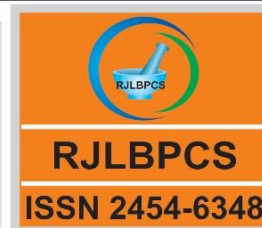




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Original Research Article

DOI: 10.26479/2018.0405.49

ETHNOPHARMACOLOGICAL SURVEY OF MEDICINAL PLANTS IN ANDRO VILLAGE IN MANIPUR (INDIA)

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ABSTRACT: The Andro village is located at the intersection of 94⁰.2'E longitude and 24⁰.44'N latitude. It has an area of about 4.0 km⁻². The total population of Andro is 8744 according to 2011 census. The scheduled caste people of Andro Village have a very good knowledge about the treatment of various diseases and ailments using different plant parts as ethnomedicine. The present study reveals that overall 32 different diseases and ailments are being treated with a total of 56 species belong to 51 genera that are distributed over 30 families. The Factor Informant Consensus for insect bite is 0.95, the highest among the 32 ailments and diseases followed by jaundice, hypertension, indigestion, gynecological problems etc. The plant with highest fidelity level of FL 90 is shown by *Allium hookeri* Thwaites and *Solanum indicum* L. followed by *Pogostemon benghalensis* (Burm.f.) Kuntze, *Tagetes erecta* L., *Azadirachta indica* A. Juss., *Mentha spicata* L., *Citrus hystrix* DC. etc. These findings will be helpful to determine the most effective traditional remedies towards the development of herbal medicinal products and also will give the way of advanced research for new medicines in future. The preservation of traditional knowledge and local health practice of this isolated scheduled caste people is the outcome of the present study.

KEYWORDS: Andro, Manipur, Scheduled Caste Community, FL, FIC.

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1. INTRODUCTION

Traditional medical knowledge of medicinal plants and their use by indigenous healers are not only useful for conservation of cultural traditions and biodiversity but also for community healthcare and drug development in the present and future [1]. About 80% of the population in developing countries use traditional medicines because they cannot afford the high cost of western pharmaceuticals and health care, and because traditional medicines are more acceptable from a cultural and spiritual perspective [2]. According to studies on ethnomedicine and folk medicines about 2000 species of plants are newly identified as drug yielding plants and are well known for their use in about 4000 drug industries of various Indian system of medicine. Numerous drugs have been introduced to international markets [3] through validation of traditional medicines [4], indigenous therapies [5,6] and ethnopharmacological practices [7]. Manipur as a part of the north eastern region of Indian sub-continent is very rich in the resource of folk medicine. The thirty three recognised tribal communities, the Meitei Pangal (Manipuri Muslims), the seven scheduled caste communities and the majority Meiteis of the Manipur state have their own origin, tradition and culture. They have common knowledge and easy cure for many simple and common diseases. Evaluation of pharmacological activity and the analysis of probability of reality using quantitative tools for the promising medicinal plants are now a days becoming important. A good number of papers have been published since 1986 on the Ethnobotany of Manipur with main emphasis on medicinal plants [8-27].

2. MATERIALS AND METHODS

2.1. Description of the Study area

The present study site Andro village is located at the foothills of the Baruni (Nongmaiching) hills at a distance of about 24km from Imphal the capital city of Manipur along the Imphal-Ngariyan hill road. The study site is included under the Imphal East District of Manipur. Andro village is one of the oldest villages in Manipur. The exact location of Andro village is at the intersection of $94^{\circ}.2'E$ longitude and $24^{\circ}.44'N$ latitude. The elevation of Andro is about 783m above the mean sea level. It has an area of about 4.0 km^2 . Andro is surrounded by Sanapat in the east, Uchon on the south, Maringthel in the west and Baruni (Nongmaiching) Hills on the north. The inhabitants of this village are listed as a scheduled caste group of Manipur under the Scheduled Castes and Scheduled Tribes orders (Amendments) Act 1956 (Act no. 6 of 1956). The groups which are generally known as 'Lois' has been included in the list of scheduled castes and tribes of Manipur. The word Andro is derived from the word "Handro" meaning return back after a long separation. The people of Andro belong to the 'Chakpas'. They still maintain their caste solidarities with a primitive state of economic life. They depend mostly on surrounding plant communities with traditional agriculture as a primary means of livelihood. The people of Andro have its own tradition, culture origin and history and are still maintaining their realistic ideology. Andro is an earmarked village which has been developed to represent the cultural heritage and the artistic creativeness of the Manipuri tribes. Andro is

popularly known for the production of a local wine and pottery. Besides the production local wine and pottery, Andro is also famous for a Doll House which show-cases the dolls belonging to some 29 popular tribes of Manipur. Each and every elderly people of Andro have common knowledge and easy cure for many common diseases like cold, coughs, dysentery, diarrhoea, fever, etc. There are extreme rules and regulations as “do’s” and “don’ts” regarding food habit, untouchability, breach of taboos etc. Andro village is divided into thirteen Localities (Leikais in Manipuri). The literacy rate of the Andro is 64.4% (Male literacy rate = 58.9%: Female literacy rate= 52.7%) which is lower than the average literacy rate of Imphal East District (81.9%). The average sex ratio is 1030.

