IJBPAS, July, 2025, 14(7): 3870-3879

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

A DESCRIPTIVE REVIEW OF THERAPEUTIC MANAGEMENT OF PULMONARY TUBERCULOSIS THROUGH AYURVEDA

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Received 20th March 2024; Revised 24th April 2024; Accepted 16th Aug. 2024; Available online 1st July 2025

https://doi.org/10.31032/IJBPAS/2025/14.7.9213

ABSTRACT

Despite of remarkable advances in medicines and focused government policies, pulmonary tuberculosis (TB) still remains a major problem. Even the anti-tubercular treatment (ATT) drugs may affect health due to their hepatic and gastro-intestinal side effects. The traditional medicine systems such as Ayurveda are providing treatment as *Rajayakshma Chikitsa*, even before the ATT was prevalent. Ayurveda principles provide therapeutic management options that build host defense mechanism. Thus, present study was carried out to descriptively review certain Ayurveda clinical studies for TB management.

'AYUSH Research Portal,' an exclusive database containing current researches in Ayurveda was searched with Ayurveda specific terminology for TB, i.e. '*Rajayakshma*' to retrieve clinical studies published till February,2024. The descriptive review was carried out basis on scope of studies done according to Ayurveda principles for '*Rajayakshma Chikitsa.'*

Of the eight studies selected, five were published in indexed journals. The time duration covered in studies was 1978-2020. The inclusion criteria for all studies were a confirmed diagnosis of TB, clinically, by sputum-examination and/or radiologically. Six studied included even pediatric population (between 11-17 years). Six studies used add-on design, and remaining two also had an only treatment arm. However, all the included studies were comparative and standard controlled with established drugs from ATT. Most of the studies utilized one or more '*Rasayana'* drugs with different mechanisms of

action. Some of them focused on providing nutrition to body elements and some improved absorption of nutrients. Overall, a synergistic integration of Ayurveda and conventional medicine is seen.

Keywords: *Rajayakshma*, Ayurveda, Lung Diseases, ATT, Koch's Disease, AYUSH Research Portal

INTRODUCTION-

Pulmonary Tuberculosis (TB) has been affecting mankind since ancient times. The WHO 'End-TB Strategy' aims in 95 % reduction of its incidence by 2035 **[1]**. However, this possibility looks dim in light of current global TB scenario. Developing nation such as India faces high burden due to increase in number of drug resistant cases **[2]**. Also, there is slow improvement in eliminating disease harnessing factors such as malnutrition. Despite of government of India's remarkable efforts in this field, many hurdles still remain. Even the anti-tubercular treatment (ATT) drugs may cause grievous damage to hepatic and gastro-intestinal systems **[3]**. Thus, despite of being a completely curable disease, TB poses new challenges and demands continuous upgradation of treatment options.

In India, the National Tuberculosis Elimination Programme (NTEP) (earlier known as revised national TB control programme -RNTCP) is implemented by the government of India for diagnosis and treatment of TB according to directly observed treatment short-course (DOTS) strategy **[4]**. In spite of its momentous efforts, the situation is improving in exceedingly slow manner.

India is endowed with a rich heritage of healthcare systems in form of AYUSH, i.e., Ayurveda, Yoga, Unani medicine, Siddha, and Homeopathy. These traditional medicine systems were combating the TB issue, even before the advent of antimycobacterial drugs. Thus, efforts are being carried out by these practitioners to help in this cause by providing therapeutic management options, leads for potential drugs and even immunity builders to enhance host defense mechanism. Recently, a guidance document was released to encourage collaboration of NTEP and AYUSH and thereby promote adjuvant usage of evidence-based AYUSH interventions for prevention as well as management of TB **[5]**.

Ayurveda, the oldest among these systems elaborates '*Rajayakshma*,' a disease-complex very relatable to TB. Due to its comprehensive presentation affecting all body systems and challenging management, it is even termed as 'King of diseases.' Many drugs and dietary regimes are described in Ayurveda and practiced over centuries for its management. Even today, Ayurveda researchers and practitioners utilize them for better outcome in patients' interest. However, these efforts are inadequately

disseminated, creating a lacuna in understanding scope and potential of Ayurveda drugs in TB management.

'AYUSH Research Portal' is an exclusive database designed to present current researches in AYUSH systems **[6]**. It includes research articles from indexed as well as non-indexed journals, unlike PubMed and Scopus. Thus, we limited our literature search to this specific database. Previously, a similar systematic review had included only PubMed indexed articles published till 2015 **[7]**. Thus, our review was focused on a specific database and extending the time duration too. Our aim behind this work was to present descriptive analysis of current Ayurveda clinical studies from AYUSH Research portal for assessing role of Ayurveda in therapeutic management of TB and allied complications.

