

External Application of Ethno-Veterinary Plants to Treat Bone Fractures in Domestic and Pet Animals of the Villages in Nallamalla Forest Region of Eastern Ghats of AP, India

N.V. Jayanth Babu¹, B. Raja Sekhar², K. Sandhya Rani², G. M. Narasimha Rao^{1*}

¹Department of Botany, Andhra University, Visakhapatnam-530003, Andhra Pradesh, India

²District Animal Disease Diagnostic Laboratory, Kadapa, Andhra Pradesh, India

DOI: [10.36347/sjavs.2024.v11i03.002](https://doi.org/10.36347/sjavs.2024.v11i03.002)

| Received: 03.04.2024 | Accepted: 07.05.2024 | Published: 09.05.2024

*Corresponding author: G. M. Narasimha Rao

Department of Botany, Andhra University, Visakhapatnam-530003, Andhra Pradesh, India

Abstract

Original Research Article

Bone fractures are resulted due to accidents or violent acts caused by others either willfully or negligently. In some cases, it may be due to falling or due to pathological reasons. The present survey provides information on external application of Ethno veterinary plant medicine for treating bone fractures of domestic animals by the natives of AP region in Nallamalas of Eastern Ghats of India. The therapeutical properties of 65 plant species belonging to 59 genera and 42 families are being used for treating bone fractures. Information on botanical name, vernacular name, family, plant parts used, mode of drug preparation, administration and mode of preparation of poultice are provided. The Information gathered in this study would act as vital data for scientific community.

Keywords: Bone fractures, ethno veterinary plants, Nallamala Forest areas, Eastern Ghats of India.

Copyright © 2024 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Bone fractures are caused due to accidents and fractures are accompanied by severe pain, swelling and injuries also. Fractures include 1) Hair line bone fractures 2) Incomplete fractures (Green stick fractures) 3. Simple bone fractures (Chalk stick Fractures) 4) Multiple fractures. In Nature some wonderful plants and traditional medical practices are in vogue from the time immemorial for healing the fractures quite effectively. In Tribal and Folk (Jaanapada) medicine, hair line fractures, incomplete fractures, simple fractures can be healed safely and easily. Whereas, for treating multiple fractures, or compound fractures, for fixing of plates bolts, to reset the fractured bone to its original alignment – surgeries are being performed in the Veterinary Hospitals which are located far away from the interior Habitations. Even after performing the surgeries, for quick healing of compound and multiple fractures, the proven, Ethno veterinary / Tribal / Folk/ Jaanapada medicinal treatments in vogue are being followed, for alleviating unbearable pain, and for quick healing. Usage of powerful Pain killers and injections for longer period may harm the health of the animals. More over there is no specific treatment in Allopathy for healing the fractured bones effectively. Hence there is a need to follow traditional proven Ethno-veterinary / Jaanapada

medicinal practices which are safe, effective and are without any side effects.

In spite of enormous progress in modern medical system, about 80% of the world population still depends on traditional systems of medicine for primary health care, which is true in Indian scenario; Anonymous, (2002). Medicine in contemporary India is a fascinating blend of traditional system with conventional one and often been used for various historical, cultural and ecological and socio-economic reasons;(Khan, (2006), Kunwar *et al.*, (2010). It is very important to document, analyze and evaluate this knowledge not only for the cultural reasons, but also for the commercial value. Ethno medicinal uses of plants are one of the most successful criteria being used by the pharmaceutical industry in finding new therapeutic agents. (Cox and Balick, (1994). Few authors documented the ethno veterinary practices in eastern ghats of Andhra Pradesh (Murty and Narasimha Rao, 2012; Lakshminarayana and Narasimha Rao, 2013 A; 2013B; 2013C; Lakshminarayana and Narasimha Rao 2015A and 2015B).

In this present study information was collected basing on the therapeutical properties of certain

Citation: N.V. Jayanth Babu, B. Raja Sekhar, K. Sandhya Rani, G. M. Narasimha Rao. External Application of Ethno-Veterinary Plants to Treat Bone Fractures in Domestic and Pet Animals of the Villages in Nallamalla Forest Region of Eastern Ghats of AP, India. Sch J Agric Vet Sci, 2024 May 11(3): 30-37.

medicinal plants available in Nallamala Forest areas of the Eastern Ghats of India to treat the bone fractures of domestic and pet animals.