2.2. Ethnomedicinal study of plant species

The paper is based on the data collected on ethnomedicinal practices among the people of Andro Village during January 2015 to December, 2017. For the present study all the 13 localities under Andro village have been exhaustively investigated ethnobotanically using standard methods for the collection of ethnobotanical information [28-34]. Direct interviews with the people of Andro were conducted in all the localities. Informants were chosen by random sampling technique from amongst the people who possess the knowledge of ethnomedicine. The information were collected from 56 persons (44 male and 12 female) ranging from 32 to 80 years in age. Various data were collected with semi-structured questionnaires which include inquiries about pharmacological information of diverse medicinal plants used for therapy including dosages, plant parts use, method of preparation, mode of application, type of disease treated, local name of the plant etc. The specimens collected were identified by using standard local floras of Manipur [35-37] and matched with the herbarium specimens of Assam at Kanjilal Herbarium (Shillong). Efforts have also been made to find out the correct botanical names in accordance with the latest International Code of Nomenclature (ICN) 2012. For nomenclatural updates names in author citation www.theplantlist.org and www.ipni.org was used all the time. The correct authors’ names have also been given as per *Authors of Plant Names* of Royal Botanic Garden, Kew [38]. Colour photographs were also taken for most of the species and herbariums were also prepared for the collected specimens and the same have been deposited in the Botany Department of Thoubal College, Thoubal (Manipur), India for future use. Prior Informed Consent (PIC) was obtained from the people of Andro village.

2.3. Data Analysis

Analysis of data was done by using two quantitative tools **FL** (Fidelity level) and **F_{IC}** (Factor informant consensus).

The fidelity level (FL)

The fidelity level (FL) was determined for the most frequently used category by calculating the percentage of informants claiming the use of a certain plant for the same major purpose [39].

$$FL (\%) = NP/N \times 100$$

where NP = Number of informants that claim the use of a particular plant species to treat a particular

disease only and N is the number of informants that use such species including other disease in addition to the former disease. The value of N will always be more than or equal to NP.

Informant consensus factor (F_{IC})

Informant consensus factor was used to check the similarity on the informant's information for each use category and also to check the authenticity of the work by using the following formula [40, 41]:

$$F_{IC} = \frac{nur-nt}{nur-1}$$

is mainly concerned for particular disease,

where, *nur* = total number of informants who use plant species for a typical ailment, *nt* is the total number of plant species used in that particular disease. Generally plants which are used in some repetitive fashion are more likely to be biologically active [42]. The factor provides a range of 0 to 1 [40].

3. RESULTS AND DISCUSSION

F_{IC} indicate the probable and reasonable use of a particular plant for specific disease and this is supported by the high value of FL with higher number of informants. Higher the number of informants using a specific plant species for a particular disease more is the value of FL. On the other hand, higher the value of FL, the corresponding value of F_{IC} is also high. So these values are directly proportional and correlated. Such kind of observation is applicable and 90% of the analysis using these two tools is found correct in the present study. *Solanum indicum* L. shows the highest number of informants (30) for cough which have FL 90 and F_{IC} 0.73 (Table 4) even though it possess second category (due to *nt* value; higher the value of *nt*, the lower will be the value of F_{IC}) when compared to hypertension having F_{IC} 0.86 and 20.

Table 1: Diseases with total number of informants; plants with maximum number of informants and total plants used

Sl. No.	Name of the disease	No. of informants	Name of the plant with maximum no. of informants within bracket	No. of plant species used
1	Abdominal/ Muscle pains	25	<i>Mimosa pudica</i> L. (07)	06
2	Arthritis /Rheumatism	51	<i>Justicia adhatoda</i> L. (09)	13
3	Asthma	18	<i>Hedychium flavescens</i> Carey ex Roscoe (04)	08
4	Boils/Blains/Ulcers	41	<i>Plantago asiatica</i> subsp. <i>erosa</i> (Wall.) Z.Yu Li (09)	20
5	Burns	05	<i>Azadirachta indica</i> A. Juss. (03)	02
6	Cold	05	<i>Phyllanthus emblica</i> L. (03)	02
7	Cough	53	<i>Solanum indicum</i> L. (30)	15
8	Cuts and Wounds	26	<i>Ocimum tenuiflorum</i> L. (12)	08

9	Diabetes	10	<i>Oreocnide integrifolia</i> (Gaudich.) Miq. (10)	01
10	Diarrhoea/ Dysentery	24	<i>Phyllanthus emblica</i> L. (10)	06
11	Diuretic/ Hydrocele	55	<i>Allium tuberosum</i> Rottler ex Spreng. (15)	08
12	Fever	41	<i>Allium tuberosum</i> Rottler ex Spreng. (10)	16
13	Gynaecological problems	23	<i>Allium ascalonicum</i> L. (08)	05
14	Hypertension	54	<i>Allium hookeri</i> Thwaites (20)	08
15	Indigestion	48	<i>Oxalis corniculata</i> L. (10)	09
16	Insanity and Hallucination	09	<i>Datura metel</i> L. (05)	02
17	Insect bites	22	<i>Azadirachta indica</i> A. uss. (12)	02
18	Insomnia	03	<i>Cinnamomum verum</i> J.Presl (03)	01
19	Jaundice	29	<i>Zehneria scabra</i> Sond. (20)	04
20	Laxatives	21	<i>Carica papaya</i> L. (12)	04
21	Liver disorders	13	<i>Ocimum tenuiflorum</i> L. (05)	04
22	Malarial fever	14	<i>Curcuma longa</i> L. (07)	03
23	Paralysis	09	<i>Clerodendrum glandulosum</i> Lindl. (05)	02
24	Piles	55	<i>Pogostemon benghalensis</i> (Burm.f.) Kuntze (12)	18
25	Skin diseases	54	<i>Azadirachta indica</i> A. Juss. (14)	19
26	Snake bites	04	<i>Lantana camara</i> L. (04)	01
27	Soothing and Cooling agent	08	<i>Alocasia macrorrhizos</i> (L.) G.Don (05)	02
28	Stomach problems	51	<i>Carica papaya</i> L. (12)	14
29	Stone case	36	<i>Lindernia ruellioides</i> (Colsm.) Pennell (15)	06
30	Tonsillitis	13	<i>Elsholtzia blanda</i> (Benth.) Benth. (06)	03
31	Typhoid fever	14	<i>Alpinia galanga</i> (L.) Willd. (05)	06
32	Urinary tract disease	38	<i>Caesalpinia enneaphylla</i> Roxb. (12)	09