METHODS-

For identification of studies for including in this descriptive review, 'AYUSH Research portal' was searched with Ayurveda specific terminology for TB, i.e. '*Rajayakshma*.' The search was limited to clinical studies published till February, 2024. The article retrieved were manually screened for availability of full-text and content relevance. For selected articles, further data such as author details, publication details and clinical study details were retrieved and organized in MS-Excel spreadsheets. The descriptive review was carried out basis on scope of studies as per utilization of Ayurveda principles for '*Rajayakshma Chikitsa'* and role of drugs used in them.

The flow diagram of study selection is presented in **Figure 1**.

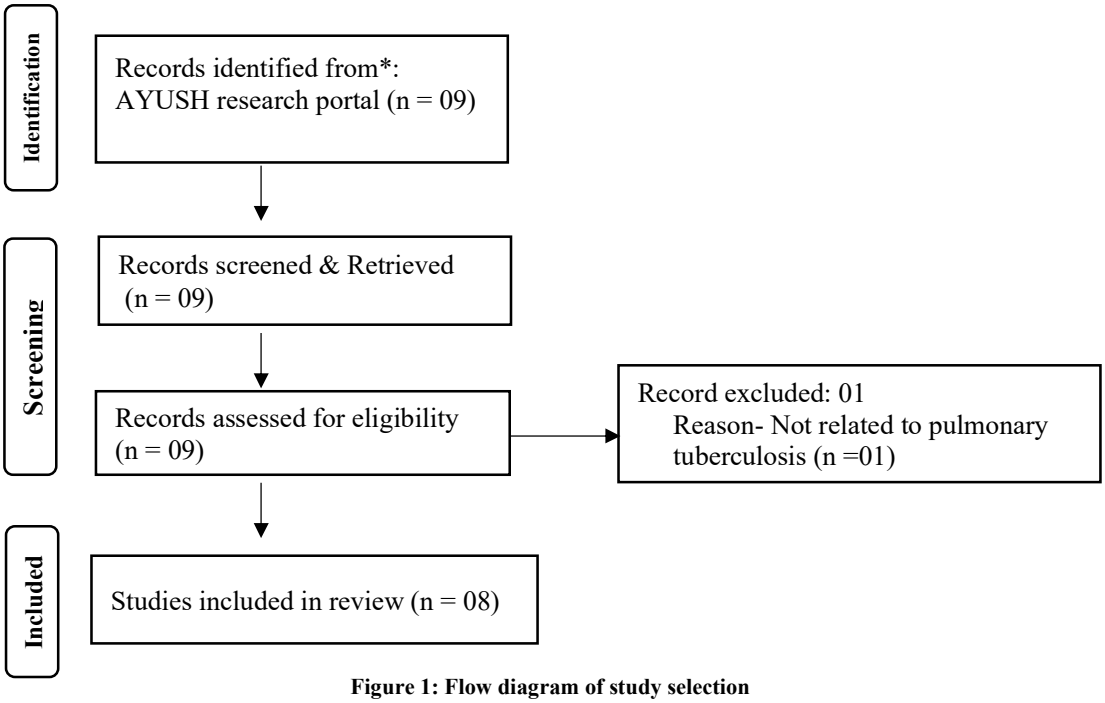

Figure 1: Flow diagram of study selection

RESULTS & DISCUSSION

According to the study methodology, nine clinical studies were retrieved by database search. Of them, eight studies were selected for present review. A case-report by Verma et al on post-COVID complications, was excluded as it was not relevant and did not mention TB management **[8]**. The author details and publication details of eight selected studies are mentioned in **Table 1**, arranged as per year of publication.