Study Area:

Nallamala hills are the section of the Eastern Ghats which forms the eastern boundary of Rayalaseema Region of the state of Andhra Pradesh, located in Five erstwhile Revenue districts namely Kurnool, Guntur, Kadapa, Mahaboob nagar and Prakasam. The total length of this Hill range is about 430 kms which is located between the rivers Pennar and Krishna. Aproxmately the width of Hill ranges, is about 31 kms. The elevation rages from 900 to 1100 MSL. The geographical location of Nallamala hills is in between the latitude 16° 28' 33" and the longitude 79° 48'30". The vegetation in Nallamala forest region varies from moist deciduous, deciduous forests to scrub jungles. Tribes like, Konda reddis, Valmikis, Chenchus, Lambadas, Yanadis and Yerukalas are the inhabitants of the forest regions of Nallamalas in Eastern Ghats.

MATERIALS AND METHODS

Generally Jaanapada / folklore and Tribal medicinal practices are not easily revealed or shared with anyone. They avoid by saying that, if they reveal the names of the Plant species their medicine will not work. Tribal people may share their knowledge with certain people under special circumstances only. Whereas, the village folk native Doctors living in the villages located in the fringes of forest areas, generally also do not reveal their secrets and inherited methods of treatment so easily. As a Forest officer, and the first author (Jayanth Babu) was privileged to work and perambulated several times, in all the interior Forest areas of Eastern Ghats located in Andhra Pradesh as well as in Telangana State for more than 35 years of his service.

During the years 2017 and 2018, for the purpose of Conduct of Research work on this subject, the authors were visited several areas and habitations in Nallamalas. In this process, met several tribal people, as well as many native doctors, who are well versed in treating ailments easily with the plants available in Nature locally. As a Field Botanist, very much enthusiastic to know the therapeutic practices, met repeatedly and interacted with such knowledgeable people to know the proven, effective, established secret formulae and therapeutic values of such wonderful plants. In the process, authors were successful in acquiring the valuable knowledge from them for treating many ailments. While doing so, first author used to compare, verify and confirm the prevailing treatment practices of a particular area with other areas also. He also used to enquire, verify, and cross check the data collected by him, with the local doctors and Tribal people to ascertain the real facts. The methodology adopted was, as described by Jain (1964, 1987), Koppula Hemadri (1994) and Martin (1995).

Procedure followed for collection of the required plant materials and further processing including the methods of preparation of infusions, dosages, different poultices used for curing bone fractures, and for pain management.

1. Fully developed / matured leaves / Flowers were collected in the morning time preferably at the time of sunrise and used the same before one to six months period.
2. Bark from stem / roots were collected from healthy trees, at the time of flowering or fruiting. Cuticle / dead material/ flakes were rejected.
3. Underground rhizomes and roots were collected:
 - a. From the annuals before flowering
 - b. From the bi-annuals before flowering or at the end of the year
 - c. From the perennials before leaves begin to appear

The collected plant materials like Flowers, leaves were dried in shade, under sunlight

1. The dried plant material was stored in a dry place, after short exposure to sunlight, to avoid fungus attack and stored in bags / boxes duly labeling the details.
2. Roots, Stems and Bark of stem / roots were dried under sun directly, labeled and preserved.

Poultice is a soft and paste like medicated plant mass, mixed along with other ingredients in various forms, applied on the body ie., on the affected body parts to overcome inflammation, as well for joining the fractured Bones. Poultice is applied on the skin around the fractured bone as a coat with uniform thickness. A thin, clean white cloth OR muslin cloth is wrapped over the poultice tightly, in the form of bandage and splints of Bamboo are placed over the bandage and again wrapped with the same cloth for arresting the movements of the fractured limb as well, for ensuring stability. Along with the specified / indicated plant materials to be used for bone setting, certain ingredients were also mixed and applied as poultice for the purpose of enhancing or increasing the effectiveness of the medicinal properties of the plants/ herbs that are being used, in addition to the supply of the elements like calcium, Magnesium, phosphorous as well other essentials required for causing quick healing of fractured bone as well as for creating strong, qualitative and effective bond in between the fractured bone. Incidentally this poultice acts as a pain killer also to alleviate the pain in the Bone fractured area.

