etc.

GIT Cancer/Stomach cancer

In 40 % cases cancer develops in lower part and middle part of stomach.

Early stage it is asymptomatic.



Symptoms include: Bloating after eating, dark stools, nausea, vomiting, loss of appetite, weight loss, abdominal pain etc. [1]

Thyroid cancer

It occurs in cells of thyroid gland.

Symptoms include: pain in neck and throat, enlarged lymph nodes in neck, difficulty in swallowing, hoarseness of voice, cough etc. [2]

Oral cancer

It is the most common form of head & neck cancer.

It affects 1st part of tongue, mouth roof and floor and oropharynx also.

Symptoms include: pain in mouth, ear and face, difficulty in chewing & swallowing, mouth ulcers, bad breath, red and white plaques, cough etc. [3]

Breast cancer

Upper outer quadrant of breast is the common site.

Symptoms include: swelling of breast, pain in breast, red or flaky skin in nipple area, pain in nipples etc. [4]

Ovarian cancer

It occurs in cells of ovaries or in related areas of fallopian tube and peritoneum.

Early stages it is asymptomatic.

Later on symptoms starts appearing like, abdominal bloating, weight loss, fatigue, back pain, constipation, frequent urination. [5]

Uterine cancer/ endometrial cancer It begins in lining of uterus.

Symptoms include: vaginal bleeding after menopause, bleeding between periods, pelvic pain etc. [6]

Prostate cancer

It occurs in prostate gland of men.

Symptoms include: trouble in urinating, blood in urine, blood in semen, bone pain, erectile dysfunction, loss of weight etc. [7]

Cervical cancer

Malignant tumour in cervix, lowermost part of uterus.

Symptoms include: foul odour vaginal discharge, watery bloody discharge, vaginal bleeding after intercourse, pelvic pain etc. [8]

Lung cancer

Most common types of cancer occur in right lungs.

Symptoms include: shortness of breath, coughing up blood, hoarseness of voice, loss of appetite, chest pain with deep wheezing etc. [9]

Treatment

Based on the signs and symptoms and stages of cancer the treatment will be different. It is divided into three:

- Curative – using medications
- Primary treatment – it is to completely remove the cancer from the body.
So surgery is included in this.
- Adjuvant treatment – chemo therapy, radiation therapy, hormonal therapy □ Palliative treatment – to relieve the side effects of treatment.
- Other therapies are: Immunotherapy or biological therapy, Targeted drug therapy, Bone marrow transplants. [10]

Arbuda

According to Ayurveda in arbuda, mamsa [muscle tissue], meda [fat], and rakta [blood tissues] are affected. The symptoms are similar to cancer like swelling over body parts, severe pain etc. Ayurveda says that it affects the sixth layer of skin.

Types of arbuda

There are 8 types of arbuda, they are: Vataja, Pittaja, Kaphaja, Raktaja, Mamsaja, Medaja.

Treatment for arbuda

In Ayurveda arbuda is treated according to dosha predominance and disease condition of patient. There are mainly three types of treatment:

- Shodhana chikitsa [panchakarma procedures]: it is a purification process by which the vitiated doshas are eliminated. It includes snehana [oleation], swedana [sudation], vamana [emesis], virechana [purgation] vasti [enema], nasya [nasal medication] and raktamokshana [bloodletting].



- Shamana chikitsa [palliative treatment]: it includes strengthening digestive power, promoting digestion, giving strength to body tissues and controlling the symptoms of diseases.

- Rasayana chikitsa [rejuvenation therapy]: therapy which gives energy or strength to body cells and tissues by acting at the level of digestion and metabolism. In Ayurveda it is done by administering medicines in different forms like choorna, arishta, leha etc after the shodhana karma or purificatory procedures. Herbo-mineral formulations are included in this. It includes rasa bhasmas [incinerated powders] and tablets.

- Vataja Arbuda Chikitsa

Ushna upanaha sweda [sudation therapy] with taila [oil] prepared with seeds of Karkaruka, Ervaruka, Narikela, Priyala & mixed with ksheera ghrita ambu, Nadi sweda, raktamokshana with Shringa.

- Pittaja Arbuda Chikitsa

Mridu sweda, upanaha, kaya virechana, ghritapana with ghrita prepared by Syama, Girihva, Anjanaki, Draksha & Sphatika+ Klitaka kalka. Vighrista with leaves of Udumbara, saka and Gojihwa. After that lepa is prepared of Sarjarasa + Priyangu + Rodhra +Anjana + Yashtika + Aragvadha + Gojihwa + Soma + Syama + Madhu.