Table 1: Metadata of selected research articles

Sr. No.	Title	Authors	Journal	Year of Publication
1	A Comprehensive Study of Swarna Basanta Malti in Cases of Rajayakshma (Pulmonary Tuberculosis)-A Clinical and Experimental Study [9]	C. B. Dube, Y. K. Sharma, C. M. Kansal	Nagarjuna	1978
2	The concept of Rasayana as an adjuvant therapy in the management of Rajayakshma Vis-A-Vis Pulmonary Tuberculosis [10]	Ashwini Bana, B.K. Sevatkar, B. N. Upadhyaya	Journal of Research in Ayurvedic Sciences	2007
3	Nutritional efficacy of Agastya Haritaki Rasayana with special reference to Rajayaksma [11]	Guheshwar B. Patil, G. A. Ramana	Aryavaidyam	2007
4	Adjunct therapy of Ayurvedic medicine with antitubercular drugs on the therapeutic management of pulmonary tuberculosis [12]	P. K. Debnath, Jaydeb Chattopadhya, Achintya Mitra, Anjan Adhikari, Mirza Samsur Alam, S. K. Bandopadhyay, Jayram Hazra	Journal of Ayurveda & Integrative Medicine	2012
5	Clinical efficacy of Bhringarajasava as Naimittika Rasayana in Rajayakshma with special reference to pulmonary tuberculosis [13]	Sathya N. Dornala, Snehalatha S. N. Dornala	AYU	2012
6	Clinical evaluation of Rasayana compound as an adjuvant in the management of tuberculosis with anti-Koch's treatment [14]	Purvi Vyas, H. M. Chandola, Firoz Ghanchi, Shivprakash Ranthem	AYU	2012
7	Rasayana effect of Rudanti (*Capparis moon*, Wight) W.S.R. TO Pulmonary Tuberculosis - A Clinical study [15]	Nilesh Patel, Mayuresh Agate, S. B. Chaugala	Aryavaidyam	2013
8	Evaluation of Rasayaṇa activity of Rudanti (*Capparis moonii* Wight.) in the Management of Rajayakshma (Pulmonary tuberculosis) [16]	Lalit Nagar, Ringzin Lamo, Mishra J K, Dwivedi K N	International Journal of Ayurvedic Medicine	2020

Of the eight selected studies, only three were published in non-indexed journals (Aryavaidyam & Nagarjuna), while rest five were published in journals indexed in UGC-CARE/ PubMed/ SCOPUS/ Web of Science. The time duration covered in the study was of four decades. Geographically, three studies were conducted in Uttar Pradesh, two in Karnataka and one each in Andhra Pradesh, Gujarat, and West Bengal. Thus, a pan-Indian distribution was observed. The inclusion criteria for all studies were a confirmed diagnosis of TB, clinically, by sputum-examination and/or radiologically. Six studied included even pediatric population ranged from 11-17 years, along with adults. Ethical aspects, such as ethics committee permission, registration in Clinical Trials Registry-India (CTRI) or even informed consent were not mentioned in four studies. All the studies used an add-on design, with exception of two studies. However, all the included studies were comparative and standard controlled with established drugs from ATT. The general study characteristics are described in **Table 2**.

Table 2: General Characteristics of selected studies

Sr. No.	Study Details	Study Design	Sample Size	Inclusion Criteria	Sample Age	Intervention Details		Treatment Duration
						Study Group	Control Group	
1	Dube et al	Standard Controlled	09	Sputum smear positive cases of TB	25-35 yrs.	Group 1- *Swarna Vasanta Malati* Group 2- ATT + *Swarna Vasanta Malati*	ATT (Streptomycin, Isoniazid Thioacetazone)	4 months
2	Bana et al	Standard Controlled- Add-on	40	Sputum smear positive or radiologically confirmed cases with clinical presentation of TB	15-70 yrs.	Group 1- ATT + *Rasayana* compound (*Swarna Vasant Malti Rasa, Lakshmivilas rasa, Shringa Bhasma, Shilajatvadi Loha, Sitopaladi Churna, Pravala Bhasma*); Group 2- ATT + *Pippali Churna*	ATT	3 months
3	Patil & Ramana	Standard Controlled- Add-on	26	Confirmed cases of TB undergoing ATT	17-55 yrs.	ATT + *Agastya Haritaki*	ATT	Not Specified
4	Debnath et al	Standard Controlled- Add-on	110	Freshly diagnosed cases of TB	12-60 yrs.	Group 1- ATT + *Ashwagandha* (*Withania somnifera*) Group 2- ATT + *Chyawanprasha*	ATT (Rifampicin, Pyrazinamide, Ethambutol, Isoniazid)	28 days
5	Dornala & Dornala	Standard Controlled- Add-on	60	Confirmed cases of TB (Category I, II and III)	11-70 yrs.	ATT + *Bhringarajasava*	ATT	-ATT for 6 or 8 months -*Bhringarajasava* for 2 or 3 months i.e., during the intensive phase of ATT
6	Vyas et al	Standard Controlled- Add-on	133	Category-I TB cases	> 13 yrs.	ATT + *Rasayana* compound (*Amalaki, Ashwagandha, Guduchi, Yashtimadhu, Sariva, Haridra, Pippali,Kushtha, Kulinjana*)	ATT (CAT I Protocol)	60 days
7	Patel et al	Standard Controlled- Add-on	60	Confirmed cases of TB	15-60 yrs.	ATT + *Rudanti* (*Capparis moon*) *Phala Churna*	ATT	45 days
8	Nagar et al	Standard Controlled- Add-on	100	Freshly diagnosed or relapsed cases of TB	20-70 yrs.	ATT + *Rudanti* (*Capparis moon*) *Phala Churna*	ATT (DOTS)	6 months

