GENERAL INTRODUCTION
1. General Introduction

The research on pharmacognostical studies of some indigenous medicinal plants which are endemic to Chittoor district has been taken up to provide a reliable scientific and diagnostic information to identify the species, that are medicinally important. Moreover the study will go a long way in providing scientific information to check adulteration. In the codified traditional systems of medicine, as it is practised today, there is considerable variation in the identity of the various source plants of the individual drugs selected for use. The source plant in almost all cases is referred to by several names and some of these synonyms are applied to other plants as well, thus leaving selection of the correct plant dependent upon ingenuity, learning or common use. In these circumstances, a study on the endemic medicinal plants of Chittoor district with a pharmacognostical account has been undertaken mainly with this object in view. Besides it is also an attempt to enrich ethnopharmacognostical data and to provide additional or new information regarding tribal and folk medicine of Chittoor district, to assess the safety and efficacy of these new folklore crude drugs and their potentialities.

Throughout the history of man plant drugs have played a vital role in healing and curing illness. Early man used plants as prophylactic and therapeutic aids to health. The knowledge of drugs developed together with the evolution of scientific and social progress (Pasquale, 1984). Many indigenous methods were in use for centuries to treat or to overcome various ailments. Sorcerers and Witch-doctors, who influenced the prehistoric man with their magico-religious beliefs and animal sacrifices, were recognised at first as medicine men. Later, primitive/ethnic population established their
own domestic medicine with the use of vegetable sources/plant and animal products on trial and error basis. This lead to the development of many useful medicinal agents.

In India, the Vedas (known as the book of knowledge) dating back to 3500-1800 BC, are the most ancient scriptures enumerating the first use of medicinal herbs. The Rig Veda and the Atharva Veda include more descriptions on herbs. The use of plant drugs and therapies are found in abundance particularly in Atharva Veda.

Among the 2000 drugs mentioned in the ancient classics like Charaka Samhita and Sushruta Samhita, more than 1800 drugs are of vegetable origin (Kannabhiran, 1978). Sorcerers became insignificant during classical Indian period. The Indian medicine/Ayurveda laid foundations to the development of contemporary medical systems and it is followed as an alternative system to modern medicine in South Asian countries. Works like Bhava Prakasha Nighantu (Chunekar, 1969), Raja Nighantu (Bhattacharya & Battacharya, 1933) and Madanapala Nighantu (Krishnadasa, 1954) are pioneering works in Ayurveda. But the Ayurvedic materia medica became stagnant after the Moghul and persisted till British rule (Yoganarasimhan et al, 1985 and Jaiprakash, 1995).

Tribal and folk medicine possess a treasure house of knowledge on therapeutical properties of many crude drugs of animal and plant origin. Practices and preparations of herbal medicine in these systems are evolved around local plant resources and are time tested, more accessible to the local
population and are low or of no cost to the rural folk and tribals. Many modern drugs of today are developed based on the tribal medicine and traditional knowledge. Many plant drugs in crude form are still used successfully as they are used for hundreds of years in folklore for treating various diseases. Quinine used by the Peruvian tribe and Artimisinin in Chinese medicine turned out to be the real cure for combating malaria. Similarly, Morphine used for pain killing in German medical practices was based on traditional knowledge. Reserpine and Serpentine were used by Santhal tribes in India for nervous tension and became highly prized sedatives in modern medicine. The discovery of ephedrine from the Chinese drug “Mahuang” and tubocurarine from Curane by Indian tribes for muscle relaxation are some of the important drugs used in indigenous medical practices. Recent clinical studies at the Toyama Medical university in Japan proved that, their traditional system of medicine, ‘Kampo’ was more efficient than the western medicine in the treatment of several skin disorders, gastro-intestinal tract ailments and in muscular and nervous disorders. There is a world wide attention for Vietnamese traditional treatment for burns, and the Government of Vietnam has set up a National Research Hospital for burns based on the traditional medical practices. Indian Council of Medical Research (ICMR), New Delhi in India has recently validated the effectiveness of “Kshara Sutra” (a sterile herb-coated thread) for management of anal fistula. Surprisingly, Kshara Sutra is a non-invasive ayurvedic surgical procedure described in Sushruta Samhita (Prabha, 1999).
With the above findings, one can infer that the local health practices and the indigenous medicinal plants can definitely provide a range of potent solutions for the global problems. But, there is a need for systematic and scientific approach to standardise and validate these local health practices.

