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Ayurvedic Approach Towards The Treatment For Mycobacterium Tuberculosis

P. Hyma,¹ Marri.Ruthika Ratna Veni,² Apurva.Mamidipalli,³ Lingam.Harini⁴

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1. Associate Professor, Pharmaceutics; Sarojini Naidu Vanitha Pharmacy Mahavidyalaya, Vijaypuri Colony, Tarnaka, Secunderabad, Telangana.
2. B. Pharm 4th year Student, Sarojini Naidu Vanitha Pharmacy Mahavidyalaya, Vijaypuri Colony, Tarnaka, Secunderabad, Telangana.
3. B. Pharm 4th year Student, Sarojini Naidu Vanitha Pharmacy Mahavidyalaya, Vijaypuri Colony, Tarnaka, Secunderabad, Telangana.
4. t B. Pharm 4th year, Studen, Sarojini Naidu Vanitha Pharmacy Mahavidyalaya, Vijaypuri Colony, Tarnaka, Secunderabad, Telangana.

Corresponding Author :- Marri. Ruthika Ratna Veni, Student B. Pharm 4th year, Sarojini Naidu Vanitha Pharmacy Mahavidyalaya, Vijaypuri Colony, Tarnaka, Secunderabad, Telangana.

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ABSTRACT: -

The Ayurvedic system of medicine is the oldest Indian system of medicine and is being practiced in few places around the globe. Ayurveda is the traditional Hindu system of medicine that is purely based in curing the individuals from any kind of disease or disorder by maintaining a balance of the body systems with the help of diet, herbal treatment and yoga breathing. Tuberculosis is a disease that primarily effects the lungs and rarely the other parts of the body. Tuberculosis effects the lungs by blocking the airways and making it difficult to breathe. There are many ayurvedic remedies or treatments that help cure the Tuberculosis disease. The onset of the disease from the period of the infection to the cure or death of the individual is about three years. In the view of Ayurveda, Tuberculosis is known as *Rajyakshma*. Tuberculosis is generally caused due to the loss of immunity, loss in tissue and many more. It is primarily caused by the bacterium, Mycobacterium Tuberculosis. In Ayurveda, there are certain procedures or therapies to be followed to completely cure the Tuberculosis. The procedures involve emesis, Oleation, purification, etc. The Ayurvedic procedures work by eliminating the toxins from the body and balancing the Doshas of the body. In this article we are going to discuss about the Tuberculosis in brief, it's Pathophysiology, the allopathic remedies or treatment involved and the Ayurvedic treatment, procedures and different herbs used in the ayurvedic treatment.

Keywords: Mycobacterium tuberculosis, , *Rajyakshma*, Ayurvedic Herbs, *Doshas*.



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INTRODUCTION

According to some studies the deadliest disease after Covid-19 is Tuberculosis. Tuberculosis is mainly caused by a bacterium, Mycobacterium Tuberculosis. This generally effects the lungs. The bacteria which is the source of Tuberculosis rolls its way out when the infected person sneezes or coughs. Primarily, the person infected with this bacterium do not come up with any kind of symptoms. Tuberculosis is an air borne disease, i.e., spreads through air. When a Tuberculosis infected person sneezes, coughs, talks, sings or spits, they project out the TUBERCULOSIS germs in the air. The period between the exposure and the appearance of the symptoms ranges from two weeks to twelve weeks. The effected person can be infective as far as the TB bacteria is feasible.^[1]

Symptoms: - The main symptoms of TUBERCULOSIS are cough, in some cases the cough is associated with blood; weight loss, there is a sudden decrease in the weight due to the loss of tissues; night sweats, sweating is seen only during the night period and finally fever.^[6]

Diagnosis: -The presence of this infection can be detected by two different tests, they are (a) The TUBERCULOSIS skin test and (b) the TUBERCULOSIS Blood tests. The drawback of these skin and blood tests is that they only predict the presence of the bacteria that originates the infection and we cannot understand whether it's a latent TUBERCULOSIS Infection or it's been improved into a TUBERCULOSIS disease. There are many other tests like chest X-ray, MRI, a sample of sputum which tell us if the patient is

affected by the TUBERCULOSIS disease. The pregnant woman and the baby are at a higher risk if they are not tested for the TUBERCULOSIS disease.^[5]

Treatment: -The treatment for Tuberculosis can be done by prescribing a few medications like Isoniazid, Rifampin, etc, etc. If it is drug resistant TUBERCULOSIS, a combination of antibiotics is given to the patient. BCG or Bacillus Calmette-Guerin vaccine is the vaccine that was developed against the Tuberculosis. This vaccine aims for the Mycobacterium Tuberculosis, a bacterium. A shot of this vaccine is given to babies to prevent from getting affected by Tuberculosis.^[1]

Types of Tuberculosis: - There are two major classes of Tuberculosis: - (a) Pulmonary Tuberculosis and (b) Extra Pulmonary Tuberculosis. The Pulmonary Tuberculosis is again divided into two different forms: (i) Primary disease and (ii) Secondary Disease. There are many types of Extra Pulmonary Tuberculosis like Lymphoid Tuberculosis, Pleural Tuberculosis, Skeletal Tuberculosis, Genitourinary Tuberculosis and many more.^[4]

PATHOPHYSIOLOGY:

Tuberculosis is a severe contagious bacterial disease caused by an organism, Mycobacterium tuberculosis. As it is a communicable disease, it spreads through air. The droplets of an infectious TUBERCULOSIS diseased person expel and transmitted to other person by cough, sneeze, these aerosols are about 1 to 5 microns in diameter and they remain in air for few hours and spread the infection.^[6] All the people who come in contact

with the tuberculosis patient may not experience the disease, there are few factors which increase the probability or risk of spreading the disease, they are

- Infectiousness of the aerosols of TUBERCULOSIS patient
- Rate of recurrence and exposure period
- Immunity condition of the droplet exposed person.