The therapeutic management of Rajayakshma according to Ayurveda mainly focuses on treating the symptoms and building host resistance towards the disease progress. Thus, there are variety of herbs and formulations described serving either or both purposes. An overview of selected studies revealed that *Suvarna Malini Vasant, Pippali (Piper longum), Ashwagandha (Withania somnifera)* and *Rudanti (Capparis moon)* were studied in multiple studies. A comprehensive list of all studied ingredients is placed in **Table 3**.

Table 3: List of study drugs

Formulations		Herbs	
1	***Suvarna Malini Vasant (Swarna Vasant Malati)***	**1**	***Pippali (Piper longum)***
2	***Laxmivilas Rasa***	**2**	***Ashwagandha (Withania somnifera)***
3	***Shringa Bhasma***	**3**	***Amalaki (Emblica officianalis)***
4	***Shilajatvadi Loha***	**4**	***Guduchi (Tinospora cordifolia)***
5	***Sitopaladi Churna***	**5**	***Yashtimadhu (Glycyrrhiza glabra)***
6	***Pravala Bhasma***	**6**	***Sariva (Hemidesmus indicus)***
7	***Agastya Haritaki***	**7**	***Haridra (Curcuma longa)***
8	***Chyawanprasha***	**8**	***Kushtha (Saussurea lappa)***
9	***Bhringarajasava***	**9**	***Kulinjana (Alpinia galanga)***
		10	***Rudanti (Capparis moon)***

Therapeutic management principles utilized in the selected studies can be classified based on their focus at disruption of disease pathophysiology. According to Ayurveda, *Rajayakshma* is characterized by signs and symptoms indicating severe emaciation of *Dhatu* (body tissues). As the disease progresses, regeneration of these tissues further gets hampered and sustains the disease. Most of the studies utilized one or more '*Rasayana'* drugs. However, it was noted that, all of them had different mechanisms of action.

A. Regeneration of *Dhatu* by managing progressive *Dhatu Kshaya*-

The progressive emaciation of body tissue needs to be treated with supply of nutrition specific for their regeneration. Certain studies focused this aspect of managing undernutrition with help of nutrition enhancers such as *Agastya Haritaki*, *Chyawanprasha*, Ashwagandha etc. Most of the contents of '*Rasayana* Compound' also fall under this category. As expected, adjuvant action of such drugs along with ATT, enhanced its action by providing nutrition to body tissues and helped build the host resistance mechanism.

B. Regeneration of *Dhatu* by managing *Dhatvagnimandya*-

As the *Rajayakshma* progresses, there is excessive *Dosha* vitiation causing obstruction in *Srotas*, which control the formation and regeneration of *Dhatu*. This results in decline in metabolism of these tissues (*Dhatvagnimandya*) and in turn affects formation of subsequent *Dhatu*. Certain drugs used in these studies such as,

Suvarna Malini Vasant, Pippali, Bhringarajasava categorically work on such pathway obstruction. Thus, it helps in sustenance of normal Dhatu regeneration process.

Additionally, some studies have added special drugs such as, *Shringa Bhasma, Kushtha, Kulinjana* etc., which have special affinity towards the chest and lung regions. Thus, it becomes helpful for other drugs to reach there and act synergistically.

CONCLUSION-

An overview of some studies related to therapeutic management of TB (*Rajayakshma*) reveals a positive picture suggesting great integration of conventional medicine and Ayurveda. It is evident that, ATT is capable of eradicating the disease-causing bacilli. However, there is more to TB than just elimination of these micro-organisms. The body's response and sustenance play a crucial role in success of the treatment. As ATT-induced hepatotoxicity is a major issue, such drugs can be helpful there too. This is the area where Ayurveda can help profitably, and should be utilized with great hope. Additionally, many of the drugs possess hepatoprotective properties.

ACKNOWLEDGEMENTS- None

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