Table 2: Medicinal plants used with their ailments, use informant number, FL value and parts used. (* denotes plant species showing highest number of informant for that particular ailment)

Name of the species	Ailment	Use informant (NP), (FL)	Plant part used
1. <i>Acacia farnesiana</i> (L.) Willd. Family: Leguminosae. Local name: Chigonglei angouba.	(i) Boil/blain/ulcer (ii) Pile (iii) Skin disease (iv) Urinary tract	(1,16) (2,33) (2,33) (1,16)	Inflorescence Leaf Leaf Leaf
2. <i>Allium ascalonicum</i> L. Family: Amaryllidaceae. Local name: Meitei tilhou macha.	(i) Abdominal/ Muscle pains (ii) Fever (iii) Gynaecological problems (iv) Stone case (v) Urinary tract disease	(1,7) (2,14) (8,57)* (1,7) (2,14)	Bulb Bulb Bulb Bulb Bulb
3. <i>Allium hookeri</i> Thwaites Family: Amaryllidaceae. Local name: Maroi napakpi.	(i) Hypertension (ii) Stomach problems	(20,90)* (2,9)	Leaf Leaf
4. <i>Allium sativum</i> L. Family: Amaryllidaceae. Local name: Chanam.	(i) Abdominal/ Muscle pains (ii) Boil/blain/ulcer (iii) Cough (iv) Cuts and Wounds (v) Fever (vi) Hypertension (vii) Indigestion (viii) Paralysis (ix) Pile	(3,9) (6,18) (1,3) (4,12) (5,15) (7,21) (2,6) (4,12) (1,3)	Bulb Bulb Bulb Bulb Leaf Bulb Bulb Bulb Bulb
5. <i>Allium tuberosum</i> Rottler ex Spreng. Family: Amaryllidaceae. Local name: Maroi nakuppi.	(i) Asthma (ii) Diuretic/ Hydrocele (iii)Fever (iv)Hypertension (v) Liver disorders (vi) Pile	(1,3) (15,48)* (10,32)* (1,3) (3,9) (1,3)	Whole plant Leaf Leaf Leaf Whole plant Whole plant
6. <i>Alocasia macrorrhizos</i> (L.) G. Don Family: Araceae. Local name: Hongu.	(i) Arthritis /Rheumatism (ii) Boil/blain/ulcer (iii) Soothing & cooling agent	(4,36) (2,18) (5,45)	Petiole Leaf & petiole Petiole

7. <i>Alpinia galanga</i> (L.) Willd. Family: Zingiberaceae. Local name: Kanghu.	(i) Fever (2,12) (ii) Indigestion (1,6) (iii) Liver disorders (4,25) (iv) Pile (1,6) (v) Skin disease (2,12) (vi) Stomach (1,6) (vii) Typhoid Fever (5,31)*	Rhizome Rhizome Rhizome Rhizome Rhizome Rhizome Rhizome
8. <i>Azadirachta indica</i> A. Juss. Family: Meliaceae. Local name: Neem.	(i) Boil/blain/ulcer (1,2) (ii) Burn (3,8)* (iii) Cough (1,2) (iv) Insect bites (12,32)* (vi) Pile (6,16) (v) Skin disease (14,37)*	Bark & Leaf Leaf Bark & Leaf Leaf Branch Leaf
9. <i>Basella alba</i> L. Family: Basellaceae. Local name: Urok sumbal.	(i) Boil/blain/ulcer (1,25) (ii) Diuretic/ Hydrocele (1,25) (iii) Stomach problems (1,25) (iv) Typhoid Fever (1,25)	Leaf Leaf Leaf Leaf
10. <i>Bryophyllum pinnatum</i> (Lam.) Oken Family: Crassulaceae. Local name: Mana hidak.	(i) Boil/blain/ulcer (1,20) (ii) Cuts and Wounds (1,20) (iii) Diarrhoea/ Dysentery (3,60)*	Leaf Leaf Leaf
11. <i>Caesalpinia enneaphylla</i> Roxb. Family: Leguminosae. Local name: Kangol.	(i) Diuretic/ Hydrocele (8,25) (ii) Stone case (12,37) (iii) Urinary tract disease (12,37)*	Leaf Leaf Shoot
12. <i>Cannabis sativa</i> L. Family: Cannabaceae. Local name: Ganja.	(i) Diarrhoea/ Dysentery (4,50) (ii) Insanity and Hallucination (4,50)	Leaf Leaf
13. <i>Capsella bursa-pastoris</i> (L.) Medik. Family: Brassicaceae. Local name: Chantruk.	(i) Boil/blain/ulcer (1,50) (ii) Urinary tract disease (1,50)	Leaf Seed
14. <i>Carica papaya</i> L. Family: Caricaceae. Local name: Awathabi.	(i) Boil/blain/ulcer (2,5) (ii) Gynaecological problems (5,12) (iii) Indigestion (8,20) (iv) Laxative (12,30)*	Latex Fruit Fruit Fruit