Alveoli are small air sacks which are responsible for exchange of oxygen and carbon dioxide. They are comprised of epithelial cells and are arranged very closely in clusters. Alveoli contain alveolar macrophages which functions to keep the alveolar space clean, and to avoid the inflammation caused by any pathogens. When the mycobacterium tuberculosis bacterium is opsonized by the alveolar macrophages by releasing a peptide called ESAT-6, early secretory antigenic target, which permit the bacterial entry into the cell. Like this, the bacteria will multiply in the alveoli by several divisions. For every cycle, mycobacterium requires 24 hours

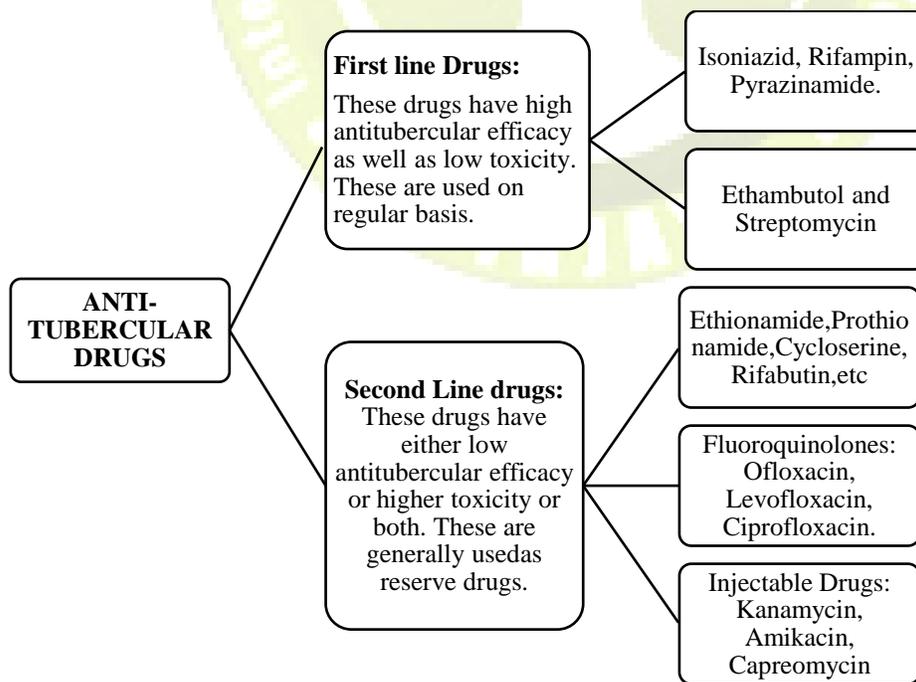
which leads to the death of the alveolar macrophages. By the repeated multiplication for several days' mycobacterium will cause cell death of the alveoli and cause inflammation.^[7]

The inflammatory response in the alveoli leads to loosening of the rigidity of the alveolar clusters and finally leads to damage of alveoli causing lymphadenitis

In some cases, the mycobacterium tuberculosis will be present in the lungs but, the immune system of the body will suppress the bacilli by producing specialized immune cells that surround the bacteria. These immune cells will form as a shield and acts as a barricade to enter into alveoli, this condition is known as Latent TUBERCULOSIS infection.

The mycobacterium may enter the blood stream through lymph nodes and spread entire body. It mainly effects the lungs, in severe cases it also spreads to organs like kidneys, brain, bones, etc. ^[7]

ALLOPATHIC REMEDIES:



Introduction on the Ayurvedic Perspective of Tuberculosis:

Tuberculosis is said to be known as *Kshayaroga* or *Rajyakshma* in the Ayurvedic literature. This disease is characterised by different symptoms like fatigue, low grade fever, sweating at night, loss of appetite and sudden weight loss. The other

symptoms include damage to different organs of the body. In general, Tuberculosis affects lungs and symptoms like fever in the evening, cough, hoarseness in the voice and night sweats including emaciation, angina and a burning agitation in the palms and the soles feet are observed.

Ayurvedic treatment endorsed for Tuberculosis include the following procedures:

Ayurvedic procedures	Laboratory Procedures
<ul style="list-style-type: none"> • <i>Snehana</i> • <i>Swedana</i> • <i>Vamana</i> • <i>Virechana</i> 	<ul style="list-style-type: none"> • Oleation • Sudation or Sweat Therapy • Medical Emesis • Purgation

The above-mentioned procedures in the table are potent only in an individual who has the capability to with stand these therapies. Shodana Karma, also known as Purification Therapy cannot be applied in the weak patient, these processes should be very mild even administered

in a strong person affected by Tuberculosis. This is due to the Kshaya, which means depletion of all the seven Dhatus in the Tuberculosis. Hence, Brimhan also known as nourishment therapy is prescribed to reinforce the body.