Method of Preparation of Poultice and the Process Involved

First, the following ingredients are grounded well in a mortar and made into a homogeneous paste.

INGREDIENTS AND QUANTITIES RANGE

1. Black Pepper 2 to 10 nos. To be powdered.

2. Garlic clefts 1 to 10 nos. To be made in to Paste.
3. Shell lime powder 1 to 10 grams.
4. Jaggery powder 5 to 20 grams.
5. Egg white - Adequate quantity, for mixing all the ingredients to obtain a fine paste.

(Quantities of the ingredients for preparation of the poultice are given for application to the animals weighing 5 kgs to 100 kgs range. Hence discretion is to be used while preparing the poultice)

Process:

A) The Indicated plant material paste / powder mentioned in the above table, is added to this fine paste of poultice and further grounded well in a mortar for making a fine homogeneous paste, for the purpose of external application, as a coat, on the skin, with uniform thickness around the fractured area on the skin, for establishing the re-union of the fractured bone. After the application of poultice consisting of the indicated plant material, a thin, soft, clean, cloth is dipped well in this poultice, to make it wet evenly and is wrapped tight around the skin on the fractured area. Finally, Bamboo splints are placed around the limb on the fractured portion, to arrest the movements and wrapped with the cloth.

Pet animals like Cats, Dogs etc., and domestic animals like Sheep, Goats, Cows, Bulls, Buffaloes and even Horses. Depending on size of the animal the weight of the poultice to be applied externally varies from 10 grams to 500 grams. For ex., small animals to start with 2 to 5 kgs of body weight, 10 grams of poultice can be applied externally and as the weight of the animal increases, the quantity of the poultice can also be increased proportionately. This process of application is to be repeated once in a week. Complete healing can be expected within 3 to 4 weeks including pain management.

RESULTS AND DISCUSSION

In the present study a total number of 65 plant species belonging to 59 genera and 42 families have been identified as potential source for treating bone fractures. The scientific names of the species along with families, vernacular names, part(s) used, doses and mode of preparation are furnished in Table below. Our study of crude drugs yielded 64 species used for bone fractures. Among them *Vanda tessellate*, *Sterculia urens*, had been previously reported for bone fractures (Jain,1991), Kirtikar and Basu, (1935), Rama Rao and Henry, (1996). Similarly *Venda tesellata* and *Dodonea viscosa* were reported by Venkata Ratnam and Venkata Raju (2008) for treating bone fractures.

Table 1: Ethno-Veterinary plants being used for curing bone fractures, methods of preparation and dosages adopted for external application

S. No	Name of the Species, Family & Local names	Plant Parts Used and dose	Method of Preparation and application
1	<i>Achyranthus aspera</i> maranthaceae Vuttareni	Whole plant paste 25 grams.	Fine paste of the specified plant parts of <i>Achyranthus aspera</i> , <i>wrightia tinctoria</i> are mixed and applied externally. For better results, the two plant pastes are to be mixed with the POULTICE and applied on the skin around fractured bone. This results in alleviation of pain and for quick re-union of fractured bone
2	<i>Wrightia tinctoria</i> Apocynaceae. Palabarika	Leaves paste 25 grams.	
3	<i>Pedaliium murex</i> Pedaliaceae Yenugu Palleru	Leaves, Fruits/seeds paste 25 grams	Fine paste of the specified plant parts of <i>Pedaliium murex</i> and <i>Wattakaka volubilis</i> are made and applied externally. For better results, the pastes of 2 plants are mixed with the POULTICE and applied on the skin around the fractured bone. This alleviates pain and joins the fractured bones qualitatively and effectively.
4	<i>Wattakaka volubilis</i> /// Asclepiadaceae. Dudi paala teega	Leaves, / stem bark Roots Paste 25 grams	
5	<i>Ipomea sepiaria</i> Convolvulaceae Golla jiddu or Gorre jiddu	Leaves paste 25 grams	Fine paste of he specified plant parts of <i>Ipomea sepiaria</i> or <i>Ipomea hedirfolia</i> is applied externally. For better results, any one of the plant's paste is mixed with the POULTICE and applied on the skin around the fractured bone and bandaged. This alleviates pain and joins the fractured bones qualitatively and effectively.
6	<i>Ipomea hedirfolia</i> Convolvulaceae Golla jiddu or Gorre jiddu	Leaves paste 25 grams	
7	<i>Pergularia daemia</i> Asclepiadaceae Dustapaaku, Jittapaaku	Leaves paste 25 grams	25 grams of the leaves paste of <i>Pergularia daemia</i> and shell lime powder 3 grams are to be mixed made into fine paste and applied externally as poultice for relieving pain and for uniting the fractured bones. For better results the poultice is prepared with the ingredients specified in the formula furnished under POULTICE and bandaged. This alleviates pain and unites fractured bones effectively.