India is well known as the “Home of herbs” and is the seat for many traditional healing practices. The recently conducted All India Ethnobiological Research project under the Ministry of Environment and Forests, Government of India estimates that 8000 medicinal plants are used in the country. However, the task of making a more precise estimate is handicapped due to the lack of intensive studies on plants used in folk medical practices as well as in Ayurveda, Unani, Siddha and Tibetan systems (Narayana Rao et al., 1991 and Ved et al., 1999).

1.1 Physiography and general features of the area studied

Chittoor district, the southern most region of Andhra Pradesh, falls under the Southern Eastern Ghats of Peninsular India. It lies between 12° 37" and 14° 8" of North latitude and between 78° 33" and 79° 55" east longitude. The district spreads over an area of 15,152 sq kms with the population of 3.22 million (Amulya Ratnanda, 1991) and the forest area comprises of 4513.40 sq kms (map 1). The district is divided into two divisions, viz, Chittoor East with seven sectors (Bhakrapet, Tirupati, Srikalahasti, Satyavedu, Puttur, Karvetinagaram and Chittoor) and Chittoor West division with five sectors (Madanapalli, Punganur, Bangarupalem, Kuppam and Palamaner). The Eastern Ghats are predominant in the west
MAP 1 The surveyed region of Chittoor district, Andhra Pradesh, India.
Vegetation of Tirumala hills

Talakona water falls
and they gradually bend towards Tirupati passing through Chandragiri and entering Nellore district. The forest area in the east division (known as Seshachalam hills) is mostly hilly and the plateau is at an average height of 500 m intersected with wide and deep valleys, while the west division comprises undulating plateau with the elevation varying from 610 m to 762 m above mean sea level. The district is veered by the common rock (granitic gneiss) similar to that found in Mysore plateau. The climate is tropical and the temperature varies from 40.5°C to 16.5°C. The average rainfall is about 320 mm which is mostly from the north east monsoon. Phytogeographically, the region is enriched with a diverse flora with large degree of endemism and harbours many varieties of medicinal plants. Plants show gigantism in many forest areas of the region like Tirumala, Talakona, Kambakkam, Sadasivakona, Kailasakona, Bheemavaram and Kaigalla and Horsley hills, where soil fertility and higher water table perhaps influence the luxuriant growth of the vegetation. Also, the climatic factors favour the perpetuation of rich, deciduous, semi evergreen, hydrophytic and xerophytic type of vegetation in the forests.

1.2 People

Besides several rural communities (Sudhakar & Madhava Chetty, 1998) a few primitive societies known as tribes inhabit in the district (Yanadi (Y), Yerukula (Ye), Sugali (S), Nakkala (N) & Irula (I)). They live almost isolated from the main stream of life in remote, secluded areas of dense forests. Tribes like the Yanadi and Yerukula are dominant in the East division while majority of Sugali tribe are concentrated in the west division.
The other tribe known as Nakkala are nomadics who camp under the shade of trees at popular centres in various parts of the district. However, patches of hamlets of all tribes are observed in both the divisions of the district. Illiteracy and extreme poverty can be observed among these tribals and rural folk. Though mother tongue of tribals is Telugu (Sugali with Lambadi language), it differs in pronunciation when compared to other communities.

Although some work on medicinal plants (Hemadri, 1987a,b; Sudarsanam, 1987; Basi Reddy, 1991; Nagaraju, 1992; Vedavathy, 1992; Vedavathy & Rao, 1995 and Vedavathy et al., 1997a,b) have been carried out in this region, they are incomplete in many aspects due to additional and new information added continuously. Also, there is scanty information available on the application of herbal medicine in the successful treatment of various ailments known in the surveyed district. Besides, ethnobotanically this region has not been adequately codified and no comprehensive account especially on the folk-lore/tribal-lore survey is available (Reddy and Sudrsanam, 1986).