There are different kinds of herbs used in the treatment of Tuberculosis. Some of them are:

Ayurvedic Herbs	General name
<ul style="list-style-type: none"> • <i>Vidarikand</i> • <i>Brahmi</i> • <i>Rasonam</i> • <i>Yashtimadhu</i> • <i>Ashwagandha</i> • <i>Guduchi</i> 	<ul style="list-style-type: none"> • Indian Kudz • Water hyssop • Garlic • Mulethi • Indian Ginseng • Heart leaved moonseed

The ayurvedic medicines that are prescribed in the treatment of Tuberculosis are “*Eladi Churna, Sitopaladi Churna, Chitraka-Haritaki, Mahalaxmivilasa Rasa, Chyawwan prashav aleha, Draksharishta, Dhanvantara Gutika, Bhringrajasava, Sawrna Malini Vasanta,*

Madhumalini, Vasanta and Vasanta Kusumakar”.^[13]

DISCUSSION

The Pathophysiology of Tuberculosis in terms of Ayurvedic system of medicine:

1. In Ayurveda Tuberculosis is referred to as *Yakshama* or *Rajyakshma* which is characterised by *Dhatukshaya* meaning tissue loss that primarily instigates the *Rajyakshma*.
2. This tissue loss leads to the metabolic dysfunctioning of the body to which *Meda*, in general medical terms is Adipose tissue; *Rasa* means tissue fluids in the medical terminology; *Rakta* is referred to as blood in medical terms; *Mamsa* meaning muscle and *Shukra* meaning Generative tissue in the general medical terminology, such *Dhatus* are reduced.
3. This attenuation of the dhatus leads to the *Ojokshaya* which means loss of immunity and in due course of time this leads to the suppuration by the pathogenic microorganisms, which finally gives rise to *Rajyakshma*.^{[1],[2]}

A brief note on the Ayurvedic procedures:

Snehana: - It is also known as Oleation Therapy. This therapy is done to prepare the body to acquire the specialized Panchakarma treatment. This therapy is done by massaging with the help of the medicated oils or ghee and herbs to the body internally and externally for around 3-7 days. This procedure is important as it removes the *ama* or toxins and doshas in the body.^{[1],[2]}

Swedana: - *Swedana* is a single word for various procedures that stimulate sweating. This is also known as Sudation or Sweat therapy. These procedures also involve the elimination of *ama*/toxins and balance doshas.

The various forms of *Swedana* are:

(i)**Tapa/ Fomentation:** -This form of *Swedana* is generally to induce heat to the body. This is

done with the help of a metal object or a heated cloth or warm hands.

(ii)**Upanaha:** -This type of *Swedana* consists of a dressing with different herbs in a hot cloth.

(iii)**Ushma:** - In this *Swedana* steam is used that is created by boiling the herbs that are relevant to balance the particular doshas present.

(iv)**Dhara:** - *Dhara* in general is known as flow. In this *Swedana*, a medicated fluid or a liquid is warmed and poured over the body

Vamana: - In general medical terms this process is known as medical emesis. Emesis is the medical term used for Vomiting. The *Vamana* process is generally utilized to stimulate the emesis. In this technique, different herbs and their combinations are utilized that stimulate vomiting. This way is useful to reduce the toxins(*ama*) and also balance the doshas of the body. Another use of this process is to remove the mucus from the *Naad* is meaning channels and chest. The major herbs used in this process are *Vamaka* and *Vamanopaga*. The use of *Vamaka* herb is used to stimulate Vomiting and the *Vamanopga* herbs are utilized to boost the reactions generated by *Vamaka*. This procedure is not approved to be used in pregnant woman, children and weak or devitalized Humans.

a) **Virechana:** - *Virechana Karma* is also known as the Purgation therapy. In general, medical terms, Purgation means evacuation of the bowels with the help of laxatives. In this procedure, the laxative herbs are delivered orally to revitalize the cleansing of the bowels. Similar to the technique of *Vamana*, *Virechana* also eliminated the *ama*. The most often used herbs in the process of *Virechana* are aloe, rhubarb and senna. This process helps in the removal of irritated pitta from gall bladder, liver and small intestine. Here, pitta means the burning sensation.

b) **Basti Karma:** - This process is generally applied in the treatment of fallopian tube Tuberculosis. In this technique, the medicated oil or ghee is administered parenterally into the uterus, which then heads to the site of infection and cures the area.^{[1],[20]}

AYURVEDIC REMEDIES

Ayurvedic condiments used in tuberculosis therapy

Vidarikand – also known as **Indian kudzu** (*Pueraria tuberosa*)

- i. *Vidarikand* precisely affects upon digestive and reproductive system moreover is said to be a roborant, nutrimental and revitalizing herb.
- ii. Helps in improving anorexic and weakened patients which consequently covers up one of the paramount adverse effects.
- iii. Management of increasing the size of the liver and spleen.
- iv. This herb is usually given in the form of powder, decoction, confection and milk decoction.
- v. Also, it's used as in formulation of *chawanprash* which is used as an adjunct in treatment of pulmonary tuberculosis.