	(v) Stomach problems	(12,30)*	Fruit
15. <i>Centella asiatica</i> (L.) Urb. Family: Apiaceae. Local name: Peruk.	(i) Cuts and Wounds (ii) Fever (iii) Hypertension (iv) Indigestion (v) Stomach problems (vi) Typhoid Fever	(2,9) (1,4) (3,13) (7,31) (8,36) (2,9)	Whole plant Whole plant Whole plant Whole plant Whole plant Whole plant
16. <i>Cinnamomum verum</i> J. Presl Family: Lauraceae. Local name: Ushingsha.	(i) Insomnia	(3,100)*	Seed
17. <i>Cissus adnata</i> Roxb. Family: Vitaceae. Local name: Kongouyen.	(i) Diuretic/ Hydrocele (ii) Stone case (iii) Urinary tract disease	(8,40) (5,25) (7,35)	Leaf Leaf Leaf
18. <i>Citrus hystrix</i> DC. Family: Rutaceae. Local name: Heiribob.	(i) Asthma (ii) Gynaecological problems (iii) Stone case	(1,16) (4,66)* (1,16)	Fruit Fruit Fruit
19. <i>Clerodendrum glandulosum</i> Lindl. Family: Lamiaceae. Local name: Kuthap laba.	(i) Arthritis /Rheumatism (ii) Fever (iii) Hypertension (iv) Paralysis (v) Pile	(6,27) (1,4) (9,40) (5,22) (1,4)	Leaf Leaf Leaf Leaf Leaf
20. <i>Colocasia gigantea</i> (Blume) Hook.f. Family: Araceae. Local name: Yendem.	(i) Arthritis /Rheumatism (ii) Cough (iii) Boil/blain/ulcer (iv) Laxative	(2,25) (2,25) (2,25) (2,25)	Petiole Leaf Petiole Petiole
21. <i>Coriandrum sativum</i> L. Family: Apiaceae. Local name: Phadigom.	(i) Boil/blain/ulcer (ii) Fever (iii) Skin disease	(1,20) (3,60)* (1,20)	Leaf Leaf Leaf
22. <i>Curcuma caesia</i> Roxb. Family: Zingiberaceae. Local name: Yaimu.	(i) Cough (ii) Fever (iii) Stomach problems (iv) Tonsillitis	(2,15) (3,23) (3,23) (5,38)	Bulb Bulb Bulb Rhizome
23. <i>Curcuma longa</i> L. Family: Zingiberaceae.	(i) Asthma (ii) Cough	(2,13) (1,6)	Rhizome Rhizome

Local name: Yaingang.	(iii) Fever (2,13)	Rhizome
	(iv) Malarial fever (7,46)*	Rhizome
	(v) Skin disease (1,6)	Rhizome
	(vi) Typhoid Fever (2,13)	Rhizome
24. <i>Cynodon dactylon</i> (L.) Pers. Family: Poaceae. Local name: Tingthou.	(i) Boil/blain/ulcer (1,12)	Leaf
	(iii) Cuts and Wounds (2,25)	Leaf
	(iii) Pile (1,12)	Whole plant
	(iv) Stomach problems (4,50)	Whole plant
25. <i>Datura stramonium</i> L Family: Solanaceae. Local name: Sagoidak amuba.	(i) Boil/blain/ulcer (1,8)	Leaf & fruit
	(ii) Diarrhoea/ Dysentery (3,25)	Leaf & fruit
	(iii) Insanity and Hallucination (5,41)*	
	(iv) Skin disease (3,25)	Leaf & fruit
		Leaf & fruit
26. <i>Drymaria cordata</i> subsp. <i>diandra</i> (Blume) J.A. Duke Family: Caryophyllaceae. Local name: Tandan pambi.	(i) Diarrhoea/ Dysentery (2,40)	Leaf
	(ii) Fever (1,20)	Leaf
	(iii) Skin disease (2,40)	Leaf
27. <i>Eclipta prostrata</i> (L.) L. Family: Compositae. Local name: Uchi sumbal.	(i) Cough (1,25)	Whole plant
	(ii) Cuts and Wounds (1,25)	Whole plant
	(iii) Fever (1,25)	Whole plant
	(iv) Typhoid Fever (1,25)	Whole plant
28. <i>Elsholtzia blanda</i> (Benth.) Benth. Family: Lamiaceae. Local name: Kanghuman.	(i) Abdominal/ Muscle pains (3,20)	Leaf & shoot
	(ii) Cough (1,6)	Leaf & shoot
	(iii) Hypertension (1,6)	Leaf & shoot
	(iv) Pile (3,20)	Leaf & shoot
	(v) Stomach problems (1,6)	Leaf & shoot
	(vi) Tonsillitis (6,40)*	Leaf & shoot
29. <i>Emilia sonchifolia</i> (L.) DC. ex DC. Family: Compositae. Local name: Terapaibi macha.	(i) Boil/blain/ulcer (2,11)	Leaf
	(ii) Cuts and Wounds (2,11)	Leaf
	(iii) Hypertension (5,29)	Leaf
	(iv) Skin disease (1,5)	Leaf
	(v) Stomach problems (7,41)	Leaf
30. <i>Eupatorium cannabinum</i> L. Family: Compositae. Local name: Langthrei.	(i) Boil/blain/ulcer (2,20)	Shoot
	(ii) Skin disease (1,10)	Shoot
	(iii) Stomach problems (6,60)*	Shoot

