

Ethnomedicinal List of Plants Treating Fever in Ahmednagar District of Maharashtra, India

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Abstract A search of ethno-botanical literature revealed that 62 plant species belonging to 32 families are used as ethnomedicines under various preparations in the treatment of fever by ethnic groups residing in Ahmednagar district of Maharashtra, India. A coordinated field study however recorded 71 plant species from 35 families that were explained to deal with fever by the countryside dwellers. Out of these two lists, 23 plant species belonging to 17 families are found common. The total identified families containing all plant species (n=109) are arranged as per the latest edition of Angiosperm Phylogeny Group (APG) Classification System (APG IV, 2016) with indications of newly recorded ones for a future interests.

Keywords Ethnomedicine, Fever, Ahmednagar District, APG Classification

people are still depending on ethnomedicinal practices pursued mostly by seniors and experienced individuals among them to heal/cure most of the health related ailments in their periphery. Ethnomedicinal traditions or therapies are having natural potential but have not been adequately and clinically documented to claim equal status of modern medicine. Several ethno-botanical/ethnomedicinal surveys have been carried out in all parts of forest dominated areas during last hundred years including Ahmednagar district of India. There are different objectives attached to these surveys such as studying the floristic and bio-diversity of the region, documenting ethno-botanical, ethno-medico-botanical and ethno medicinal practices being carried out against different diseases and disorders from different tehsils of the district. [3-12]. Present study was focused to enlist the specific plants used to treat patients during fever under ethnomedicine by the locals in Ahmednagar district of India. This will add more information to the database of ethnomedicinal plants for future endeavours.

1. Introduction

Fever, also known as pyrexia in modern medical terminology and *Jvara* in vernacular language, is a common medical symptom and a sign of an increased internal body temperature to the levels above normal temperature i.e. 37°C (98.6°F). Body temperature varies with time of the day, being at lower levels in the morning and higher levels in the evening. Body temperature greater than 41.67°C (107°F), can result in brain damage and possibly death. [1] Fever is commonly associated with many other diseases and thus treated individually and along with other disorders. The febrile response, therefore, remains a significant contributor to the pathogenesis, clinical presentation and outcome of many illnesses and diseases. Consequently, understanding fever and febrile response is vital in the diagnosis, treatment and follow-up of various ailments and diseases. [2] Ethnic groups and countryside

2. Materials and Methods

2.1. Study Area

Ahmednagar district of Maharashtra state, India lies between 18°2' and 19°9'N latitudes and 73°9' and 75°5' E longitudes. The district has 14 tehsils/talukas. Akole and Sangamner tehsils of the district are mostly tribal populated due to forest covers. Therefore, the present study of ethnomedicinal data collection was based at these two Tehsils. The field study was carried out by arranging Botanical excursions for documenting local ethnomedicinal knowledge at different times. Surveys were conducted during the period of July 2016 to June 2018 (covering all the seasons) in tribal areas of the district. The tribal communities namely, Mahadev Koli,

Katkari, Bhill and Thakar are found in Akole and Sangamner Tehsils. Geographically, this part of the district is the foothill zone of the end part of Western Ghats mountain ranges.^[27] The assistance of local experts (key informants) belonging to these tribal groups was taken during the survey visits.

2.2. Literature Survey

The review of literature and related studies were carried out from the reports of Ethnomedicinal surveys, floras and botanical analysis of Ahmednagar district published by many authors.^[3-12] The information was also searched for the ethnomedicinal uses of plants mentioned for the treatment of fever from other sources.^[13-26]

2.3. Methods

The methods followed for the survey were i) Interview methods: Informal/qualitative methods (Open ended or semi-structured interviews); ii) Formal/quantitative methods (Systematic or structured interactions through Questionnaires), and iii) Participant Observation method. This was to find and assess how do the local informants use medicinal plants, parts used to make formulations and serve dosage, etc. Random sampling method was used in selecting the study area, sub-areas as well as the informants. Each plant specimen was botanically identified, dried and was made in to herbarium. The voucher specimens are deposited in the herbarium of Swami Ramanand Teerth Marathwada University's Sub-Centre, Latur, for the purpose of documenting the presence of that particular species of the study area and for future reference. The identified species are arranged family-wise and presented in a Table form. The families in turn are sequenced according to the latest APG- IV (Angiosperm Phylogeny Group - Fourth Version) system of classification (2016).^[28,29] An attempt was also made to use Roman Unicode font with diacritical marks to write the Sanskrit/Marathi/Vernacular words for universal correct pronunciation and understanding.