Yasthimadhu – also known as **Mulethi** (*glycyrrhiza glabra*)

- Basically, *yasthimadhu* meaning sweet root is used to pacify all three doshas *vata*, *pitta* and *kapha* in our body, moreover it eradicates excess *kapha* from the system.
- Along with this, *mulethi* is shown to have healing and rejuvenating properties
- Promotes endurance and helps in firming of body.
- Its beneficial to a wide range of diseases like joint pains, bleeding, throat pain, hyperreactivity, tumours, inflammatory reactions.

- Important function of *yashthimadhu* is to increase immunity as it is an immunity modulator, thus proving efficacious for treatment of tuberculosis
- Most commonly taken dosage form for *yashthimadhu* is powder or granulated form.

Rasonam – also known as **Garlic** (*allium sativum*)

- i. Rasonam elucidates action on different systems of the body such as respiratory, nervous, circulatory, reproductive, and digestive system.
- ii. It's also said to be carminative and gives extensive action being an anti-helminthic, anti-parasitic, anti-spasmodic.
- iii. Along with these lasha displays expectorant, reviving and intoxicant action.
- iv. Reviving power is specifically shown in bone and nerve tissues.
- v. Key effect of garlic is that it opens up naadis and takes out ama from blood and lymph moreover treats vata fever, microbial infections of lungs and bronchi as well, which is an important factor in curing tuberculosis.
- vi. Marketed dosage forms of lasha are powder, juice, infusion and medicated oil.
- vii. Chiefly used to reduce the dangerous consequence of pulmonary tuberculosis.^[14]

Brahmi -also known as **Indian pennywort** (*bacopa monnieri*)

- In ayurveda, *brahmi* is titled as *medhyarasayanama* which means it acts as a nerve tonic and revitalizing agent.
- It shows it's action on respiratory, reproductive, digestive, and excretory systems.
- Particularly it's an excellent brain tonic which rejuvenates brain cells and nerves, in addition to

that *brahmi* helps in purging, nourishing the immune system, cleanses blood in addition to that it's an antiemetic as well as antipyretic which helps in curing cough and fever respectively, which are known to be major symptoms of tuberculosis.

- It pacifies excessive *kapha and vata* doshas which occurs due to its high potency.
- It has many health benefits such as its anti-inflammatory, anti-convulsant, aids in detoxification moreover it permeates sweating of body which is a key method to eliminate contaminants.
- Particularly, aids in treatment of *vata kapha jwara* (fever caused due to imbalance of *vata* and *kapha* dosha in the body).
- Due to the presence of glycosides and saponins it's also used for the treatment of cardiovascular diseases and bowel related complications
- It's taken in the form of clarified butter (ghee), oil, powder, infusion and decoction form.^[13]

Guduchi – also known as **Tinospora, giloy gulbel** (*tinospora cordifolia*)

- In Ayurveda, Guduchi is known as *rasayana* which plays a role in increasing its efficiency in improving the overall functioning of the body.
- It's one of the rare herbs used to cure all the three doshas which are *kapha pitta and vata* moreover detoxifies the deepest dhatu (*Shukra*)
- Along with its properties to treat tuberculosis, it's also known to cure *pitta* diseases like jaundice, constipation, gout, malarial fever and chronic rheumatism as well.
- Guduchi also shows its action in removing toxins from body along with anti-inflammatory and analgesic properties.
- Its major dosage forms in which they are dispensed are powder form and extracts.

- *Gulbel* is used in combination with *amalki, Vidarikand, brahmi and yasthimadhu* to treat inflammation in fallopian tubes due to genetic tuberculosis in females.
- Its other uses include treatment of anaemia, cardiovascular disorders, viral hepatitis, asthma, indigestion, urinary complications and skin diseases.^[15]

Ashwagandha – also known as **Varahakarni /Indian ginseng** (*withania somnifera*)

According to Atharvaveda, ashwagandha is said to be one of the most important herbs for curing all sorts of diseases particularly tuberculosis.

- It mainly acts on respiratory and reproductive systems of body.
- Indian ginseng is shown to have rejuvenating, immune boosting and anti-inflammatory properties, furthermore plays an important role in managing fever in tuberculosis patients.
- *Ashwagandha* particularly is used as an adjunct with anti-tubercular drugs in treatment of pulmonary tuberculosis.
- It's used as main ingredient in formulation of *chawanprash* as its an exceptional immunocompetent.
- This herb has a long history in curing mental illness, relieving stress, moreover used as a diuretic excluding all the toxins in the body.
- Frequently manufactured in powder and paste form.

Ayurvedic Medicines For Prognosis Of Tuberculosis

There are many medicines mentioned in ancient texts of learned scholars however the most important ones used in the recent as well as in olden times are as follows

Mahalaxmivilasa rasa:

- it's an ayurvedic medicine popular in tablet form, it's said to have many health benefits.
 - *Mahalaxmivilasa rasa* is made up of *Suvarna bhasma* which is the calcinated ash of the metals *abhrakha*(mica), *tamra*(copper), *maultik*(pearl), *raupya*(silver), *suvarna* (gold), *vaga* (tin), and *naga* (lead).
 - This preparation helps increase immunity and strength in tuberculosis patients in order to prevent further symptoms and infections.
 - Furthermore, its used in treatment of headaches or migraines caused due to vitiated *vata*.
 - It acts on lung, nasal activity, male reproductive system, muscles and affected by microbial infections by easing out the airways and allowing easy inspiration and expiration especially in the case of infected respiratory system.
 - This particular medicine shows its action by inhibiting the reproduction and growth of the mycoplasma bacteria and also reviving strength, energy and weight.
 - It's mainly used as a supportive therapy along with anti-tubercular drugs.
 - *Mahalaxmi vilas rasa* is also indicated in conditions like tonsillitis, sinusitis, and swelled up lymph nodes.
 - *Suvarna bhasma* in addition used in prognosis of fever, coughs, worm infestation, low appetite, eye infections, poisoning and heart related issues.
 - *Laxmivilas* tablet is also given in the form of powder combined with milk, honey and ginger powder giving rise to maximum effect.
- Sitopaladi Churna:***^[18]
- *Sitopaladi Churna* is a traditional ayurvedic medicine, valuable in curing variety of disease relating to respiratory digestive and immune system.
 - It's used as a base for preparation of remedies in specific for respiratory diseases.
 - Aids in restoration of natural functions of respiratory, digestive, circulatory and other systems as well.
 - Its specific action is being a bacteriostatic to mycobacterium tuberculosis where it inhibits the cell wall synthesis, its used when initial symptoms appear in patients. Although, this *Churna* is not strong enough as *Suvarna bhasma and vasant maltha ras*, it gives sympathomimetic effect.
 - *Sitopaladi churna* covers up most of the symptoms that arise from contacting tuberculosis like cough, fatigue, loss of appetite, nocturnal sweats, low grade fever, restlessness and debility.
 - It is prepared from *vans lochan* (bamboo resin), *elaichi*(cardamom), *dalchini* (Cinnamon), *pippali* (piper longum) and *misri*(sugar), these all are mixed together in powder form stored in an air tight container in a dry place.
 - *Sitopaladi churna* is given in combination with *jasad bhasma and praval pishti* to treat chronic fever.
 - This drug balances all the three doshas that cause fever and cough due to their imbalance.
 - It is also used in digesting the toxins that cause fever and helps the body in eliminating them.
 - It's an anti-tussive, immune-modulators, anti-inflammatory, anti-microbial, adaptogen and bronchodilator. it acts as a bio-enhancer when used along with long pepper and cinnamon.^[18]
- Eladi churna:***^[19]
- Eladi churna is typical ayurvedic medicine used in treatment of pulmonary tuberculosis and other forms as well.
 - It's an effective ayurvedic powder comprising of *cardamom*, *cinnamon bark* and its leaves, *nagakesara* (Indian chestnut), *maricha* (black

pepper), *pippali* (long pepper), and *shunti* (dried ginger).

- Treats major symptoms of tuberculosis like cough, fever, breathing stuffiness occurring due to imbalance of *kapha and vata*.
- This churna is applied externally as a paste on skin for its absorptive actions as well as internally in the form of juice or extracts.
- It has anti-emetic, carminative, digestive, stomachic, tidoshara, nutritive, laxative, analgesic, antispasmodic, anti-microbial, anti-fungal, expectorant and appetizing properties
- It is also known as *Eladi choornam or Eladi choorna*. Moreover, along with curing tuberculosis it is also said to treat asthma, bronchitis, throat disorders, piles and vomiting induced by *kapha and pitta*.
- This powder is taken along with vehicles like honey and sugar.
- It's a brown coloured, smooth powder that balances *kapha and vata* at the level of oral cavity, stomach and intestine.
- It's an effective formulation of ayurvedic origin that treats most of the ailments re-energising the body functions.^[19]

Madhu malini vasanta:

- *Madhumalini basant* is an antibiotic ayurvedic formulation manufactured by ayurveda rasashala, used for treatment of diabetes, chronic fever, irregular fever and bleeding disorders along with bacterial infections like tuberculosis
- It is made up of purified *cinnabar* (shuddha hingula), *zinc carbonate* (kharpara bhasma), *artocarpus lakoocha* (lakucha swarasa), *hen eggs* (kukkutanda), *curcuma zedoaria* (kachur churna), *black pepper* (marich churna) with main ingredient being the *hingula*.

- These all ingredients are all dried up, powdered and mixed up together in proportionate measure and sealed in an air tight container.
- Its main aim is to reduce the onset of fever along with reducing the build-up of sputum in the throat area due to accumulation of mycobacterium tuberculosis (causative organism of tuberculosis).
- It's also indication in various other medical conditions like cough(*kasa*), *anaemia (pandu)*, *jaundice and liver disorders (kamala)*, *piles(arsha)*, *diabetes(prameha)*, menorrhagia (abnormal uterine bleeding).
- As being a potent immune-enhancer it upsurges the low immune level in patients suffering from tuberculosis or any other microbial/viral infections.
- This specific medicine is used in the form of *vrushya, rasayana and valya*.
- Usually, it given in tablet form along with honey, jeera powder and milk.
- Enhances vigour and vitality in patients by rejuvenating their body functions in all aspects.
- Fe and Ca supplementation is also done via this *churna* which is essential in the formation of new rbc cells in turn giving more capacity for the body to take up oxygen.
- *Madhumalini vasanta ras* is one of the three *vasanta kalpas* used in diagnosis of various diseases caused due to imbalance of *kapha, vata and pitta*.^{[1],[14]}

Bhringrajusava:

- Bhringrajusava is a compound herbal formulation containing bhringraj as the main component which is used majorly in improving the quality of life and improving the immunity of the patients.