- Kaphaja Arbuda Chikitsa

Sodhana therapy [purification] followed by raktamokshana [bloodletting]. Upanaha with urdha adho doshahara dravya kalka & Kshara-agni-sastra karma [treatment using alkalies, fire, and sharp instruments]. Vrana sodhana [wound cleaning] with asphota, jati, Karavira patra siddha Kashaya and vrana ropana with taila prepared from Bharangi, Patha & Triphala.

- Medo Arbuda Chikitsa

Swedana, vidarana and visodhana of rakta [blood], seevana followed by avacurna with powder of Haridra [turmeric], Griha dhuma, Rodhra, Pattanga, Manahshila and ala. Ropana by Karanja taila + Madhu. [11]

RASA BHASMAS

Abhraka bhasma [mica nanoparticles] [12]

Abhraka bhasma is brick red in colour. It has madhura and Kashaya rasa, snigdha guna and seeta veerya. It is included in madhura vipaka. It has actions like rasayana, vajeekarana, varnya, bala vridhikara. It is indicated in grahani, jwara, arsha, ashmari etc. It was found that Abhrak Bhasma shows concentration dependent positive in-vitro anticancer activity on leukemia, lung cancer and prostate cell lines with highly significant activity on prostate cancer cell lines. Shataputi Abhrak Bhasma had maximum activity on prostate cancer cell lines. [13]. It is given in 1 to 2 ratti dose along with suitable anupana's.

Swarna bhasma [gold nanoparticles] [12]

Swarna is gold itself, it is yellowish in colour. It has madhura rasa, seeta veerya and snigdha guna. It acts as vrushya, ayushya, balya, rasayana, deepana and ojokara. It is indicated in kshaya, bhrama, unmada, apasmara like psychological diseases etc. it is given in 1/8th to 1/4th dose along with different anupana's conferring to diseases. A study showed that Swarna bhasma had significant effect in rectal cancer group by 70%. In Lung, gall bladder, and liver improvement showed by 40%, 40%, and 37.5% respectively. Gold-silica Nano shell has been used to kill tumor cells by near Infra-Red (IR) light. It also showed analgesic property. Gold-EGFR conjugates have been used to detect the cancer cells by exploiting the light scattering properties of gold Nano conjugates. [14]

Tamra bhasma [copper nanoparticles] [12]

It is blackish in colour. It is having madhura [sweet], tikta [bitter], Kashaya [astringent] and amla rasa [sour]. Also have ushna veerya [hot potency], katu vipaka [pungent after digestion], snigdha and laghu guna [light]. It has properties like rasayana which helps to improve the metabolism and lekhana property helps to scrape the unwanted cells. It is indicated in pandu, peenasa, sophia, shula, arsha etc. it is given in ½ to 1 ratti dose along with anupana's like Sunthi [dry ginger], Pippali [Piper longum], Yava kshara etc. Study showed that copper can induce the apoptosis in GIT carcinogenic cells. Copper induces the decrease of mitochondrial membrane potential. [15]



Kanmada bhasma [Asphaltum punjabinum] [12]

It has tikta rasa [bitter taste], ushna veerya [hot in potency] and katu vipaka [pungent taste after digestion]. It acts as yogavahi, rasayana and balya. It is indicated in sotha [inflammation], pandu [anemia], gulma [ascites], jwara [fever] etc. it is given at the dose of 2 to 8 ratti along with Dugdha [milk], Takra [buttermilk], Mamsa rasa [meat soup], Jala [water] and Gomutra [cow's urine]. The studies proved that Kanmada [shilajit] can inhibit G0/G1 or S phase cell cycle, by induced apoptosis in urinary bladder malignancy. [16]

Vajra bhasma [diamond nanoparticles] [12]

It is white in colour, having sad rasa's [all six tastes], snigdha guna and seeta veerya [cold potency]. According to Rasa tarangini it is indicated in arbuda [cancer] and granthi [tumor]. It acts as ayushya, yogavahi, deepana, balakara [strengthening] and rasayana [rejuvenating]. It is given at the dose of 1/32th to 1/16th gunja. The diamond nanoparticles are used as a carrier for drug delivery in cancer treatment. And it has proved that anti-angiogenic properties of diamond nanoparticles inhibit cell migration and adhesion, thereby arrest the G0/G1-phase of the cell cycle in glioblastoma therapy. [17]

Yashada bhasma [zinc nanoparticles] [12]