1.3 Present work

The present studies are taken up to enrich ethnopharmacognostical data of the district. It is an attempt to provide additional or new information on tribal and folk medicine of Chittoor district, to assess the safety and efficacy of these new folklore crude drugs and their potentialities. Carefully planned intensive ethnobotanical field studies were carried out in and around especially unexplored areas of the district for about six years (1995 to 2000).
Five hundred villages situated in various sectors of East (200) and West (300) divisions were selected for the present study. The results of six years of study have resulted in the preparation of medicinal plant herbarium of Chittoor district, a book on *Tribal Medicine of Chittoor district* (Vedavathy *et al.*, 1997a) and numerous, hitherto unreported uses of plants and herbs were recorded during the intensive survey (Vedavathy *et al.*, 1995, 1997a,b, 1998; Madhava Chetty *et al.*, 1998; Sudhakar & Madhava Chetty, 1998; Sudhakar & Vedavathy, 1999). First hand information was obtained on general herbal drugs and their therapies and many uses were recorded for the first time. The emphasis was laid on traditional healers in the tribal hamlets and other villages in the study area. It was observed that knowledge and usage of crude drugs from plant and animal sources for the effective treatment of various ailments are still prevalent among tribals and rural people and it plays a major part of their life and culture.

The author gained confidence of the tribals and native doctors to understand the drugs used by them in crude form. Most of the information was gathered based on personal contacts and in depth interviews, at the herbal clinics/herbal homes of experienced traditional healers/herbalists possessing high degree of knowledge of herbal crude drugs. Besides this, the information on plants having other primary uses, such as vegetables, fruits and other wild edibles also formed part of the study (Sudhakar & Vedavathy, 1999). It was observed that the herbalists obtain their plant drugs from various sources found in deep forests, fringe areas, farm lands, gardens and in abandoned lands.
Juandice specialist
Peddabba - Yellampalli village

Tubers (Peuraria tuberosa)
collected by
Subbarayudu - Yanadi

Yanadi - snake catcher

Author interviews a
herbal paralysis specialist
Subbaraju - K.V.B.Puram village
Author (ext.right) and Research supervisor (ext.left) with native herbal doctors of K.V.Palle

Chalapathi Naidu (herbal physician) - gives herbal injection for snake bite

Rajamma - herbal physician prepares medicine for madness - Irala village
Medicinal plants garden at Tirupati - established by author and his Research supervisor

A herbal vendor carries herbal plant material to the local market on bullock cart
Established herbal centres were also found during the survey in the district, viz., well known bone setting centres at Puttur, Kallur and Belupalli; Herbal drug centre for mental disorders at Irala; Herbal paralysis centres at Kalikiri, K.V.B. Puram, Virupakshapuram and Tiruchanoor; popular herbal treatment centres for snake-bite at Renigunta, Bairedypalle and Yerpedu; Drug centre for eye problems at Pachikapallam and for dog bite at Puttur and Kalahasti; Herbal treatment centres for jaundice at Kalahasti, Piler and Puthalapattu; plant drug centre for abortion at Chandragiri; Plant medicine centre at Keelapatla; Herbal medicine centres at for fertility at Talakona and Chandragiri and magico-religious herbal centres at Panakam and Puditlabailu (Pakala) are some of the outstanding established herbal clinics in the district. Large number of patient from various parts of this district and also neighbouring districts visit everyday for proper treatment to the above mentioned centres. The herbalists of the centres depend only on these practices for their livelihood. Hence, there is a need to investigate the medical practices of the indigenous herbalists scientifically.