- Along with bhringraj its also maid of *haritaki* (terminalia chebula), *pippali* (piper longum Linn) along with *jatiphala* (myristica fragrans), *lavang* (syzygium aromaticum), *tevak* (cinnamomum zeylanicum), *ela* (elatteria cardomomium), *tamalapatra* (cinnamomum tamala), *nagalesara* (messua ferra), and *gudam* (old cane jaggery).

- It's prepared by mixing the molten jaggery into the juice of bhringraj along with all the other dry components and mixing it all together, they are transferred into a new container which kept aside for 1 month resulting into asava.

According to a clinical study done on the effect of *bhringraj* being used as *nanmaitikke rasayana* (complementary medicine) in patients suffering from pulmonary tuberculosis specifically, some useful observations have been made:

- ✚ Enhanced immunity and increased defensive mechanism of body by increasing the stimulation of reticulate endothelial system (RES) which activates the mesenchyme and accelerates the healing at the damaged tubercular site, additionally it destructs the leukocytes promoting the growth of neo healthy material.
- ✚ Addition of bhringraj to the DOTS treatment gives hepatic protection as the leaves of bhringraj contain a precise chemical constituent, wedelolactone which has hepatic protective functions.
- ✚ Immune modulatory functions which give subjective well-being to the patient.
- It's also said to be cardiogenic, rejuvenate, anti-tonic, anti-bacterial (mycobacterium tuberculosis) giving improved, harmless and quicker relief to the patient.
- It's known to decrease ama (toxic) levels thereby increasing the energy, blood and fluid level in the body.

- This Kasahara furthermore corrects errors in biological system (koshtagni and dhatu Agni which is metabolic and digestive fire in tissue).^{[1],[13]}

Dhanvantara Gutika:

- It's an excellent and versatile ayurvedic formulation that is effective against asthma cough and cold, gives instant relief from flatulence, bloating and hiccups.
- *Dhanvantara vati* includes the chief ingredient *ela* (eltaria officinalis) laterally *shunti* (zingiber officinalis), *haritaki* (terminalia chebula), *jati* (Jasminum officinalis), *brihati* (solanum indicum), *kiratatikta* (sertia chirata), *jeeraka* (Cuminum cyminum), *kankola*(piper-cubeba), *bhunimba* (Andrographis paniculate), *rudraksha* (Elaecarpus ganitus), *karpura* (Cinnamomum camphora), *karigutha*, *mrigaretasa*(civet-cat-semen).
- It's indicated in conditions like indigestion, vomiting, hiccups, asthma, tuberculosis, cough and rheumatoid arthritis.
- It's also identified to have anti-bacterial, anti-hyper lipidemic, anti-microbial, anti-oxidative, anti-pyretic properties along with being a digestive stimulant, detoxifier and carminative.
- It's combined with decoction made up of bark of panasa (jackfruit) in form of co-drink.
- This type of formulation balances *vata and kapha* levels in the body.
- Its major use is management of cough that results in blood sputum, high fever, and various other symptoms caused by mycoplasma tuberculosis
- Eases the airway pathways giving rise to easy inspiration and expiration of lungs
- Usually, its treatment results are shown on a long-term basis.

Chawanprash vahela:

- *Chawanprash vahela* is an authentic ayurvedic preparation that involves wide variety of herbs of different kinds.
- It's a powerful herbal remedy which helps in bolstering up the overall immunity and also increasing the longevity of the patient.
- The core elements used are *amalki/amla* (vit-c supplement), *cow's ghee*, *sesame oil*, *sugar and honey* (respiratory anomalies). The other components that complete the formulation are *neem*(anti-microbial), *pippali/long pepper* (*indigestion, expectorant*), *brahmi* and *tulsi* (anti-oxidant, anti-cancer), *saffron* (aphrodisiac-balances kapha and vitta doshas in the body), *white sandalwood* (anxiety and stress), *ashwagandha* (adaptogen, immunity modulator), *tulsi* (expectorant, anti-viral), *cardamom/elaichi* (anti-oxidant, diuretic) and *arjuna*(hypertension).
- It's taken generally in the form of edible paste and decoction manufactured by various herbal companies like dabur, baidyanath etc.
- Its major function in targeting tuberculosis is bolstering up the immunity due to the presence of vit-c source along anti-bacterial, anti-viral and anti-fungal functions which is extremely useful in preventing infections like fever, cold and cough.
- *Chawanprash* promotes digestion due to its anti-flatulence property (reduces the formation of gas in alimentary canal), also due to presence of excess fibre.
- Also known to have potential antacid properties which helps in reducing the acidity of stomach due to excessive use of conventional medicines.
- Its dosage regimen depends from person to person by age, health and gender, nevertheless it's taken on an empty stomach before a meal or 2 hours after a meal.

- It also helps in management respiratory illness like dry cough, cold, bronchitis, asthma and chronic obstructive pulmonary disorder.