S. No	Name of the Species, Family & Local names	Plant Parts Used and dose	Method of Preparation and application
8	<i>Cocculus hirsutus</i> Menispermaceae Dusari teega	Leaves paste of male plants 25 grams	Fine paste of the leaves of male plants of <i>Cocculus hirsutus</i> is applied around the skin on the fractured bone. Or for better results the plant paste is mixed with other ingredients furnished under POULTICE and applied on the fractured bone and bandaged for quick healing of fractures and for alleviation of pain
9	<i>Securiniga virosa</i> Euphorbiaceae. Tella Pooli	Leaves paste 25 grams	Leaves paste of securiniga plant is mixed with the ingredients mentioned in poultice, applied on the skin around the fractured bone and bandaged for quick setting of fractured bone and for pain relief.
10	<i>Senna occidentalis</i> Caesalpinoidae Kasintha or Kasivenda	Leaves paste 25 grams	Fine paste of leaves of <i>Senna occidentalis</i> is to be mixed with egg white yolk and lime powder and applied on the skin around the fractured bone twice in a week for 3 weeks or mixed with other ingredients of POULTICE for the better results.
11	<i>Dodonea viscosa</i> Dodonaceae Bandedu	Fresh green leaves. The mid veins of the leaves are removed manually, pounded to get moist powder of the leaves -weighing 25 grams.	Green leaves of Dodonia 25 Grams are pounded mixed with the ingredients of POULTICE, applied on the skin around the fractured bone and bandaged
12	<i>Aerva javanica</i> Amaranthaceae Pedda konda pindi	Whole plant powder or paste about 25 grams.	Whole plant powder or paste of <i>Aerva javanica</i> is mixed with the ingredients mentioned in POULTICE applied on the skin around fractured bone and bandaged.
13	<i>Sterculia urens</i> Malvaceae Yerra Poliki	Root /stem bark powder 25 grams + and it's gum 10 grams	Root bark powder, Gum 10 grams are to be mixed with the specified ingredients of POULTICE and applied on the skin around the fractured bone for alleviation of pain and for effective re union of fractured bones.
14	<i>Acacia nilotica</i> Mimosoideae Nalla thumma	Fine stem bark powder 25 grams and its gum 10 grams	Stem bark powder, Gum powder are to be mixed with the specified ingredients of POULTICE and applied on the skin around the fractured bone and bandaged s.
15	<i>Manilkara hexandra</i> Sapotaceae Paala	Stem Bark powder 25 grams	Fine Stem bark powder is to be mixed with the specified ingredients of POULTICE and applied on the skin around the fractured bone and bandaged
16	<i>Albizzia amara</i> Mimosaceae Chigara, Cheekireni	Leaves paste 25 grams	Fine leaves powder/ paste is mixed with the specified ingredients of POULTICE, applied on the skin around the fractured bone and bandaged.
17	<i>Tinospora cordifolia</i> Menispermaceae Tippa Teega	Stem paste 25 grams	Fine stem paste is to be mixed with the specified ingredients of the POULTICE, applied on the skin around the fractured bone and bandaged
18	<i>Bamboosa arundanaceae</i> Poaceae Mullem Veduru, Hallow / Thorny Bamboo	Leaves and juvenile shoots paste 25 grams	Fine paste is mixed with the specified ingredients mentioned in the POULTICE applied on the skin around the fractured bone and bandaged
19	<i>Nerium indicum</i> Apocynaceae Ganneru (with white flowers only)	Leaves paste of the plants having white flowers only – 25 grams	Fine paste of leaves is to be mixed with the specified ingredients mentioned in the POULTICE and applied on the skin around the fractured bone and bandaged
20	<i>Mimosa pudica</i> Mimosoideae Athapathi, Lajjavathi	Fine paste of leaves 25 grams	Fine paste of leaves is mixed with the specified ingredients mentioned in the POULTICE and applied on the skin around the fractured bone and bandaged for alleviating pain and for joining fractured bones and bandaged.
21	<i>Lagenaria siceraria</i> Cucurbitaceae CHEDU SORAKAAYA	Fruit paste/ Fruit powder – 25 grams (only bitter tasting fruit to be used)	Fine fruit paste or fruit powder is mixed with 3 grams of shell lime powder and a paste is to be prepared by adding and grinding with sheep milk. This paste is to be applied on the skin around the