3. Results and Discussion

3.1. Results

The analysis of Ethnomedicinal data from this piece of work reveals -

- A. **62** species belonging to **32** families were recorded from literature studies.
- B. **71** species belonging to **35** families were recorded during field studies.
- C. Out of **62** species, **37** species belonging to **21** families were found exclusively in literature studies.
- D. Out of **71** species, **48** species belonging to **26** families were found exclusively in field studies.
- E. Thus a total **109** species belonging to **43** families are recorded for ethnomedicinal way of treatment for fever/*jvara*.
- F. **23** species belonging to **17** families were recorded as the species common to both the literature records as well as the field studies enumerations.
- G. The families Asteraceae, Fabaceae, Apocynaceae and Acanthaceae are the abundant families with respect to utilization of ethnomedicines from those.
- H. Table 3 reveals that Herbs constitute the major portion with respect to the habit-wise distribution of plant species followed by Trees, Climbers, Shrubs and Under-shrubs which are used in the treatment of fever.

3.2. Discussion

The ethnomedicinal literature survey on Ahmednagar district enlisted a total of 62 medicinal plant species belonging to 32 families and the present field survey made in the tribal regions revealed 71 ethnomedicinal plants which are ascertained to 35 families (all angiosperms) used for the treatments of fever / *Jvara* by the locals. There are 23 plant species of 17 families found common in both studies and remaining are different. The details of the total plants, families and ethnomedicinal characteristics, etc. are presented in table 1. Specific marks are given in the table to recognize the differential species in the list. Some of the photographs of plant species and parts used as collected while conducting field visits are also presented here. It has been further observed as per the data that a maximum of 10 species belong to family Asteraceae followed by Fabaceae, Apocynaceae and Acanthaceae, which have medicinal effect on fever/*jvara* (Table 2). It is found that the most common plant species from this combined list of literature and field studies is *Tinospora cordifolia* (Willd.) Hook F. & Thoms (with the maximum score of 12 references). The other common plants are *Azadirachta indica* A. Juss. and *Andrographis paniculata* Nees. with 10 references each, followed by *Alstonia scholaris* (L.) R. Br. (09) and *Nyctanthes arbor-tristis* L. (09) whereas *Santalum album* L. (08), *Adhatoda vasica* Nees. (08) and *Vitex negundo* L. (08) together are comfortable with the fourth position that they gained. While all other species belong to the common list of 23 plants mentioned earlier. *Alstonia scholaris* (L.) R. Br. is the only species among these common plants reported from the present field studies and not found in earlier reports of the district. All these plants reported here in the context of treatment of fever would definitely get the attention of investigators for further studies and pharmaceutical research.

Table 1. List of plants used as Ethnomedicine for treatment of Fever in Ahmednagar district, India