1961; Henry et al., 1978; Nayar, 1980; Rao et al., 1981; Rao & Raja Reddy, 1983a,b; Nayyar et al., 1984; Nayudu & Thammanna, 1981; Ahmedulla & Nayar 1986, 1987; Madhava Chetty & Rao, 1990; Hose Hi, 1997 and Pullaiah & Chennaiah, 1997). Among these endemics, five indigenous medicinal plants/drugs said to possess various medicinal and economic uses were selected for the present detailed ethno pharmacognostical studies (table 1). Uses of these crude drugs have been established through the investigation of various workers (Chopra et al., 1969; Anonymous, 1969; Kirtikar & Basu, 1975; Rao & Nayudu 1976b; Reddy et al., 1979; Satyavati & Gupta, 1987; Sudarsanam, 1987; Nagaraju & Rao, 1989; Narayana Rao et al., 1991; Basi Reddy, 1991; Nagaraju, 1992; Vedavathy, 1992; Vedavathy & Rao, 1995 and Vedavathy et al., 1995, 1997a,b). Among various plant genetic resources, the selected species exhibit a high degree of endemism and are almost restricted to Tirumala and Talakona forests of Chittoor district. However a few extend into immediate neighbouring vicinity like Bhakarapet Mamandur, Kambakkam and Veligonda of Sehshachalam hill ranges. Varied microclimatological, undulating topographical and ecological conditions prevailing at various water falls (theertham) situated at different heights, provide a very favourable habitat and support the growth of the endemic species in Tirumala and Talakona. But, the surviving populations of selected endemic species are now confined only to a few pockets in Tirumala and Talakona forests (map 2) and face threat of extinction. This threat is perhaps due to various anthropogenic factors like indiscriminate felling of the species, frequent summer fires, devastation of fruits and seeds due to their collection for medicinal and economic purposes, introduction of exotic species, collection of plant parts in destructive manner for herbal drug
MAP 2 DISTRIBUTIONAL PATTERN OF SELECTED PLANT SPECIES IN THE PEAKS AND THIRTHAMS OF TIRUMALA FORESTS

SESHACHALAM-RESERVED FOREST

DENSE MIXED FOREST

* Thumburkona thirtham
* Ramakrishna thirtham
* Kumardhara thirtham
* Pasupu thirtham
* Sankara sanandana thirtham
Tellaralla peta

RESERVED FOREST

*Dense Mixed Forest

+●●● Papavinas thirtham
+●●● Akasaganga thirtham
+●●● Japali thirtham +● Kakula konda
+●●● Dharmagiri +●●●
+●●● Gogarbhumi thirtham

Lord Balaji temple • TIRUMALA

+●●● Vaikuntha thirtham +●●● FAIRLY DENSE MIXED FOREST

+●●● Alwar Cheruvu
+●●● Gennerlkunta tippa
+●●● Murlaguntapenta
+●●● Sannaralla mitta
+●●● Anjanadri
+●●● Garudadri
+● Mamnduru mitta

+●●● Utlia kona
+●●● Seshadri +● Naidri
+●●● Srivani mettu
+●●●Vrishabadri +● Galigopuram II

+●●● Gantamanda palli
+●●● Vrishabadri +● Galigopuram I

DENSE MIXED FOREST

+●●● Alipiri

Kapila thirtham

TIRUPATI EXTENSION RESERVED FOREST

Boswellia ovalifoliolata, Pterocarpus santalinus, Syzygium alternifolium, Terminalia pallida, Pimpinella tirupatiensis
preparations by traditional practitioners to mention a few. Besides, the location of the world famous Hindu temple “Lord Balaji” in Tirumala forests, influence the visit of floating population which in turn affect the depletion of indigenous taxa of the region. Developmental works like roads, dams, new buildings and establishment of gardens for the need of pilgrims also contribute to the threat of endemic taxa in Tirumala hills (Rao et al., 1993).