Swarna malini vasanta rasa:

- This type of rasa is an immunity enhancer as well as an anti-biotic known in prognosis of symptoms related to variant types of tuberculosis especially concerning cough, chest pain and malaise.
- It's mainly comprised of *Swarna bhasma* (calcined gold ash), *safed mirch* (white pepper corns), *yashad bhasma*(jasad), *shuddha hingula*(cinnabar), *ghee* (clarified butter), *nimbu ka ras* (lemon juice), *prada bhasma*(mercury), *tamra bhasma*(copper), *ayas bhasma*(iron), *gandhaka bhasma*(sulphur), *vyosha*(pepper).
- The above-stated herbs are pounded together with:
 - ❖ *Kanta kanti rasa* (*extraction of solanum xanthocarpum*)
 - ❖ *Datura rasa* (*extraction from datura metel*).
 - ❖ *Katuski rasa* (*extraction from piccorhiza kurroa*).
- With the above-mentioned ingredients, all of them are compounded together to give bacteriostatic and bactericidal activity against certain kind of bacteria especially mycoplasma tuberculosis.
- This type of vasanta rasa is mostly indicated in conditions such as:
 - ❖ Anaemia – increase in production of erythrocytes.
 - ❖ Chronic fever – Swarna malini ras along with pravalpishti and sitopaladi churna in powder form reduces the effect of illness.
 - ❖ Tuberculosis- immunity competent (resistant tuberculosis) and strengthen the body functions.
 - ❖ Goiter- increases iodine supply

- ❖ Typhoid fever.
- Its main benefits are anti-ageing, anti-depressant, improves digestion and fatigue.
- Due to its protective, therapeutic and medicinal properties, Swarna malini vasanta ras is widely used in treatment of tuberculosis and other infections as well.^[6]

Vasanta kusumakar:

- This is an herbal anti-ageing medicine often used to treat fatigue, restlessness, cough, cold and many other symptoms caused due to extreme diseases.
- Mainly used for the treatment for memory loss, diabetes, urinary tract infections.
- Its largely contains bhasma(ash) of *abrak*(mica), *Swarna*(gold), *raupya*(silver), *loha*(iron), *naga* (lead and other herbs) and *vaga*(diamond) which are included into decoctions/extracts of *vasaka* (Malabar nut), *haldi* (turmeric), *ikshu*(sugarcane), *banana tree leaves*, *kamal* (fox nut) and *chandan*(sandalwood).
- Its chief properties include libido stimulant, haematinic, anti-stimulant, anti-hyperglycaemic, cardio protective, analgesic, pacifying.
- Manages all kinds of tuberculosis symptoms like chest pain, progressive cough with blood, reduced immunity, fever and night sweating.
- Known to have aphrodisiac and rejuvenating functions as well, along with bringing out the balance of three doshas- *vata*, *pitta*, *kapha*.
- Vasanta kusumakar acts on nerves of central nervous system, respiratory system, pancreas, cardiovascular system and immune system.^[6]

Draksharishta.^{[9],[11]}

- Draksharishta is a dried-grape alcoholic preparation which contain self-generated alcohol having medicinal and restorative properties.

- Its main ingredients are *twak*(cinnamon), *ela*(cardamom), *tejpatra* (bay leaf), *khajoor* (date fruit), *chandan*(sandalwood), *lavang*(clove), *pippali* (long pepper), *madhu*(honey) and *kishmish*(raisins).
- Three types of agents are used in making this formulation along with the above-mentioned components:
 - ❖ *Kwatha dravya -draksha* (*grapes*)
 - ❖ *Sandhana dravya* (fermentating agents)- jaggery, water
 - ❖ *Prakshepa dravyas* (herbal additives)- *dhataki* flowers
- It's a type of *aristha* formulation having restorative, laxative, appetizing and expectorant and soothing purposes.
- It contains 5-10% of naturally produced alcohol from raisins, this alcohol acts as carrier/vehicle in transporting water and alcohol soluble herbs to the target organs.
- Protects the body by blocking microbial contamination building up in lungs in case of pulmonary tuberculosis(*kshaya*), increases the immunity level in latent tuberculosis.
- Indicated in chest injury, cold, cough, asthma, hyper lipidemic conditions, constipation, chronic respiratory contaminations, eye disorders, anaemia and debility.^[9]

Chitraka haritaki:

- *Chitraka haritaki* is an *avaleha* preparation known widely for its effective anti-oxidant, anti-inflammatory and anti-bacterial properties.
- Its name is itself comprised of two herbs *chitraka* and *haritaki* which are the key herbs used in the formulation, along with the other herbs used are *amla*, *guduchi stem*, *dashamoola*, *bilva*, *giloy* and *brihati*.
- It's the main medication used for the treatment of tuberculosis along with other respiratory illness

like asthma, bronchitis and chronic obstructive pulmonary disorders.

- Known to have bacteriostatic and anti-inflammatory, anti-flatulent and immunomodulatory properties.

- Acts on cardiovascular, respiratory, digestive, urinary systems of the body curing infections related to them.
- Balances the *tridosha* effect (disproportion of *kapha*, *pitta* and *vata* which leads to onset of fever, joint pains, throat infection and indigestion).