	(iv) Urinary tract disease	(1,10)	Shoot
31. <i>Hedychium flavescens</i> Carey ex Roscoe Family: Zingiberaceae. Local name: Tekhao yaikhu amuba.	(i) Asthma (ii) Cough (iii) Pile (iv) Skin disease	(4,50)* (1,12) (1,12) (2,25)	Rhizome Rhizome Rhizome Rhizome
32. <i>Holmskioldia sanguinea</i> Retz. Family: Lamiaceae. Local name: Kharam leishok.	(i) Arthritis /Rheumatism (ii) Boil/blain/ulcer (iii) Gynaecological problems	(2,28) (1,14) (4,57)	Leaf Leaf Leaf
33. <i>Ipomoea batatas</i> (L.) Lam. Family: Convolvulaceae. Local name: Manggra.	(i) Boil/blain/ulcer (ii) Fever	(3,60)* (2,40)	Leaf Leaf
34. <i>Justicia adhatoda</i> L. Family: Acanthaceae. Local name: Nongmangkha angouba.	(i) Arthritis /Rheumatism (ii) Cold (iii) Cough (iv) Fever (v) Jaundice (vi) Skin disease	(9,36) (2,8) (3,12) (3,12) (2,8) (6,24)	Leaf Leaf & Inflorescence Leaf & Inflorescence Leaf Leaf Leaf & bark
35. <i>Kaempferia galanga</i> L. Family: Zingiberaceae. Local name: Yai thamna manbi.	(i) Arthritis /Rheumatism	(4,100)*	Rhizome
36. <i>Lagenaria siceraria</i> (Molina) Standl. Family: Cucurbitaceae. Local name: Khongdrum.	(i) Boil/blain/ulcer (ii) Burn (iii) Tonsillitis	(1,20) (2,40) (2,40)	Fruit Fruit Leaf
37. <i>Lantana camara</i> L. Family: Verbenaceae. Local name: Nongbanlei.	(i) Asthma (ii) Boil/blain/ulcer (iii) Jaundice (iv) Malarial fever (v) Pile (vi) Snake bites	(1,5) (2,10) (3,15) (5,25) (5,25) (4,20)	Leaf & shoot Leaf & shoot Leaf & shoot Leaf & shoot Leaf & shoot Leaf & shoot

38. <i>Lindernia ruellioides</i> (Colsm.) Pennell Family: Linderniaceae. Local name: Kihoman.	(i) Diuretic/ Hydrocele (ii) Stone case (iii) Urinary tract disease	(11,32) (15,44)* (8,23)	Whole plant Whole plant Whole plant
39. <i>Mentha spicata</i> L. Family: Lamiaceae. Local name: Nungshi-hidak.	(i) Diarrhoea/ Dysentery (ii) Indigestion (iii) Stomach problems	(2,16) (9,75)* (1,4)	Whole plant Whole plant Whole plant
40. <i>Milletia extensa</i> (Benth.) Baker Family: Leguminosae. Local name: Ngamu yai.	(i) Pile (ii) Skin disease	(1,50) (1,50)	Leaf Whole plant
41. <i>Mimosa pudica</i> L. Family: Leguminosae. Local name: Kangphal ekaithabi.	(i) Abdominal/ Muscle pains (ii) Arthritis /Rheumatism (iii) Diuretic/ Hydrocele (iv) Jaundice (v) Pile (vi) Skin disease (vii) Stomach problems	(7,30) (2,8) (1,4) (4,17) (5,21) (3,13) (1,4)	Whole plant Whole plant Whole plant Whole plant Whole plant Whole plant Whole plant
42. <i>Ocimum tenuiflorum</i> L. Family: Lamiaceae. Local name: Tulasi.	(i) Cough (ii) Cuts and Wounds (iii) Indigestion (iv) Liver disorders (v) Malarial fever (vi) Skin disease	(2,7) (12,46)* (2,7) (5,19)* (2,7) (3,11)	Leaf Leaf Leaf Leaf Leaf Leaf
43. <i>Oreocnide integrifolia</i> (Gaudich.) Miq. Family: Urticaceae. Local name: U-khajing.	(i) Diabetes (ii) Pile (iii) Skin disease	(10,83)* (1,8) (1,8)	Leaf Leaf Leaf
44. <i>Oroxylum indicum</i> (L.) Kurz Family: Bignoniaceae. Local name: Samba.	(i) Abdominal/ Muscle pains (ii) Arthritis /Rheumatism (iii) Hypertension (iv) Pile	(6,27) (5,22) (8,36) (3,13)	Fruit Fruit Fruit Fruit
45. <i>Oxalis corniculata</i> L. Family: Oxalidaceae. Local name: Yensil.	(i) Arthritis /Rheumatism (ii) Indigestion (iii) Urinary tract disease	(5,31) (10,62)* (1,6)	Whole plant Whole plant Whole plant
46. <i>Phyllanthus emblica</i> L.	(i) Asthma	(3,8)	Seed

Family: Phyllanthaceae. Local name: Heikru.	(ii) Boil/blain/ulcer (1,2) (iii) Cold (3,8)* (iv) Cough (2,5) (v) Diarrhoea/ Dysentery (10,27) (vi) Fever (1,2) (vii) Indigestion (8,22) (viii) Laxative (5,13) (ix) Stomach problems (3,8)	Leaf & Seed Fruit Fruit Fruit Seed Fruit Fruit Fruit
47. <i>Plantago asiatica</i> subsp. <i>erosa</i> (Wall.) Z. Yu Li Family: Plantaginaceae. Local name: Yempat.	(i) Boil/blain/ulcer (9,100)	Leaf
48. <i>Pogostemon benghalensis</i> (Burm.f.) Kuntze Family: Lamiaceae. Local name: Nungshang pambi.	(i) Laxative (2,14) (ii) Pile (12,85)*	Leaf & inflorescence Leaf
49. <i>Senna hirsuta</i> (L.) H.S. Irwin & Barneby Family: Leguminosae. Local name: Thaonam tujombi.	(i) Indigestion (1,50) (ii) Skin disease (1,50)	Leaf Leaf
50. <i>Solanum indicum</i> L. Family: Solanaceae. Local name: Shing khang.	(i) Cough (30,90)* (ii) Fever (3,9)	Fruit Fruit
51. <i>Tagetes erecta</i> L. Family: Compositae. Local name: Sanarei.	(i) Cuts and Wounds (2,16) (ii) Insect bites (10,83)*	Leaf & shoot Leaf & shoot
52. <i>Vitex trifolia</i> L. Family: Lamiaceae. Local name: Urikshibi.	(i) Arthritis /Rheumatism (4,33) (ii) Pile (4,33) (iii) Skin disease (4,33)	Leaf Leaf Leaf
53. <i>Xylosma longifolia</i> Clos Family: Salicaceae. Local name: Nongleishang.	(i) Cough (1,7) (ii) Pile (6,46) (iii) Liver disorders (1,7) (iv) Skin disease (5,38)	Leaf Leaf Leaf Leaf
54. <i>Zehneria scabra</i> Sond.	(i) Arthritis /Rheumatism (3,9)	Whole plant

