



# Ethnomedicine for tuberculosis used by the primitive and vulnerable tribal groups of north coastal Andhra Pradesh, India

J Koteswara Rao<sup>1</sup>, M Hari Babu<sup>2</sup> and T V V Seetharami Reddi<sup>3\*</sup>

<sup>1</sup>Department of Botany, Govt. College, Satyavedu - 517 588, Andhra Pradesh, India

<sup>2</sup>AMAL College, Anakapalle - 531 001, Andhra Pradesh, India

<sup>3</sup>Andhra University, Visakhapatnam - 530 017, Andhra Pradesh, India

\*reddytvvs@rediffmail.com

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## Abstract

The paper deals with 40 species of plants covering 39 genera and 27 families used by the Primitive and vulnerable tribal groups of North Coastal Andhra Pradesh (PVTGs) for curing tuberculosis. With 4 species each fabaceae and malvaceae are the dominant families followed by acanthaceae (3 spp.) and others. Trees are dominant with 14 species followed by shrubs (13 spp.), herbs (10 spp.) and others. Root is used in a maximum of 13 practices followed by leaf (11), and others. 17 practices were found to be new.

**Keywords:** *Bodo gadaba, Dongria khond, Khond porja, Konda savara*, Traditional medicine

## 1. Introduction

Of the many causes of the origin of tuberculosis, unbalanced diet, living conditions and hard work are the main causes. After recovering from pneumonia, typhoid, malaria, diarrhea, etc., the patient loses his vitality. At that time tuberculosis germs try to make their headway into any part of the body. Generally lungs, lymphatic glands covering the lungs, joints, bones, intestines and brain are affected (Verma, 1970). Tuberculosis is a contagious disease, which often leads to fatality if not treated properly. Recently, there has been increasing concerns because of the organism causing this disease has become multi-drug resistant. As a result, searches are underway throughout the world for discovery of novel compounds, which can be used successfully to treat multi-drug resistant tuberculosis. India is one of the few countries in the world which has unique wealth of medicinal plants and vast traditional knowledge of use of herbal medicine for cure of various diseases. This disease is prevalent in India and is often treated with herbal medicines by the

traditional medicinal practitioners. There are 550 tribal communities in India, of which 75 were recognized as Primitive and Vulnerable Tribal Group (PVTG) by the Government of India as per Dhebar Commission (1961). They live in inaccessible habitat in the hilly terrains with low literacy rate, stagnant or decreasing populations and practicing *podu* or shifting cultivation. Though there are ethnomedicinal studies published in literature exclusive studies on tuberculosis are not many (Gupta *et al.*, 2010; Gautam *et al.*, 2012; Mathur and Joshi, 2015) necessitating the present investigation which is the first of its kind among the PVTGs.

## 2. Materials and methods

The study area falls in between 81°51' and 84°46' of Eastern longitude and 17°45' and 19°40' northern latitude with a total area of 10,860 sq km covering 23 mandals of Srikakulam, Vizianagaram and Visakhapatnam districts (Plate 1.a) with 4002 scheduled villages with a total population of 42,88,113 of which the tribes are 6,18,500

(14.42%) and the Primitive and Vulnerable Tribal Groups (PVTGs) constitutes 1,76,324 (4.11%) as per 2011 census. Ten communities viz., *Bodo Gadaba* (Plate 1.b), *Chenchu*, *Dongria Khond* in Andhra Pradesh (Plate 1.c), *Bondo Porja* (Plate 1.d), *Gutob Gadaba*, *Khond Porja*, *Konda Reddi*, *Konda Savara*, *Kutia Khond* and *Parengi Porja* are recognized as PVTGs and except *Chenchu* and *Konda Reddi* the rest are present in the study area.

Interviews were conducted with PVTGs at their dwellings during 2008-2011. During oral interviews specific questions were asked and the information provided by the informants was noted. The data were verified in different villages among the interviewers showing the same plant sample and even with the same informants on different occasions. The knowledgeable informants were taken to the field. Along with the collection of plants for the voucher specimens, the use of plants as given by the tribal informants were noted. The field trips were meant for gathering information on medicinal plants used by them, the method and time of collection, ingredients used, mode of application, dosage and duration were recorded. In 95 pockets of the study area, 139 *vaidyas* and practitioners were consulted. Each medicinal practice was cross checked with at least 3-4 informants. Voucher specimens were collected and deposited in the Herbarium of the Department of Botany, Andhra University, Visakhapatnam (AUV).