S. No	Name of the Species, Family & Local names	Plant Parts Used and dose	Method of Preparation and application
			fractured bone and bandaged.
22	<i>Dendrocalamus strictus</i> Poaceae Sadana veduru	Leaves and juvenile shoots paste 25 grams	Fine paste is mixed with the specified ingredients mentioned in the POULTICE, applied on the skin around the fractured bone and bandaged
23	<i>Cuscuta reflexa</i> Convolvulaceae Bangaru teega	Whole plant paste 100 grams	Plant paste is to be mixed with the ingredients of poultice and applied on the skin around the fractured area and bandaged
24	<i>Cassytha filiformis</i> Lauraceae Bangaru pasi	Whole plant paste 100 grams	Plant paste is mixed with the ingredients of poultice, applied on the skin around the fractured area and bandaged
25	<i>Venda tesellata</i> Orchidaceae	Whole plant's paste 100 grams	Plant paste is to be mixed with the ingredients of poultice, applied on the skin around the fractured area and bandaged
26	<i>Aegle mormelos</i> Rutaceae, Maredu	Fine bark powder/paste 25 grams	Bark paste is to be mixed with the ingredients of the poultice, applied on the skin around the fractured area and bandaged
27	<i>Bauhinia vahlii</i> Caesalpiniaceae Addaku	Fine bark powder/paste 25 grams	Bark paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
28	<i>Canthium parvi florum</i> Rubiaceae Balusu	Fine bark powder/paste 25 grams	Bark paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
29	<i>Grewia hirsuta</i> Tiliaceae Gubathada	Fine bark powder/paste 25 grams	Bark paste is to be mixed well with the poultice, applied on the skin around the fractured area and bandaged
30	<i>Trichodesma indicum</i> Boraginaceae Guvvagutti	Whole plant	Whole plant's paste is mixed well with the poultice, applied on the skin around the fractured area and bandaged
31	<i>Capparis zeylanica</i> Capparidaceae; Aare donda	Leaf paste 25 grams	Leaf paste is mixed well with the poultice – applied on the skin around the fractured area and bandaged
32	<i>Capparis sepiaria</i> Capparidaceae; Nalla uppi	Leaf paste and bark paste 25 grams	Leaf paste is mixed with the ingredients of poultice – & applied on the skin around the fractured area and bandaged
33	<i>Azema tetracantha</i> Salvadoraceae. Tella uppi	Leaf paste and bark paste 25 grams	Leaf paste is to be mixed with the ingredients of the poultice – & applied on the skin around the fractured area and bandaged
34	<i>Acacia chundra</i> Mimosaceae Chandra	Leaves paste 25 grams	Leaf paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
35	<i>Alangium salvifolium</i> Alangiaceae. VUDUGA	Leaves paste 25 grams	Leaf paste is to be mixed with the ingredients of poultice – & applied on the skin around the fractured area and bandaged
36	<i>Cissus quadrangularis</i> Vitaceae Nalleru	Whole plant paste 25 grams	Whole plant paste is to be mixed with the ingredients of the Poultice applied on the skin around the fractured area and bandaged.
37	<i>Senna auriculata</i> Caesalpinaceae Tangedu	Leaf paste 25 grams	Leaf paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged.
38	<i>Terminalia arjuna</i> Combretaceae Arjuna, Tella maddi	Matured stem bark paste 25 grams	Matured stem bark is made into homogeneous paste by adding adequate water. This paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
39	<i>Bassia latifolia</i> Sapotaceae Ippa, Mahua	Matured stem bark paste 25 grams	Matured stem bark paste or powder is to be mixed with adequate water, made into homogeneous paste. This paste is to be mixed with the ingredients of poultice & applied on the skin around the fractured area and bandaged
40	<i>Bombax ceiba</i> Bombacaceae. Buruga	Matured stem bark paste 25 grams and gum adequately	Matured stem bark is made into homogeneous paste by adding adequate water and gum. This paste is to be mixed with the ingredients of the poultice &