Family: Cucurbitaceae.	(ii) Diuretic/ Hydrocele	(10,30)	Whole plant
Local name: Lam thabi.	(iii) Jaundice	(20,60)*	Shoot
55. <i>Zingiber montanum</i> (J. Koenig) Link ex A. Dietr.	(i) Abdominal/ Muscle pains	(5,22)	Rhizome
Family: Zingiberaceae.	(ii) Arthritis /Rheumatism	(4,18)	Rhizome
Local name: Tekhao yaikhu.	(iii) Asthma	(2,9)*	Rhizome
	(iv) Cough	(1,4)	Rhizome
	(v) Diuretic/ Hydrocele	(1,4)	Rhizome
	(vi) Pile	(1,4)	Rhizome
	(vii) Skin disease	(1,4)	Stem &
	(viii) Stone case	(2,9)	rhizome
	(ix) Urinary tract disease	(5,22)	Rhizome
			Rhizome
56. <i>Zingiber officinale</i> Roscoe	(i) Arthritis /Rheumatism	(1,5)	Rhizome
Family: Zingiberaceae.	(ii) Asthma	(4,21)	Rhizome
Local name: Shing.	(iii) Cough	(4,21)	Rhizome
	(iv) Fever	(1,5)	Rhizome
	(v) Gynaecological problems	(2,10)	Rhizome
	(vi) Soothing & cooling agent	(3,15)	Rhizome
	(vii) Stomach problems	(1,5)	Rhizome
	(viii) Typhoid Fever	(3,15)	Rhizome

Table 3: Diseases with Fic values

Sl. No.	Name of the disease	Value of <i>nur</i>	Value of <i>nt</i>	Fic
1	Abdominal/Muscle pains	26	6	0.80
2	Arthritis /Rheumatism	51	13	0.76
3	Asthma	18	8	0.58
4	Boils/Blains/Ulcers	41	20	0.52
5	Burns	5	2	0.75
6	Cold	5	2	0.75
7	Cough	53	15	0.73
8	Cuts and Wounds	26	8	0.72
9	Diabetes	10	1	1.00
10	Diarrhoea/ Dysentery	24	6	0.78
11	Diuretic/ Hydrocele	55	8	0.87
12	Fever	41	16	0.62

13	Gynaecological Problems	23	5	0.81
14	Hypertension	52	8	0.86
15	Indigestion	46	9	0.82
16	Insanity and Hallucination	9	2	0.87
17	Insect bites	22	2	0.95
18	Insomnia	3	1	1.00
19	Jaundice	30	4	0.89
20	Laxatives	21	3	0.90
21	Liver disorders	13	4	0.75
22	Malarial fever	14	3	0.84
23	Paralysis	9	2	0.87
24	Piles	55	18	0.68
25	Skin Diseases	54	19	0.66
26	Snake bites	4	1	1.00
27	Soothing and Cooling Agent	8	2	0.85
28	Stomach Problems	51	14	0.74
29	Stone case	36	6	0.85
30	Tonsillitis	13	3	0.83
31	Typhoid Fever	14	6	0.61
32	Urinary tract disease	38	9	0.78

Table 4: Arrangement of plants with highest values of F_{IC} based on decreasing value of FL (*¹ *Azadirachta indica* A. Juss. is not included in the list due to less value of F_L because of high value of N than *Tagetes erecta* L. but it possess higher number of plant and informant than *Tagetes erecta* L.

*² *Mentha spicata* L. serial is higher than *Oxalis corniculata* L. because of higher FL.

*³ *Allium tuberosum* Rottler ex Spreng. is not included in the list due to less value of FL even though it possess high value than *Coriandrum sativum* L.

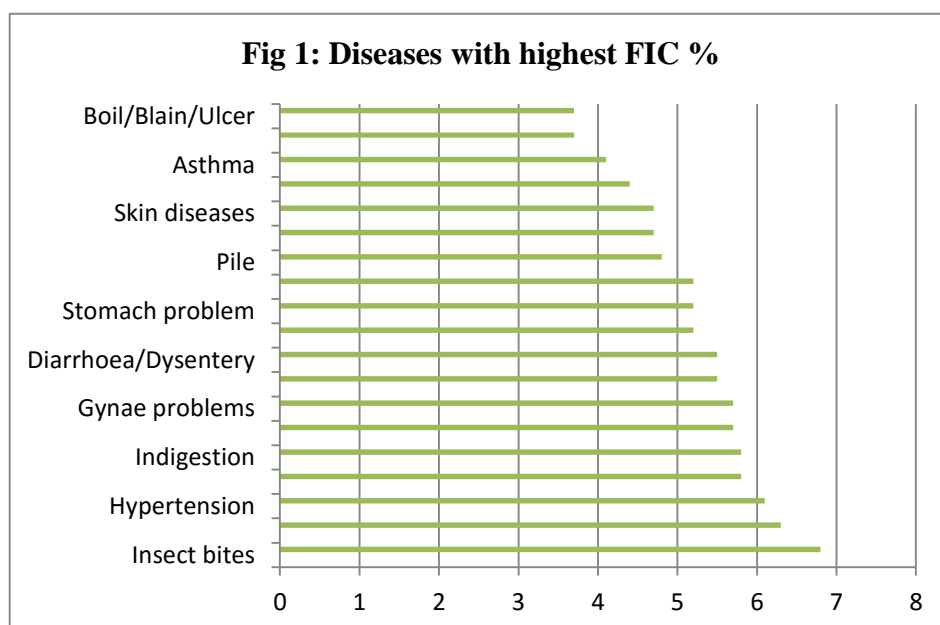
*⁴ *Bryophyllum pinnatum* (Lam.) Oken possess higher serial number than *Cannabis sativa* L. due to high value FL.