### 3. Results and discussion

The plants are arranged in an alphabetical order with their botanical name along with family name, vernacular name, English name, locality, voucher specimen number, morphological part used and method, mode and duration of treatment. Practices marked with an asterisk (\*) are considered to be new or less known.

***Abelmoschus esculentus* (L.) Moench;** Malvaceae VN: *Bendakaya* E: Okra, Dhurubili. 2778, Root; Roots with tuberous roots of *Boerhavia chinensis* (L.) Rottb. (*Punarnava*) and leaves of *Azadirachta indica* A. Juss. (*Vepa*) taken in equal quantities are ground. 2 spoonsful of paste mixed in a glass of cow milk is administered daily twice for 30 days.

***Abelmoschus manihot* (L.) Medik.;** Malvaceae VN: *Pedabenda* E: Sunset muskmallow, Sapparla, 3051, Root; A spoonful of root extract (obtained after thorough boiling in water) along with a glass of lukewarm water is administered daily once in the early morning for one month.

***Abutilon indicum* (L.) Sweet;** Malvaceae VN: *Tutturabenda* E: Mallow, Kurupam, 4111, Root; Roots with stem barks of *Azadirachta indica* A. Juss. (*Vepa*), *Ficus benghalensis* L. (*Marri*), *Ficus religiosa* L.

(*Ravi*) and *Ailanthus excelsa* Roxb. (*Peddamanu*) taken in equal quantities are ground. 2 spoonsful of paste mixed in a glass of water is administered daily twice after food for 21 days.

***Actinopteris radiata* (Swartz) Link.;** Actinopteridaceae VN: *Mayursikha* E: Ray fern, Kowsalyametta, 1081, Leaf; Two leaves each of *Actinopteris radiata* (Koenig ex Sw.) Link (*Navili juttu*) and *Teramnus labialis* (L.f.) Sprang. (*Musambaralu*) are made into paste along with equal quantity of jaggery and given twice daily in the form of pills (2g) after food for about 10-15 days.

***Allium sativum* L.;** Liliaceae VN: *Tellagadda* E: Garlic, Poojaripakalu, 9587, Fruit; Four cloves are crushed and to this one liter of goat milk and half piece of coconut are added. This mixture is boiled and reduced to half. This decoction is taken with sugar daily in the early morning. Daily one spoonful quantity is increased till it becomes 21 spoonsful. This dose is continued for a week. Again one spoonful quantity is reduced one by one daily till it comes four. Totally the treatment is to be given for 43 days.

***Allmania nodiflora* (L.) R. Br. ex Wight;** Amaranthaceae VN: *Garugu* E: Daisy lawn, Itchapuram, 4382, Whole plant; Whole plant with leaves of *Azadirachta indica* A. Juss. (*Vepa*) are taken in equal quantities and ground. 2 spoonful of paste is administered daily twice after food for 15 days.

***Alstonia venenata* R. Br.** Apocynaceae VN: *Pala mandhu chettu* E: Devil tree, Kinchamanda, 9573, Latex; \*2-3 drops of latex obtained from bark is taken twice a day after food till cure.

***Andrographis paniculate* (Burm.f.) Nees;** Acanthaceae VN: *Nelavemu* E: Green chireta, Mettapalem, 9646, Leaf; Leaves are pound and stored for 2-3 days and fermented like toddy and the vapours are collected. The cooled and collected liquid of half cup quantity is taken twice a day after food for 7 days.

***Annona reticulata* L.;** Annonaceae VN: *Ramaphalam* E: Custard apple, Thenukharja, 3011, Fruit; \*Putrefied fruits buried in soil for 2-3 days are eaten.

***Artocarpus heterophyllus* Lam.;** Moraceae VN: *Panasa* E: Jack fruit, Seethampeta, 1055, Fruit; Edible part of the fruit is taken and kept in a mud pot with jaggery in alternate layers, then the pot is sealed with a thick cloth and is kept in sun light for 21 days, later on the entire material is pound into a paste and 2 spoonsful of the paste is given once a day for 21 days in empty stomach.

***Barleria strigosa* Willd.;** Acanthaceae VN: *Adivikanakambaram* E: Nail dye, Palakonda, 1057, Root; The crushed roots with black pepper are filtered and the filtrate is taken in 2 spoonful twice a day after food for 30 days.