Sr. No.	Botanical Name (most probable) with plant authority and family	Local/ Vernacular Name (Marathi)	Habit	Part Used	Earlier Reports in Literature	\$	Method(s) of use
01	Family- Piperaceae						
**	<i>Piper longum</i> L.	<i>Pimpālī</i>	Climber	Flowers and Fruits	Y[14,20]	2	An infusion prepared from 1-2 g dried unripe fruits— a teaspoonful with honey twice a day.
02	Family- Annonaceae						
**	<i>Annona squamosa</i> Linn.	<i>Sitāphaḷa</i>	Tree	Fruits	-		The fresh juice prepared from 50 g ripe fruit pulp - to relieve thirst in fever.
03	Family- Araceae						
**	<i>Acorus calamus</i> L.	<i>Vekhaṃḍa</i>	Herb	Dried rhizome	Y[7,14,16,18,19,23,26]	7	The decoction of rhizome 25 g - with a glass of milk twice a day.
04	Family- Liliaceae						
**	<i>Aloe vera</i> (L.) Barm	<i>Koraphaḍa</i>	A succulent herb	Leaves	Y [3,20,22,23]	4	The fresh juice of pulp 5-10 ml mixed with honey a teaspoonful - twice a day.
**	<i>Asparagus racemosus</i> Willd	<i>Śatāvārī</i>	Climber	Tuberous roots	Y[14]	1	5 g dried root powder in a glass of milk - twice a day.
#	<i>Gloriosa superba</i> L.	<i>Kaḷalāvī</i>	Climber	Rhizome	Y[3,14]	2	-
05	Family- Commelinaceae						
#	<i>Commelina diffusa</i> Burm.f.	<i>Kaṃcaṭa, Kānapeta, Kenā</i>	Herb	Roots	Y [8]	1	-
#	<i>Cyanotis cristata</i> (L.) J.A. & J.H. Schult	<i>Nabhālī</i>	Herb	Roots	Y [8,10]	2	-
#	<i>Cyanotis tuberosa</i> (Roxb.) J.A. & J.H. Schult.	<i>Ābhālī</i>	Herb	Roots	Y [8,18,22,23]	4	-
06	Family- Zingiberaceae						
#	<i>Zingiber officinale</i> Roxb.	<i>Ādraka, Āle (Fresh), Sumṭha (Dry)</i>	Herb	Dried rhizome, Fresh rhizome	Y[10,20]	2	-
07	Family- Cyperaceae						
**	<i>Cyperus rotundus</i> L.	<i>Lavhāḷe, Mothā, Nāgara-Mothā</i>	Herb	Dried rhizome	Y[3,4,18,19,20]	5	
08	Family- Poaceae						
**	<i>Cymbopogon citratus</i> (DC) Stapf.	<i>Gavatī Cahā, Hiravā Cahā, Olā Cahā</i>	Herb	Whole plant	Y[10,11,14,18,19,23]	6	An infusion of 5 g leaf powder - a teacupful 2 times a day.
09	Family- Menispermaceae						
**	<i>Cocculus hirsutus</i> (L.) Diels	<i>Vāsanavela, Pātāla garuḍī</i>	Climber	Roots	Y[7,24]	2	A decoction of root a tablespoonful - twice a day.
**	<i>Tinospora cordifolia</i> (Willd.) Hook F. & Thoms	<i>Guḷavela</i>	Climber	Stem	Y[3,6,7,8,13,14,17,19,20,22,23,24]	12	The fresh juice 5 ml of the crushed stem mixed with honey - twice a day in intermittent, chronic, typhoid or dengue fever.
10	Family- Crassulaceae						
#	<i>Bryophyllum pinnatum</i> (Lam.) Oken Syn. <i>Kalanchoe pinnata</i> (Lam.) Pers.	<i>Pānaphuṭī</i>	A succulent herb	Leaves	Y[11]	1	-