The selected species are considered very important from the medicinal and economic point of view; the uses vary depending upon the ailments. These taxa are widely used in indigenous practices by traditional healers to cure various ailments/diseases in the district and its surrounding regions. These plants/drugs are collected mainly by means of wild sources only, but very rarely from cultivated source also. However cultivation practices are concentrated mostly in Chittoor and Cuddapah districts, where the species form their natural habitats. In order to curb their illegal collection from wild, the Tirumala and Tirupati Devasthanams (TTD) Tirupati, Research wing of forest department of Andhra Pradesh and some local non-governmental organizations like Herbal Folklore Research Centre (HFRC) are now actively involved in carrying out planned and experimental cultivation of these valuable endemic species, both at in-situ and ex-situ level. As the success of therapeutics mainly depend upon the use of genuine drug, the selected plants were critically investigated adopting pharmacognostical parameters, which not only help in proper identification but also in obtaining authentic drug material.
Table 1: Selected species for present investigation

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the plant / crude drug</th>
<th>Presently investigated part(s)</th>
<th>Uses investigated in folklore / ethnomedicine / indigenous system</th>
<th>Previous works</th>
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<tr>
<td></td>
<td>Balak &amp; Henry</td>
<td>stem bark</td>
<td>Stomach ulcers and inflammations.</td>
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<td></td>
<td>(Burseraceae)</td>
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<tr>
<td>2.</td>
<td><em>Pterocarpus santalinus</em></td>
<td>wood</td>
<td>Used as an astringent, tonic, diaphoretic, anthelmintic. Also used in diabetes, rheumatic pains, diarrhea, inflammations, headache, ulcers and bilious affections</td>
<td>CNS depressant activity (Mehta et al., 1979), Nematicidal activity (Vijayalakshmi et al., 1979), Anti-spasmodic activity (Dhawan et al, 1980). Blood sugar lowering effect, anti-ulcer and mild analgesic activities were studied (Nagaraju et al., 1991).</td>
</tr>
<tr>
<td></td>
<td>Linn.</td>
<td>fruit</td>
<td>Used in chronic dysentery and skin eruptions.</td>
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<td></td>
<td>(Fabaceae)</td>
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<tr>
<td>3.</td>
<td><em>Terminalia pallida</em></td>
<td>wood</td>
<td>Used in swellings.</td>
<td>CNS depressant effect on CVS, anti-fungal action (Sudarsanam, 1987).</td>
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<td></td>
<td>Brandis</td>
<td>fruit</td>
<td>Antipyretic, purgative and diuretic. Used in diarrhea, peptic ulcers, diabetes, venereal diseases, cough and cold, dysentery and fissures and cracks in the feet.</td>
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<tr>
<td></td>
<td>(Combretaceae)</td>
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<td></td>
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<tr>
<td></td>
<td>Walp.</td>
<td>fruit</td>
<td>Used for diabetes, bacillary dysentery, ulcers, joint pains.</td>
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<tr>
<td></td>
<td>(Myrtaceae)</td>
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<td>5.</td>
<td><em>Pimpinella tirupatiensis</em></td>
<td>root tuber</td>
<td>Used as an aphrodisiac, abortifacient and in stomachache. Also used to cure ulcers in the stomach, mouth, throat and genital system</td>
<td>Anti-histaminic action (Sudarsanam, 1987); anti-ulcer activity, anti-histamine, anti-inflammatory activity (Vedavathy, 1992).</td>
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<tr>
<td></td>
<td>Bal. &amp; Subr.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(Apiaceae)</td>
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</table>
A work of this kind attempted probably for the first time on some endemic medicinal plants of Tirumala cannot be expected to be exhaustive or comprehensive. Ethnopharmacognostical work is taken up with the objectives of proper identification, i.e., botanical identity of the source plant with morphological and anatomical details and chemical constituents of the plants. Studies also carried out on the crude drugs and powders helps to differentiate spurious specimen from genuine one and to facilitate a comparative study. The study provides basis for further research.
1.4 Plan of Thesis

The studies carried out are arranged in the thesis under the following chapters.

1. General introduction which includes physiography, people and present work.

2. Taxonomy and ethnobotany which include enumeration of medicinal plants of the district.

3. Pharmacognostical studies which deals with the review of the literature and pharmaco-botanical studies on five selected species.

4. Phytochemical studies which provide preliminary phytochemical analysis, physico-chemical parameters and chromatographic studies useful in laying down standardization parameters.

5. Summary and Conclusion.


7. Appendix – Publications.

The chapters on taxonomy and ethnobotany, pharmacognostical, phytochemical and physico-chemical studies are provided with introduction material and methods and experimental studies.