• Nutritious And Health-Giving Established Ways For Tuberculosis Patient According Ayurvedic:^[10] [13]

Moral habits	Immoral habits
1. A healthy balanced diet comprised of proteins, vitamins, minerals, carbohydrates and fats. For example: ghee, whole grain cereals, milk products, vegetables, fruits, red meat, fish, egg. Etc. 2. Moderate amount of wine upto to a certain limit. 3. Using clarified butter and seed oils like sesame seed oil for cooking purpose instead of high fat oils. 4. Incorporation of Herbal juices extracted from aloe vera, amla, giloy and jamun gives complete nourishment. Doing regular exercise and also practicing yoga asanas like pranayama increases breathing efficacy(lungs) in tuberculosis patient.	1. Intake of oily, fatty and junk food with no nutritional value. 2. Drinking carbonated drinks in higher amounts rather than herbal juices and water. 3. Improper sleep schedule leading to fatigue, restlessness and improper body functions. 4. Increased caffeine (tea and coffee) in diet along with over consumption of alcoholic drinks and tobacco products which can lead to drug toxicity. 5. Not maintaining proper sanitisation after visiting a contaminated area/patient. Not following doctor's recommendation of medicine therapy plan.

Effectiveness Of Panchakarma Medicines Used For Treatment Of Tuberculosis Patients:

Tuberculosis is known to be one of the most infectious and easily communicable microbial infection caused by mycoplasma tuberculosis. Although, there are numerous current conventional anti-tubercular drugs available in market it takes long time for a patient to recover

due to severe side-effects that occur due to prolonged use of allopathic drugs like isoniazid and rifampicin. Hence, ayurvedic medicines come into use as they have very much less adverse effects which do not hinder the normal physiological processes of the body.

Herbal medicines like *ashwagandha*, *churna* and *rasayana*, *chawanprash* are used as adjuncts in multi-drug treatment especially given to patients

suffering from pulmonary and drug resistant tuberculosis.

According to a clinical study, the use of chawanprash rasa is known to be potent immunity booster in most of the population suffering from pulmonary and drug resistant tuberculosis due to its powerful formulation containing a wide range of ingredients mainly including amla used as vit-c supplement. Also manages chest pain, hepatotoxicity, fever, cold, productive cough with blood as sputum, blocked airways of lungs, and many other symptoms. Therefore, ayurvedic medicals are considered to be safe, strong and compelling formulations that can be used for prognosis of the upcoming and current-dwelling infectious diseases.^[20]

Side Effects And Risks For Ayurvedic Medicines

Some Ayurvedic medicines may contain side effects and drug interactions, however they will be very mild to moderate. Severe side effects in case of ayurvedic medicines will be very less or rare. Seeking advice from a doctor is preferable to keep away these side effects. We should be very particular about the dosage also; it is always safe to start taking the drug with low dosage. Because of the absence of qualitative research, it is advisable to avoid these ayurvedic herbs for pregnant woman and lactating mothers. Some of the side effects of Ayurvedic drugs used for Tuberculosis treatment are:

Vidarikhand

- *Vidarikand* slows down the blood clotting process
- Mild side effects like headache, fever, dizziness can be seen.
- It may show drug interactions with the drugs used for bleeding

Bramhi^[15]

Brahmi is a safer drug as it has very less and common side effects like

- Nausea
- Bloating
- Diarrhoea
- Dry mouth

Rasonam

- It shows the blood thinning effect
- It **interferes** with the drugs used for blood clotting disorders like haemophilia

Yasthimadhu

It is a drug which should be used very cautiously as the increase in dosage may cause serious side effects like mentioned below, however discontinuing the drug will decrease the side effects in 3 weeks

- Increase in blood pressure
- Low potassium and high sodium levels
- Bloating

Ashwagandha

Ashwagandha is a safer drug and very few side effects and drug interactions can be seen

High doses of ashwagandha may cause stomach upset and diarrhoea

Guduchi^[17]

• It may further decrease the blood glucose levels if taken with diabetic medications so, diabetic patients should take this drug with the guidance of doctor

Overview Of Ayurvedic Treatment Of Tuberculosis

Tuberculosis is a transmittable infectious bacterial disease which mainly effects the lungs. Now a days DOTS therapy is extensively used for the treatment of tuberculosis. As the bacteria is developing resistance to the conventional drugs, it is becoming tough for completely curing the diseases with allopathic treatment and moreover these conventional medicines are

leading to serious side effects such as peripheral neuritis, liver toxicity, haemolysis. As the Ayurveda blends the ancient wisdom to our modern evolved diseases with very minimal side effects it is an excellent source for curing these kinds of communicable deadly diseases. Not only complete curing they also improve the immunity to prevent the occurrence of the diseases and endorse complete health

CONCLUSION:

Tuberculosis is the leading transmittable infectious disease in the world which is the main cause for 1.4 million deaths each year and is one of the top 10 causes of death. It is caused by Mycobacterium tuberculosis, which mainly affects the lungs and may also affect the organs like kidneys, brain etc. It spreads through droplets or aerosols of the infected person. Directly observed treatment, popularly known as DOTS therapy is commonly used treatment for tuberculosis now-a-days. But, a lot of side effects can be seen with the allopathic treatment. So, the whole world is looking towards Ayurveda, which involves the treatment with the nature's touch. The uniqueness of the Ayurveda is not only treating the dreadful diseases with natural plant herbs with very minimal side effects, but also improves and strengthens our immune system and provide a complete well-being. The minimal side effects which are seen by ayurvedic herbs are also majorly reversible and are not seen when the medicine is discontinued. Ayurveda was officially recognized by world health organization in 1976. As it re-establishes the balance between mind body and spirit, we can confidently say that, the Ayurveda blends the ancient wisdom to our modern evolved diseases with very less side effects.

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