11	Family- Fabaceae						
**	<i>Caesalpinia bonduc</i> (L.) Roxb. Dandy & Exell.	<i>Sāgaragoṭā</i>	Shrub	Root bark, Leaves and Seeds	Y[13,14,17,20,23,24]	6	The decoction of powdered bark of root ½ g – in remittent and intermittent fevers.
**	<i>Cassia fistula</i> L.	<i>Bahāvā</i>	Tree	Fruits	Y[17,20,23]	3	Decoction of the fruit pulp 5 g - once in a day for 2-3 days.
**	<i>Cassia tora</i> Linn. Syn. <i>Senna tora</i> (L.) Roxb. <i>Cassia obtusifolia</i> L.	<i>Ṭākaḷā</i>	Shrub	Leaves	Y[19,24]	2	Leaf decoction - once daily in high fever.
**	<i>Clitoria ternatea</i> L.	<i>Gokaṛṇa, Viṣṇukrāntā</i>	Climber	Leaves	Y[17,19]	2	The paste of Leaf mixed with the paste of adrak (<i>Zingiber officinale</i>) 1 g each - applied on forehead.
**	<i>Indigofera cordifolia</i> Heyne ex Roth	<i>Godhaḍī, Becakā</i>	Herb	Roots	Y[8]	1	The root paste made with water - with a teaspoonful of honey.
#	<i>Mucuna pruriens</i> (L.) DC. Syn. <i>M. prurita</i> Hook.	<i>Khāja kuirī, Khāja kuilī</i>	Climber	dried mature seeds, dried roots	Y[8,17,19,20,23]	5	-
**	<i>Sesbania grandiflora</i> Pers.	<i>Agastā, Hādagā, Śevārī</i>	Tree	Whole plant ⁵	Y[4]	1	Flowers are fried and eaten as vegetables.
**	<i>Tamarindus indica</i> L.	<i>Cimca</i>	Tree	Fruits	Y[17,19,20,23,24]	5	The juice made from 1-2 ripe fruits soaked overnight in water and then jaggery is added – drunk early morning on an empty stomach.
**	<i>Tephrosia purpurea</i> (L.) Pers	<i>Unhālī</i>	Under-Shrub	Roots	Y [13,17,19,24]	4	The root paste 5 g made with the rhizome of ginger (<i>Zingiber officinale</i>) and black paper - with a teaspoonful honey.
12	Family- Rhamnaceae						
**	<i>Ziziphus jujuba</i> Lamk. Syn. <i>Z. mauritiana</i> Lamk Syn. <i>Rhamnus jujube</i> L.	<i>Bora, Borāḥī</i>	Tree	Fruits	Y[17,23,24]	3	<i>Sharbat</i> (Juice) is prepared from the fruit pulp after removing seeds to relieve thirst during high fevers.
13	Family- Moraceae						
**	<i>Ficus racemosa</i> Linn. Syn. <i>Ficus glomerata</i> Roxb.	<i>Uṃbara, Udumbara</i>	Tree	Latex	-		The milky latex that is obtained early in the morning - 8-10 drops along with rock sugar.
**	<i>Ficus religiosa</i> L.	<i>Pimpāḷa</i>	Tree	Leaves	Y[13]	1	Decoction made from the leaves, <i>ale</i> (rhizome of <i>Zingiber officinale</i>) and <i>kale mire</i> (fruits of <i>Piper nigrum</i>) suppresses shivering in fever.
14	Family- Cucurbitaceae						
#	<i>Coccinia grandis</i> (L.) Voigt.	<i>Toṃḍālī</i>	Climber	Leaves	Y[7,17]	2	-
#	<i>Corallocarpus epigaeus</i> (Rottl.) C. B. Cl.	<i>Muṃgūsa kaṃḍa</i>	Climber	Tubers	Y[10]	1	-
#	<i>Diplocyclos palmatus</i> (L.) Jeffrey	<i>Śivaliṃgī</i>	Climber	Fruits	Y[10]	1	-
**	<i>Momordica dioica</i> Roxb. exWilld.	<i>Karaṭola, Karaṭolī</i>	Climber	Root Tuber	Y[17]	1	The tuberous roots of female plants are ground with water to form paste - rubbed lightly on body.
**	<i>Momordica charantia</i> Linn.	<i>Kārale</i>	Climber	Fruits	Y[17,19,20,21]	4	The fruits are eaten as vegetables purposely in