S. No	Name of the Species, Family & Local names	Plant Parts Used and dose	Method of Preparation and application
			applied on the skin around the fractured area and bandaged
41	<i>Acacia chundra</i> Mimosaceae 'Chandra'	Leaves paste 25 grams	Leaf paste is to be mixed with the ingredients of poultice & applied on the skin around the fractured area and bandaged
42	<i>Euphorbia nivula</i> Euphorbiaceae 'Aku jemudu'	Stem bark 25 grams	Matured stem bark is made into homogeneous paste by adding adequate water and its latex. This paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
43	<i>Ficus benghalensis</i> Moraceae. 'Marri'	Stem bark /, prop roots tips 25 grams and Latex	Matured stem bark is made into homogeneous paste by adding adequate water and its latex. This paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
44	<i>Ormocarpum cochinchinens.</i> Fabaceae; 'Elum botti'	Leaves paste 25 grams	Leaf paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
45	<i>Oxalis corniculata</i> Oxalidaceae 'wood sorrel' or 'yellow sorrel'	Whole plant 25 grams	Specified Plant parts of S.NO. 45 & S. NO. 46 are to be made into paste and to be mixed with the poultice and applied on the skin around the fractured area and bandaged
46	<i>curcuma longa.</i> Zingiberaceae. Turmeric	Fresh rhizome 25 grams	Specified Plant parts of S.NO. 45 & S. NO. 46 are to be made into paste and to be mixed with the poultice and applied on the skin around the fractured area and bandaged
47	<i>Plumbago zeylanica</i> Plumbaginaceae Chirtumulam	Root paste 25 grams	Root paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
48	<i>Eryhrina variegata;</i> Fabacea. 'Badisa'	Seed paste 25 grams	Seed paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
49	<i>Ipomea carnea</i> Convolvulaceae. 'Samudra pala or Rubber plant or lotta peesu'	Leaves paste 25 grams	Leaf paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
50	<i>Lannea cora mandelica</i> Anacardiaceae 'Gumpena'	Stem bark 25 grams	Matured stem bark is made into homogeneous paste by adding adequate water. This paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
51	<i>Soyimida febrifuga</i> Meliaceae. 'Somida' / Somi	Stem Bark 25 grams	Matured stem bark is made into homogeneous paste by adding adequate water. This paste is to be mixed with the ingredients of the poultice & applied on the skin around the fractured area and bandaged
52	<i>Ziziphus oenoplea</i> Rhamnaceae. 'Regu Parika kampa'	Bark of Root /stem and leaves 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
53	<i>Sida acuta.</i> Malvaceae Common wire weed, Polikattaku	Leaves 25 greams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
54	<i>Schleichera oleosa</i> Sapindaceae. 'Busi' Lac insect tree	Stem bark 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied
55	<i>Litsia glutinosa</i> Lauraceae 'Nara maamidi'	Stem bark 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area
56	<i>Holoptelea integrifolia</i>	Stem bark 25 grams	Indicated plant material is to be grounded into paste

S. No	Name of the Species, Family & Local names	Plant Parts Used and dose	Method of Preparation and application
	<i>Ulmaceae Nemili naara</i>		using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
57	<i>Cochlospermum religiosum</i> Bixaceae. 'Konda gogu' silk cotton tree	Stem bark 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
58	<i>Dichrostachys cinerea</i> Mimosaceae 'Veluthuru chettu'	Root bark 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
59	<i>Cissus repanda</i> ; Vitaceae; Pani bel	Root 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area
60	<i>Diospros chloroxylon</i> Ebenaceae 'Vulinda'	Stem bark 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area
61	<i>Pupalia leppacea</i> Amaranthaceae 'Anteetha'	Leaves 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
62	<i>Caralluma attenuate</i> Asclepiadiaceae	Stem 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
63	<i>Acampe praemorsa</i> Orchidaceae	Whole plant 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
64	<i>Blumea eriantha</i> ; Asteraceae Barrenka	Leaves 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged
65	<i>Prosopis spicigera</i> ; Fabaceae; Sami; Jammi	Stem Bark paste 25 grams	Indicated plant material is to be grounded into paste using adequate water. This paste is to be mixed with the ingredients of the poultice and applied on the skin around the fractured area and bandaged