*⁵ Both *Milletia extensa* (Benth.) Baker and *Senna hirsuta* (L.) H.S.Irwin & Barneby possess the same value of for the same disease.

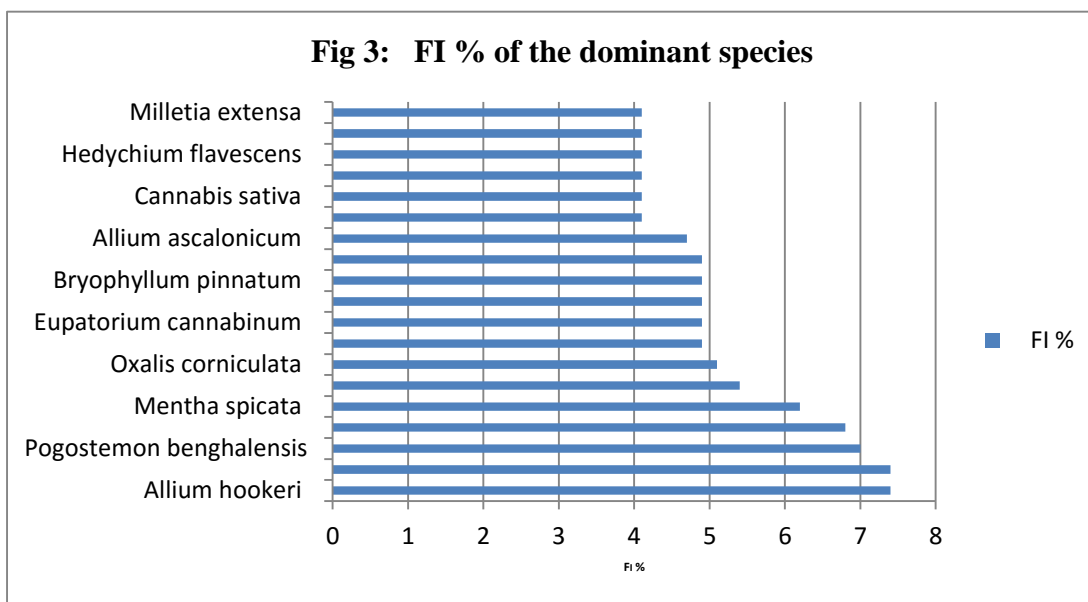
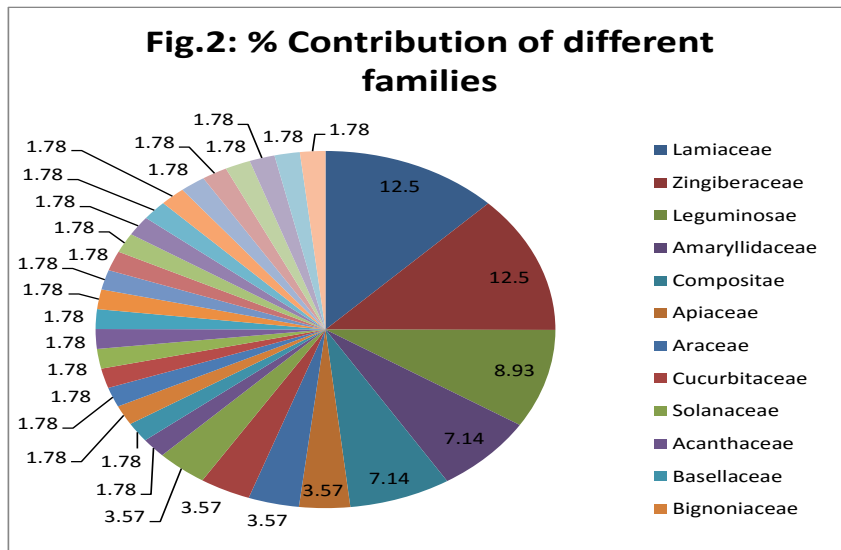
*⁶ Insect bites possess highest F_{IC} (0.95) but included in the 4th position due to low FL value.)

Name of the species	FL	FIC	Name of disease	No of informants for the plant	Remark
<i>Allium hookeri</i> Thwaites	90	0.86	Hypertension	20	Highest no. out of 8
<i>Solanum indicum</i> L.	90	0.73	Cough	30	Highest no. out of 15
<i>Pogostemon benghalensis</i> (Burm.f.) Kuntze	85	0.68	Pile	12	Highest no. out of 18
<i>Tagetes erecta</i> L. *6	83	0.95	Insect bites	10	2 nd highest out of 2
<i>Azadirachta indica</i> A. Juss. *1	32	0.95	Insect bites	12	Highest no. out of 2
<i>Mentha spicata</i> L.	75	0.82	Indigestion	09	2 nd highest out of 9
<i>Citrus hystrix</i> DC.	66	0.81	Gynaecological Problems	04	3rd highest out of 5
<i>Oxalis corniculata</i> L. *2	62	0.82	Indigestion	10	Highest no. out of 9
<i>Zehneria scabra</i> Sond.	60	0.89	Jaundice	20	Highest no. out of 4
<i>Bryophyllum pinnatum</i> (Lam.) Oken *4	60	0.78	Diarrhoea/ Dysentery	03	3rd highest out of 6
<i>Eupatorium cannabinum</i> L.	60	0.74	Stomach Problems	06	4 th highest out of 14
<i>Coriandrum sativum</i> L.	60	0.62	Fever	03	3rd highest out of 16
<i>Allium tuberosum</i> Rottler ex Spreng. *3	32	0.62	Fever	10	Highest no. out of 16
<i>Ipomoea batatas</i> (L.) Lam.	60	0.52	Boils/Blains/ Ulcers	03	3rd highest out of 20
<i>Allium ascalonicum</i> L.	57	0.81	Gynaecological Problems	08	Highest no. out of 5
<i>Cannabis sativa</i> L.	50	0.78	Diarrhoea/ Dysentery	04	2 nd highest out of 6