**Calotropis procera (Aiton) Dryand.**; Asclepiadaceae VN: *Tellajilledu* E: Apple of Sodom, Jarada, 2755, Root; Roots along with those of *Mucuna pruriens* (L.) DC. (*Dulagondi*) and *Vitex negundo* L. (*Vempali*) are ground with honey and made into tablets (5g) and administered one tablet once a day before bed for 40 days.

**Capparis zeylanica L.**; Capparaceae VN: *Uppi* E: Indian caper, L.N. Puram, 1253, Root bark; Root bark is ground with black pepper and made into pills of 2g size. These pills are administered in doses of 2 pills twice a day after food for 15 days (Plate 1.e).

**Cassia fistula L.**; Caesalpiniaceae VN: *Rela* E: Golden shower, Vantalamamidi, 9572, Fruit; \*5gm of fruit pulp is mixed in one cup of cow's milk, one spoonful of honey and half spoon of sugar and taken twice a day before food till cure (Plate 1.f).

**Celosia argentea L.** Amaranthaceae VN: *Gunugu* E: Plumed cockscomb, Diguvasoba, 4045, Root; A spoonful of root paste mixed with a spoonful of leaf paste of *Andrographis paniculata* (Burm.f.) Nees (*Nilavembu*) is administered with water, daily once in empty stomach for 21 days.

**Chloroxylon swietenia DC.**; Rutaceae VN: *Billudu* E: Ceylon satinwood, Rasthakumtumbai, 2714, Fruit; \*Fruit pulp ground with lemon juice is made into dried pills (2g) and administered in 2 pills a day after food for about one month.

**Cissus vitiginea L.**; Vitaceae VN: *Adaavigummadi* E: South Indian treebine, Jongarapadu, 3875, Whole plant; \*50ml of whole plant decoction is administered twice a day after food till cure.

**Citrus aurantifolia (Christm.) Swingle** Rutaceae VN: *Nimma* E: Lemon, Duribilli, 2898, Stem bark; \*Stem bark (10g) ground with black pepper (4) and the extract is administered in 3 spoonful thrice a day before food for 2 months or till cure.

**Curcuma angustifolia Roxb.**; Zingiberaceae VN: *Batripala* E: East Indian arrow root, Kujjali, 9586, Rhizome; Rhizome powder (2g) mixed with sugar is taken with milk once a day before bed till cure.

**Desmodium gangeticum (L.) DC.** Fabaceae VN: *Bhumi ippa* E: Sal leaved Desmodium, Dumbriguda, 9771, Root; \*One spoonful of root powder is taken with lukewarm water early in the morning till cure.

**Indigofera tinctoria L.**; Fabaceae VN: *Vavilaku* E: True indigo, Vepada, 2571, Root; \*Root paste along with those of *Mucuna pruriens* (L.) DC. (*Dulagondi*), *Calotropis procera* (Aiton) Dryand. (*Jilledu*) (10g each) is mixed in honey or cow ghee and made into tablets of 5g. One tablet twice a day after food is administered for 40 days.

**Justicia adhatoda L.**; Acanthaceae VN: *Addasara* E: Malabar nut, Bondapalli, 9545, Leaf/Root; Decoction of

10 leaves along with 50g of jaggery and water (500 ml) are kept in an earthen pot for a month and administered orally (10ml) once a day in empty stomach for 30 days (Plate 2.a). Tender leaves are made into decoction, filtered and jaggery is added. This is boiled till it becomes sticky. One teaspoonful of the syrup is administered daily twice after food for 21 days. One spoonful of leaf extract or root extract mixed with half spoon of ginger juice is administered in empty stomach daily once till cure. Handful of leaves are boiled by adding 3 pepper grains and extracted juice is administered daily twice before food for 25 days.

**Lantana camara L.**; Verbenaceae VN: *Gajukampa* E: Common Lantana, Gurla, 4518, Leaf; Leaf extract is given in doses of 3 spoonful twice a day for about 21 days for tuberculosis with fever.

**Lepidagathis cristata Willd.**; Acanthaceae VN: *Suryakanta* E: Crested Lepidagathis, Pakuva, 8236, Leaf; \*Four leaves are ground with 10g of jaggery and the extract is administered in 2 spoonful twice a day for about 20 days.

**Mucuna pruriens (L.) DC.**; Fabaceae VN: *Duladundi* E: Monkey tamarind, Panasabhadra, 4366, Root; \*Roots ground along with those of *Calotropis procera* (Aiton) Dryand. (*Jilledu*) and *Vitex negundo* L. (*Vempali*) and 5g tablets are made and administered one tablet with honey once a day for 40 days (Plate 2.b).