It is pale white or white coloured. It has katu [pungent] and Kashaya rasa [astringent] and seeta veerya [cold potency]. It acts as balya [strengthening], vrushya [and medhya [good for brain function]. It is indicated in kapha- pittaja vikaras, jwara [fever], rajayakshma [tuberculosis], swasa [breathlessness] etc. it is given at the dose of ½ to 1 ratti. The study showed that Yashada Bhasma [zinc nanoparticles] prepared with prior Jarana (JMY) acts as a cytostatic drug in human

Pancreatic ductal adenocarcinoma, due to their ability to induce cell growth arrest. [18]

Manikya bhasma [ruby] [12]

It is pale coloured. It has madhura rasa [sweet taste] and snigdha guna. It has properties like ayushkara, deepana, medhya etc. it is indicated in kshaya [emaciation], bhrama [dizziness], unmada [dementia], klaibya etc. it is given at the dose of 31 mg to 62 mg. Study showed that it exhibits

anticancer activity against breast cancer cells, cervical cancer cells, colon cancer cells & osteosarcoma cells. By inducing oxidative stress in cancer cells, which in turn affects their cell-cycle with an accumulation of cells in the G1-phase. And induces the apoptosis in cancer cells. [19]

RASA FORMULATIONS

Nithyananda rasa [20]

It contains suddha Parada [mercury], suddha Gandhaka [sulphur], Tamra bhasma [copper nanoparticles], Kamsya bhasma, Vanga bhasma [tin], triphala, suddha Haratala [Arsenic trisulphide], Trivrit, Vidanga, Sankha bhasma [conch shell], Loha bhasma [iron], Pippali [Piper longum], Chavya, Chitraka [Plumbago zeylanica] etc. drugs. According to Bhaishajya ratnavali it is indicated in arbuda, shleepada, gandamala etc. Nityananda Rasa having the therapeutic properties like lekhana [scraping], rasayana [rejuvenation], which will help for inhibiting the growth of cancer cells, acts like a curative therapy, ingredients used will help as immune therapy, non-toxic, harmless, used as rejuvenating, correction of metabolic defects, it may help in treating Arbuda [cancer]. Lekhana (Scraping)/ Bhedana action is given by Shuddha Tuttha [copper sulphate], Vanga bhasma [tin], shudda haratala [Arsenic trisulphide], Loha bhasma [iron], Kamsya bhasma, Sankha bhasma [conch shell], Varatika bhasma, Trikatu etc. Rasayana (immunomodulating) action is given by Vanga bhasma [Tin], Shuddha Tuttha [copper sulphate], Shuddha Haratala [Arsenic trisulphide], Loha bhasma. Triphala (Haritaki, Bibhitaki, Amalaki). Srotogamitwa (penetrating to minute pores) action by Haritaki [Terminalia chebula], Bibhitaki [Terminalia bellerica] etc. Balya (strengthening) action is given by Tamra bhasma, Vanga bhasma, Suddha Haratala [Arsenic trisulphide] etc. Yogavahi action is given by Kajjali helps in quick action on cancer cells. Shothaghna action of Haritaki helps to reduce swelling in affected area. It is given at the dose of 5 gunja. [21]

Trailokya sundara rasa [22]

It comprises of drugs like suddha Parada [purified mercury], suddha Gandhaka [purified sulphur], Loha bhasma [iron nanoparticles], Abhraka bhasma [mica], Triphala choorna, Guduchi choorna and bhavana dravya [levigation drug] is Bhringaraja swarasa. It is indicated



in pandu [anemia], shula [pain] and sotha [inflammation]. There is a study showed that activity of Trailokyasundara rasa in reducing tumour volume and growth inhibition in chronic myeloid leukemia. It prevented decrease in the platelet count and Hb%. Rate of increase of WBC's was also relatively reduced in Trailokyasundara rasa. [23]

Pushpadhanwa rasa [12]

It is prepared with drugs like Rasa sindhoora [sulphide of mercury], Naga bhasma [lead], Vanga bhasma [tin], Loha bhasma [iron] and Abhraka bhasma [mica]. Bhavana dravyas [levigation drugs] used are Ardra patra swarasa, Yashtimadhu kanda [or moola kwatha], Datura- Ardra patra swarasa, Shalmali twak kwatha etc. it is indicated in smriti nashi [loss of memory], upadamasha [syphilis], nidra nasha [loss of sleep], sukra kshaya [azoospermia] etc. Drugs included in this formulation like Rasa sindhoora [sulphide of mercury] has catalytic action. Manahshila [Arsenic disulphide] inhibits DNA synthesis in ovarian carcinoma cells. Honey's cyto - toxic effect increase in the levels of various proliferative and anti- apoptotic genes in ovarian cancer. Ardraka [ginger] has anti-Metastasis Inhibition of ovarian cancer. Glycyrrhiza glabra has apoptosis action in ovarian cancer& endometrial cancer. Piper betel has apoptotic, anti-metastatic and radical scavenging action. Cannabis sativa has apoptotic action. Triphala inhibits the rate of cell proliferation. We can say that these properties of drugs included in Pushpadhanwa rasa may help in treating ovarian cancer. [25]