CONCLUSION

The revitalization of these indigenous systems can provide self-reliance in primary health care and can even contribute to the frontiers of herbal system of medicine. Efforts in this direction may provide the benefit of regional information to the global community. Phyto-chemical studies of above said plants need to be taken up to find out the exact ingredients available in the indicated plant species, that helps in the curing bone fractures.

ACKNOWLEDGEMENTS

The authors duly acknowledge the tribal people, Local 'vydyas', in the study areas of Andhra Pradesh for their excellent co-operation during the field visits for this research work.

REFERENCES

- Anonymous, WHO traditional Medicine Strategy 2002–2005. World Health Organisation, Geneva, Switzerland. (WHO/EDM/TRM/2002.1.). 2002.
- Cox, P. A., & Balick, M. (1994). The ethnobotanical approach to drug discovery. *Scientific American*, 270, 82–87.
- Hemadri, K. (1994). Shastravettalanum Akashistunna GirijanaVaidyam (Tribal Pharmacopoeia). *Tribal Cultural Research and Training Institute, Hyderabad*.
- Jain, S. K. (1964). The role of botanist in folklore research. *Folklore*, 5(4), 145-150.
- Jain, S. K. n (ed.) (1987). A Manual of Ethnobotany. *Scientific Publishers, Jodhpur*.
- Khan, S. (2006). Systems of medicine and nationalist discourse in India. *Social Science and Medicine*, 62, 2786–2797.

- Kunwar, R. M., Shrestha, K. P., & Bussmann, R. W. (2010). Traditional herbal medicine in far-west Nepal: a pharmacological appraisal. *Journal of Ethnobiology and Ethnomedicine*, 6, 35.
- Kirtikar, K. R., & Basu, B. D. (1935). Indian Medicinal Plants. Vol. I – IV, periodical experts, Delhi, India.
- Martin, G. (1995). Ethnobotany - A method manual. Chapman and Hall, London.
- Pragaya Murty, P., & Narasimha Rao, G. M. (2012). Ethnoveterinary practices in tribal regions of Andhra Pradesh, India. *Bangladesh J. Plant Taxon*, 19(1), 7-16.
- Rama Rao, N., & Henry, N. (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India, Botanical Survey of India, Calcutta.
- Venkata Ratnam, K., & Venkata Raju, R. R. (2008). Traditional Medicine Used by the Adivasis of Eastern Ghats, Andhra Pradesh – For Bone Fractures. *Ethno-botanical Leaflets*, 12, 19-22.
- Lakshmi Narayana, V., & Narasimha Rao, G. M. (2013A). Traditional Veterinary Medicinal practices in Srikakulam district of Andhra Pradesh, India. *Asian J. Exp. Biol. Sci*, 4(3), 476-479.
- Lakshminarayana, V., & Narasimha Rao, G. M. (2013B). Ethno veterinary Practices in Northern Districts of Andhra Pradesh, India. *Journal of Natural Remedies*, 13(2), 109-117.
- Lakshminarayana, V., & Narasimha Rao, G. M. (2013C). Folk medicines for treating Livestock in Vizianagaram and Srikakulam Districts, Andhra Pradesh, India. *International Journal of Advanced Research in Science and Technology*, 2(3), 142-146.
- Lakshmi Narayana, V., & Narasimha Rao, G. M. (2015A). Plants used in Ethnoveterinary Medicine by Tribals of Visakhapatnam and Vizianagarm Districts, Andhra Pradesh, India. *Int. J. Pure App. Biosci.*, 3(2), 432-439.
- Lakshmi Narayana, V., & Narasimha Rao, G. M. (2015B). Ethnoveterinary Practices and Phytochemical Analysis of Some Selected Medicinal Plants from North Coastal Andhra Pradesh, India. *Indian Journal of Applied Research*, 5(9), 455-457.