**Mukia maderaspatana (L.) M. Roem.**; Cucurbitaceae VN: *Kuthurubudama* E: Madras pea pumpkin, Pachipenta, 3839, Leaf; Two spoonful of leaf juice is administered along with a cup of goat milk twice a day till cure.

**Nelumbo nucifera Gaertn.**; Nelumbonaceae VN: *Tamara* E: Indian lotus, L. Kota, 10294, Flower; \*30 ml of flower decoction mixed with one spoonful of crystal sugar is administered once a day till cure.

**Oroxylum indicum (L.) Kurz**; Bignoniaceae VN: *Bapana* E: Indian trumpet flower, Gotiwada, 9346 Stem bark/Seed; Stem bark paste (5g) or seed paste (5g) mixed with 100ml of water is administered twice a day till cure (Plate 2.c).

**Phoenix loureiroi Kunth**; Arecaceae VN: *Adavi eetha* E: Mountain date palm, Komarada, 3570, Tuber; \*Tubers (50g) are eaten once a day for 40 days (Plate 2.d).

**Piper longum L.**; Piperaceae VN: *Pippallu* E: Indian long pepper, S. Kota, 2603, Root; Roots along with dried ginger are made into paste and administered in doses of 50g with honey twice a day till cure.

**Portulaca quadrifida L.**; Portulacaceae VN: *Sannapappukoora* E: Chicken weed, Pakuva, 2895, Whole plant; \*Whole plant extract with honey is administered in 2 spoonful twice a day for about one month.

**Saraca asoca (Roxb.) Willd.**; Caesalpiniaceae VN:

*Ashoka* E: Ashoka tree, Balijipeta, 4395, Root bark; \*Two spoonful of root bark powder along with a cup of goat milk is administered twice a day.

*Schleichera oleosa* (Lour.) Oken; Sapindaceae VN: *Banrubai* E: Lac tree, Dathirajeru, 1196, Stem bark; Stem bark juice with seed powder of *Thespesia lampas* (Cav.) Dalzell & A. Gibson (*Gangaravi*) in doses of 1 spoonful twice a day with hot water is taken till cure.

*Sesbania grandiflora* (L.) Pers.; Fabaceae VN: *Avise* E: Sesbania, Chintapalli, 3104, Flower; Three spoonful of flower powder along with cow's milk is administered twice a day till cure.

*Solanum surattense* Burm.f.; Solanaceae VN: *Tikkavankaya* E: Wild eggplant, Ananthagiri, 2525, Fruit; Fruits with seeds of *Strychnos potatorum* L.f. (*Indupu*) and *Piper nigrum* L. (*Miriyalu*) are taken in equal quantities and powdered. 2 spoonful of powder mixed with a spoonful of honey is administered daily twice for 7 days.

*Strychnos nux-vomica* L.; Loganiaceae VN: *Mushidi* E: Nuxvomica, Geddamputt, 2783, Leaf; 5 spoonful of leaf extract mixed in a glass of hot water is administered once a day for 21 days.

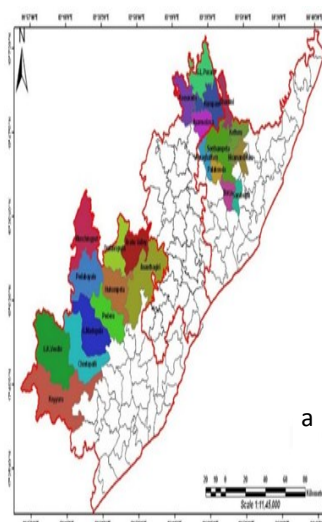
*Terminalia catappa* L.; Combretaceae VN: *Badam* E: Almond, Araku, Seed; \*One spoonful of seed powder mixed with sugar is administered once a day in empty stomach till cure.

*Thespesia lampas* (Cav.) Dalzell; Malvaceae VN: *Adavibenda* E: Common Mallow, Neelakanthapuram, 2112, Seed; Seed powder with bark juice of *Schleichera oleosa* (Lour.) Oken (*Lacca*) in doses of 1 spoonful twice a day with lukewarm water is taken till cure.