<i>Cynodon dactylon</i> (L.) Pers.	50	0.74	Stomach Problems	04	4 th highest out of 14
<i>Senna hirsuta</i> (L.) H.S. Irwin & Barneby* ⁵	50	0.66	Skin Diseases	01	Last group out of 20
<i>Milletia extensa</i> (Benth.) Baker* ⁵	50	0.66	Skin diseases	01	Last group out of 20
<i>Hedychium flavescens</i> Carey ex Roscoe	50	0.58	Asthma	04	Highest no. out of 8
<i>Capsella bursa-pastoris</i> (L.) Medik.	50	0.52	Boils/Blains/ Ulcers	01	Last group out of 20



number of informants among all the 32 types of ailments. In general observation, there is a correlation amongst the values of number of informants, value of FL and F_{IC}. Higher the values of all these three show the degree of agreement for general use of plants in the treatment of disease. The highest value of FL is shown by two species viz. *Allium hookeri* Thwaites (used for hypertension) and *Solanum indicum* L. (used for cough) with FL value of 90 each and their respective F_{IC} values are 0.86 and 0.73 respectively which is followed by *Pogostemon benghalensis* (Burm.f.) Kuntze (use for pile) with FL 85 and F_{IC} 0.68 and *Tagetes erecta* L. (use for insect bites) as shown in Table-4. The plants having lowest FL values of 50 are *Cannabis*



sativa L., *Capsella bursa-pastoris* (L.) Medik., *Cynodon dactylon* (L.) Pers., *Hedychium flavescens* Carey ex Roscoe, *Milletia extensa* (Benth.) Baker and *Senna hirsuta* (L.) H.S. Irwin & Barneby. Not only they possess lowest values of FL but they also possess low F_{IC} values. Both *Milletia extensa* (Benth.) Baker and *Senna hirsuta* (L.) H.S. Irwin & Barneby possess FL 50 and F_{IC} 0.66 for skin disease and are included in the last rank group which is being supported by only one informant each. *Cynodon dactylon* (L.) Pers. possess FL 50 and F_{IC} 0.74 for stomach problem and is placed in the 4th rank out of 14 being supported by four informants only. Thus these plants and diseases possessing low FL and F_{IC} values are supported by less number of informants and are placed at low rank when compared to those having higher values of FL and F_{IC} . There are some variables as well. *Oreocnide integrifolia* (Gaudich.) Miq. Possess high values of FL (83) and maximum value of F_{IC} (1) for

diabetes, but this species is not considered because of a single species supporting the disease. Again, *Mentha spicata* L. is placed at higher serial number of agreement than *Oxalis corniculata* L. even though both possess the same F_{IC} value for indigestion i.e. 0.82, it also possess less informants number (9) when compare to 10 informants for *Oxalis corniculata* L. This is because of the high value of FL due to less value of N (12) than *Oxalis corniculata* L. (16). In the case of fever both *Coriandrum sativum* L. and *Allium tuberosum* Rottler ex Spreng. possess same F_{IC} value (0.62) but *Allium tuberosum* Rottler ex Spreng., possess highest number of informants (10) than *Coriandrum sativum* L. (3) but *Allium tuberosum* Rottler ex Spreng. is not included in the list due to very low FL value (32) and possessing high value of N (31) when compared to *Coriandrum sativum* L. (5). These are some of the very few variables, but in general almost 90% of the data can be considered correct when the presumption that higher the value of FL and F_{IC} , there will be more positive agreement for the probability and reasonable of the species against their respective diseases. It will also be very helpful for further research in the analysis of the compound structures present in the medicinal plants of pharmaceutical importance as well.

4.CONCLUSION

The present study provides useful information about traditional uses of medicinal plants used by local community in the treatment of different ailments. The plants with the highest use values could be employed in pharmacological research and biotechnological approaches in order to achieve adequate revenue. These findings will be helpful to determine the most effective traditional remedies towards the development of herbal medicinal products and also will give the way of advanced research for new medicines in future. The preservation of traditional knowledge and local health practice of this isolated scheduled caste people is the outcome of the present study. Some of the plants in the study area are facing high threats of becoming rare, and conservation initiatives are needed to conserve them for sustainable management in the region.

ACKNOWLEDGEMENT

The authors are thankful to the Local Medical Practitioners of Andro Village in particular and the people of Andro in general for their kind cooperation during the many field trips. The first author is thankful to the North Eastern Regional Office (NERO) of the University Grants Commission of India for financial assistance in the form of Minor Research Projects. The first author is also thankful to the Department of Biotechnology, Govt. of India, New Delhi for permitting the use of laboratory facilities of the Institutional Biotech Hub located at Thoubal College, Thoubal.

CONFLICT OF INTEREST

The authors have declared that they have no conflict of interest.

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