							alleviating typhoid or dengue fever.
15	Family- Celastraceae						
**	<i>Celastrus paniculatus</i> Willd.	<i>Kāṃguṇī,</i> <i>Mālakāṃgoṇī,</i> <i>Māḷa kaṃgaṇī,</i> <i>Jyotiṣamati</i>	Climber	Seeds	Y[23]	1	The seeds are boiled in water to extract the oil. 1-2 drops of oil are added as nasal drops -twice a day.
16	Family- Euphorbiaceae						
#	<i>Bridelia retusa</i> (Linn.) Spreng.	<i>Asaṇa,</i> <i>Asaṇā</i>	Tree	Stem bark	Y[10]	1	-
**	<i>Emblica officinalis</i> Gaertn. Syn. <i>Phyllanthus emblica</i> L.	<i>Āvaḷā,</i> <i>Āvaḷakāṭhī</i>	Tree	Dried mature fruits	Y[19]	1	The dried mature powdered fruits along with the fruits of <i>Hirda</i> (<i>Terminalia chebula</i>) and <i>Behda</i> (<i>Terminalia belerica</i>) 2 g each -given orally.
**	<i>Euphorbia neriifolia</i> L.	<i>Sābara</i>	Shrub	Latex	-		The milky latex 5-10 drops mixed in half teaspoon of honey - given orally.
**	<i>Jatropha curcas</i> L.	<i>Mogalī eraṃḍa,</i> <i>Rāna eraṃḍa</i>	Shrub	Leaves	Y[14,19]	2	The decoction of the boiled leaves (to minimize toxicity) 5-10 ml - along with the lime juice.
17	Family- Combretaceae						
**	<i>Terminalia arjuna</i> (Roxb.) Wight. & Arn.	<i>Arjuna,</i> <i>sādaḍā,</i> <i>Arjunasādaḍā</i>	Tree	Stem bark	Y[13,17,19, 20,23]	5	The powdered bark 5 g - along with a glass of milk twice a day.
**	<i>Terminalia chebula</i> Retz.	<i>Haraḍā,</i> <i>Hiraḍā,</i> <i>Haraḍa</i>	Tree	Dried mature fruits	Y[14,17,19,2 0,21]	5	The dried mature fruits along with the fruits of <i>Behda</i> (<i>Terminalia belerica</i>) and <i>Avala</i> (<i>Emblica officinalis</i>) powdered 2 g each - given orally.
** #	<i>Terminalia belerica</i> Roxb.	<i>Behaḍā</i>	Tree	Dried mature fruits	Y[3,17,19,20 ,23]	5	The dried mature fruits along with the fruits of <i>Hirda</i> (<i>Terminalia chebula</i>) and <i>Avala</i> (<i>Emblica officinalis</i>) powdered 2 g each -administered orally.
18	Family- Lythraceae						
**	<i>Punica granatum</i> L.	<i>Dāḷimba</i>	Shrub	Fresh fruits	Y[19]	1	A fresh juice prepared from the fruits - a full glass twice a day in high fever.
#	<i>Ammannia baccifera</i> L.	<i>Bhara-jāmbhūḷa</i>	Herb	Fresh or dried plants	Y[8,25]	2	-
19	Family- Sapindaceae						
#	<i>Cardiospermum halicacabum</i> L.	<i>Kapāḷaphoḍī</i>	Climber	Whole plant	Y [3,14,17,19]	4	-
20	Family- Rutaceae						
**	<i>Aegle marmelos</i> (L.) Correa Ex. Schultz	<i>Bela</i>	Tree	Dried ripe fruit pulp	Y[7,14,17,19 ,22,23]	6	The fresh juice prepared from 1-2 g dried ripe powdered fruit pulp – a cupful twice a day.
**	<i>Murraya koenigii</i> (L.) Spreng.	<i>Kaḍhīpattā</i>	Tree	Leaves	Y [9,17,19,23]	4	A teacupful decoction of the leaves - twice a day.
#	<i>Ruta chalepensis</i> L.	<i>Satāpa</i>	Herb	Leaves	Y[3,11,14]	3	-
21	Family-Simaroubaceae						