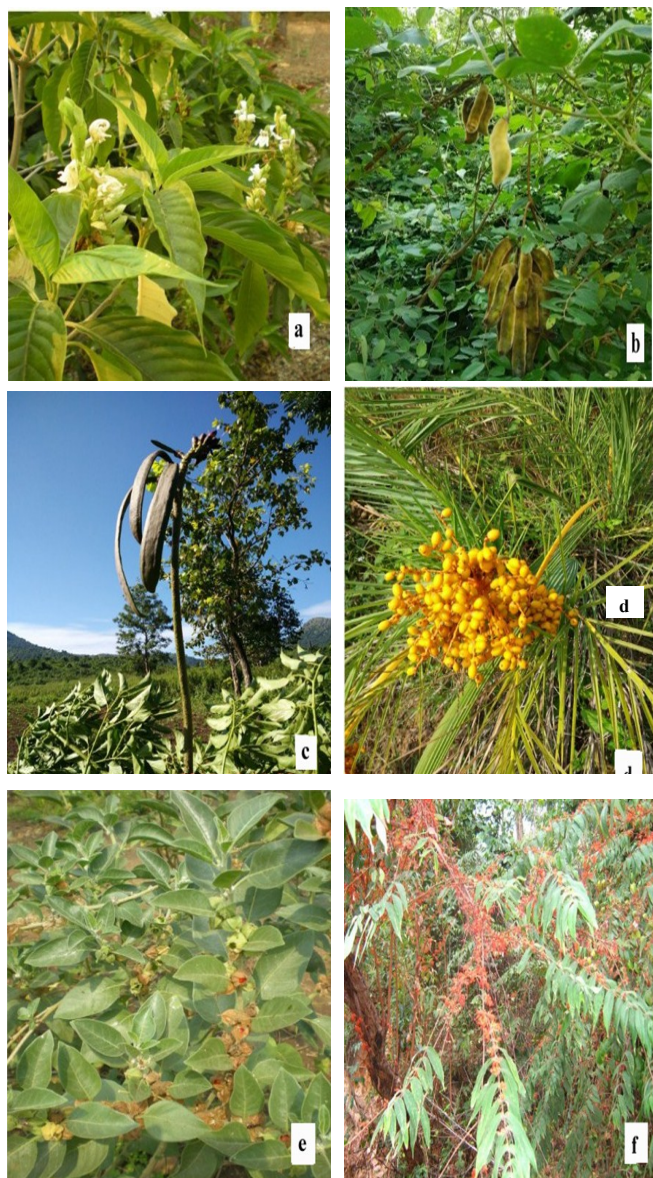
*Withania somnifera* (L.) Dunal; Solanaceae VN: *Pennerugadda* E: Indian ginseng, Jarada, 3779, Tuber; Tuber paste(5g) mixed with 100ml of water is administered thrice a day after food till cure (Plate 2.e).

*Woodfordia fruticosa* (L.) Kurz; Lythraceae VN: *Adavidraksha* E: Fire-flame bush, 3871, Stem bark; \*Stem bark decoction is administered in doses of 30 ml once a day early in the morning for 30 days (Plate 2.f).

*Ziziphus oenoplia* (L.) Miller; Rhamnaceae VN: *Parimi* E: Jackal jujube, Mondekalu, 2809, Stem; Stem with seeds of *Piper nigrum* L. (*Miriyalu*), *Phyllanthus emblica* L. (*Usiri*), *Terminalia chebula* Retz. (*Karakkayi*) and stem bark of *Cinnamomum zeylanicum* Blume (*Dalchinachekka*) taken in equal quantities are ground and made into decoction. 2 spoonful of decoction is administered daily twice for 3 months.



**Plate 1.** a. Map of Study area; b. Bodo Gadaba family; c. Dogria Khond family; d. Bodo Porja family; e. *Capparis zeylanica* L.; f. *Cassia fistula* L.



**Plate 2.** a. *Justicia adhatoda* L.; b. *Mucuna pruriens* L.; c. *Oroxylum indicum* (L.) Benth. ex Kurz; d. *Phoenix loureirii* Kunth; e. *Withania somnifera* (L.) Dunal; f. *Woodfordia fruticosa* (L.) Kurz