Rasa Karpoora [12]

This formulation contains ingredients like Parada [mercury], Gandhaka [Sulphur] and Saindhava lavana [rock salt]. It is indicated in atisara [diarrhea], aruchi [loss of taste], pravahika [dysentery] etc. A study proved that the Rasakarpoora significantly inhibited the proliferation of human cervical cancer cells. it is useful to prevent the oxidative stress induced damage seen in cancer. Thus it may act as prophylactic as well as curative drug in treating cancer. [26]

Roudra rasa [12]

It is also called as Arbudahara rasa and contains one drug only that is, Rasasindhoora. It is triturated with bhavana dravya's [levigation drugs] like Meghanada swarasa,

punarnava moola kwatha, Tambula patra swarasa, Bala moola kwatha, Gomutra [cow's urine] etc. it is directly indicated in arbuda [cancer] according to Rasa ratna samucchaya. Rasa sindhoora act on dhatu [tissue] level as a catalyst which helps to improve the body functions and decrease the cell proliferation. It is given at the dose of 30 to 60 mg.

Arkeshwara rasa [12]

It contains ingredients like suddha Parada [mercury], suddha Gandhaka [sulphur], suddha Tamra [copper] and bhavana [levigation] dravya's used are Triphala Kashaya, Arka ksheera and Chitraka kwatha. It is indicated in supta vata. In Arkeshwara rasa, ingredients like Parada [mercury] and Gandhaka [sulphur] act as catalyst and it helps to increase the action of drug and decrease the cell proliferation. Tamra has lekhana [scraping] property thereby it scrapes the cells which are unwanted. Triphala which is used for bhavana [levigation] shows cytotoxic activity in cancer cells. Plumbago zeylanica also possess significant anticancer activity. Terminalia chebula demonstrated cytotoxic activity in a number of cell lines like breast cancer cell line, osteosarcoma cell line, prostate cancer cell line by inhibiting the rate of cell proliferation and inducing cell death. Study about Arkeshwara rasa shows that pancreatic cancer cells are highly sensitive against Arkeshwara rasa as measured through growth inhibition and LDH release activity [27]. It is given at the dose of 2 gunja along with Triphala churna.

CONCLUSION

In Rasashastra [Iatrochemistry] herbo-mineral and metallic preparations are used for treatment. Rasa dravyas [mineral drugs] are given without depending on doshas and dhatus[tissues] but only the disease condition of the patient. It helps to relieve quickly from diseases rather than herbal preparations. The combination of herbal and mineral preparation gives a combined action and it increases the bioavailability of drugs. Rasa dravyas [mineral drugs] acts as catalyst in some formulations, in other it gives the strength to body to withstand with diseases. Most of the rasa dravyas [mineral drugs] are having rasayana [rejuvenation] property. By this it helps to improve the metabolism of body and thereby the drug can act faster on targets. Here some of the formulations are directly indicated in cancer by acharyas. But some



are used by practical experience by physicians based on its properties like rasayana [rejuvenating] property of Abhraka [mica], Swarna [gold nanoparticles], Loha bhasma [Iron nanoparticles], etc. Yogavahi property of Vajra bhasma [diamond nanoparticles] and Kanmada bhasma [asphaltum punjabinum]. Lekhana [scraping] property of Tamra [copper] and Tuttha bhasma [copper sulphate nanoparticles]. Ojoskara property of Swarna bhasma [gold nanoparticles] are helpful for the same. The formulations like Nithyananda rasa, Roudra rasa are directly indicated in arbuda [cancer] by acharyas. And most of the formulations are proved to be anti-cancerous. In modern also gold nanoparticles & diamond nanoparticles are used in diagnosis and treatment of cancer like radiation and chemotherapy. Most of the people consider mineral and metallic preparations are toxic so that more researches should be done to prove the safety and efficacy of these magical preparations which are able to fight with dreadful diseases like cancer.

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