The paper deals with 40 species of plants covering 39 genera and 27 families used by the primitive and vulnerable tribal groups of north coastal Andhra Pradesh for curing tuberculosis. Fabaceae and malvaceae are the dominant families with 4 species each followed by acanthaceae (3 spp); amaranthaceae, caesalpiniaceae, rutaceae and solanaceae with (2 spp each) and others with one species each. Habit wise analysis showed the dominance of trees with 14 species followed shrubs (13 spp), herbs (10 spp) and climbers (3 spp). Morphological analysis showed the maximum utilization of root in 13 practices followed by leaf (11), fruit (5), whole plant (3), flower, tuber, seed (2 each), clove, latex and rhizome (1 each). They are administered either in the form of powder, paste, decoction, extract, juice, tablets or

pills along with water, hot water, milk, cow milk, cow ghee, goat milk, ginger juice, sugar or honey. 17 practices were found to be new or less known (Jain, 1991; Kirtikar and Basu, 2003). Plants used for similar purpose in different parts of India and Pakistan are *Justicia adhatoda* L. by the Oraon, Munda, Kharia, Kisan, Bhuiyan, Gond tribes of Sundargarh district, Orissa (Satapathy and Panda, 1992) and Tripura tribe of Moulvibazar district of Bangladesh (Kabir *et al.*, 2014); *Andrographis paniculata* (Burm.f.) Nees; *Lantana camara* L., by the Halakki, Lambani, Kadukuruba, Pindari, Korcha tribes of Gulbarga, Raichur, Bidar, Koppal and Bellary district of Karnataka (Seetharam *et al.*, 1999); tribes of Gwalior Forest Division of Madhya Pradesh (Anis *et al.*, 2000), *Curcuma angustifolia* Roxb. by the Konda dora, Kotia, Valmiki, Bhagat, Samantha, Konda kummari, Gadaba and Poranji porja tribes of Paderu Forest Division of Visakhapatnam district, Andhra Pradesh (Rao *et al.*, 2001); *Capparis zeylanica* L. by the Khond (Rao *et al.*, 2006) and Savara (Rao *et al.*, 2010) tribes of Visakhapatnam and Srikakulam districts, respectively of Andhra Pradesh; the Kandha tribe of Kandhamal district of Orissa (Behera *et al.*, 2006); *Justicia adhatoda* L., *Withania somnifera* (L.) Dunal by the tribes of Bijargarh of West Nimar district, Madhya Pradesh (Mahajan, 2007), *Justicia adhatoda* L., by the folklore of Abbottabad district, Pakistan (Abbasi *et al.*, 2010); *Calotropis procera* (Aiton) Dryand., by the tribes and folklore of Bihar (Kumar and Yadav, 2009), *Bhils* of Ratlam district, Madhya Pradesh (Jadhav, 2011); *Allium sativum* L. (Gupta *et al.*, 2010); *Bhil*, *Pardhi*, *Vadar*, *Kaikadi*, *Pardhan*, *Andh*, *Vaidu* tribes of Aurangabad district, Maharashtra (Prasanth and Bhadane, 2011); *Oroxylum indicum* (L.) Kurz by the *Apatami*, *Mongpa*, *Padam*, *Ngishi*, *I-Idu* tribes of Arunachal Pradesh (Khongsai *et al.*, 2011); *Santhal*, *Kora*, *Oraon* tribal people of Birbhum district of West Bengal and Dumka district of Jharkand (Mondal and Rahaman, 2012); *Lantana camara* L., *Justicia adhatoda* L. for anti-tubercular activity (Gautam *et al.*, 2012); *Calotropis procera* (Aiton) Dryand., by the *Bhil* tribe of Ratlam district, Madhya Pradesh (Jadhav, 2012); *Barleria strigosa* Willd., by the *Bagata*, *Nuka dora*, *Valmiki*, *Kondadora*, *Kotia*, *Kondu*, *Konda reddy* tribes of Paderu forest division of Andhra Pradesh (Padal *et al.*, 2013); *Allium sativum* L., *Andrographis paniculata* (Burm.f.) Nees, *Justicia adhatoda* L., *Lantana camara* L., *Piper longum* L., *Withania somnifera* (L.) Dunal by the people in Terai Region of Kumaun, Uttarakhand (Mathur and Joshi, 2015); *Abutilon indicum* (L.) Sweet by *Irula* tribe of Western Ghats, Coimbatore district, Tamil Nadu (Ganesan and Kumaresan, 2017) and *Mucuna pruriens* (L.) DC. by the *Musahar* tribes of Khagaria district, Bihar (Chandel *et al.*, 2018).

#### 4. Conclusion

The study is of great importance to preserve the knowledge of medicinal plants used by the primitive and vulnerable tribal group people and exploit the knowledge in the treatment of tuberculosis. Moreover, further phytochemical and pharmacological studies of promising medicinal plants are an urgent need to understand the underlying mechanism of traditional treatment systems. On the other hand, these plants hold tremendous potential for pharmaceutical products of commercial value.

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