**	<i>Ailanthus excelsa</i> Roxb.	<i>Mhādūka,</i> <i>Mārūkha,</i> <i>Mahārūkha</i>	Tree	Leaves and bark	Y[17,19,23]	3	Decoction of bark 50 ml - twice a day.
22	Family- Meliaceae						
**	<i>Azadirachta indica</i> A. Juss.	<i>Liṃba,</i> <i>Kaḍulimba</i>	Tree	Stem bark	Y[3,7,10,13 , 14,16,17,19, 20,24]	10	Decoction of stem bark a 50 ml - along with some jaggery twice a day to cure general, intermittent, malarial or dengue fever.
23	Family- Moringaceae						
**	<i>Moringa pterygosperma</i> Gaertn. Syn. <i>Moringa</i> <i>oleifera</i> Lam.	<i>Śevagā</i>	Tree	Seeds	Y[17,19,21, 24]	4	Decoction of seeds made in 100 ml of water - to be drunk at a time.
24	Family- Malvaceae						
**	<i>Abutilon indicum</i> (L.) Sweet.	<i>Peṭārī, Kāsālī,</i> <i>Atibala</i>	Shrub	Leaves	Y[14,17,19, 20,22,23]	6	An infusion of 5 g leaf powder - a teacupful 2 times a day.
**	<i>Sida acuta</i> Burm.f.	<i>Tupakaḍī,</i> <i>Cīkanā,</i> <i>Bala</i>	Under- Shrub	Roots	Y[17,19,23]	3	An infusion of 5 g roots mixed with ginger - a teacupful 2 times a day.
**	<i>Sida cordifolia</i> L.	<i>Cīkanā,</i> <i>Bala</i>	Under- Shrub	Roots	Y[14,17,19, 20,22]	5	Decoction of the roots with the rhizome of ginger (<i>Zingiber officinale</i>) 50 ml - relieves shivering in fever.
25	Family- Santalaceae						
**	<i>Santalum album</i> L.	<i>Caṃdana,</i> <i>Sapheda</i> <i>caṃdana</i>	Tree	Dried heart wood	Y[11,18,19, 20,21,22,23, 26]	8	The powder of dried heart wood 2 g mixed in coconut water - twice a day.
26	Family- Plumbaginaceae						
**	<i>Plumbago zeylanica</i> L. <i>P. indica</i> L. Syn. <i>P. rosea</i> L.	<i>Citraka,</i> <i>Sapheda</i> <i>citraka</i>	Herb	Dried mature roots	Y[8,10,17, 19]	4	A tincture made from the bark of dried mature roots - orally 2-3 drops twice a day.
27	Family- Polygonaceae						
**	<i>Polygonum glabrum</i> Willd	<i>Śerala</i>	Herb	Whole plant	Y[18,23]	2	A teacupful of the decoction of the entire plant - twice a day.
28	Family-Amaranthaceae						
**	<i>Achyranthes aspera</i> L.	<i>Aghāḍā</i>	Herb	Leaves	Y[8,13]	2	An aqueous extract made from 1 g ash of dried leaves - half cup twice a day.
**	<i>Aerva lanata</i> (L.) Juss. Ex Schult.	<i>Kāpūra-</i> <i>mādhurī</i>	Herb	Leaves	Y[16]	1	Juice of 10 g leaf powder - twice a day for 3-4 days in malarial fever.
**	<i>Alternanthera sessilis</i> (Linn.) R. Br. ex DC.	<i>Becakusaḷa</i>	Herb	Whole plant	Y[23]	1	A cup of decoction made by boiling the entire plant - twice a day.
**	<i>Celosia argentea</i> Linn.	<i>Kuraḍū,</i> <i>Kukaḍā,</i> <i>Koṃbaḍā</i>	Herb	Seeds	Y[14]	1	A teacup of decoction of the boiled seeds - twice a day.
29	Family- Nyctaginaceae						
#	<i>Boerhavia diffusa</i> L.	<i>Pāṃḍharī-</i> <i>punarnavā,</i> <i>Punarnavā</i>	Herb	Dried, whole plant	Y[3,8,19,20]	4	-
30	Family- Ebenaceae						
**	<i>Diospyros malabarica</i> (Desr.) Kostel.	<i>Ṭemburnī</i>	Tree	Bark	Y[17,19,25]	3	Bark decoction 50 ml - in typhoid fever.
31	Family- Rubiaceae						
#	<i>Hedyotis diffusa</i> Willd	<i>Tarotī</i>	Herb	Whole plant	Y[8]	1	-

32	Family- Gentianaceae						
#	<i>Enicostema axillare</i> (Lam.) Raynal	<i>Nāi,</i> <i>Choḡā cirāyata</i>	Herb	Roots	Y[8,13]	2	-
33	Family- Apocynaceae						
**	<i>Alstonia scholaris</i> (L.) R. Br.	<i>Saṭavina</i>	Tree	Stem bark	Y[13,16,18,19,20,21,22,23,25]	9	Infusion of powdered bark of stem 5 g mixed with honey- teaspoonful twice a day.
#	<i>Carissa carandas</i> Linn. var. <i>congesta</i> (Wt.) Bedd.	<i>Karavaṃda</i>	Shrub	Leaves	Y[5,14,18,23]	4	-
#	<i>Catharanthus pussilus</i> (L.) G.Don.	<i>Cāṃdaṇī</i>	Herb	Stem, Leaves	Y[10]	1	-
**	<i>Holarrhena antidysenterica</i> (Roth.) A. DC Syn. <i>Holarrhena pubescens</i> (Buch.- Ham.) Wall. ex G. Don.	<i>Kuḡā,</i> <i>Pāṃḡharā kuḡā</i>	Tree	Dried seeds	Y[16,18,19,20,22,23]	6	2 g dried seed powder - in a glass of milk twice a day.
#	<i>Rauwolfia tetraphylla</i> Linn.	<i>Hāḡakī</i>	Shrub	Dried roots	Y[10,18]	2	-
	Sub-family- Asclepiadoideae (Former-Asclepiadaceae)						
**	<i>Calotropis procera</i> (Ait.) R. Br.	<i>Ruī, Ruḡī</i>	Shrub	Root bark	Y[19,23,25]	3	The root bark powder 1 g with honey - twice a day.
#	<i>Ceropegia tuberosa</i> Rorb.	<i>Pāṭāla tumbaḡī,</i> <i>Kharacuḡī</i>	Climber	Tuber	Y[3]	1	-
**	<i>Hemidesmus indicus</i> (L.) R. Br.	<i>Anaṃtamūla,</i> <i>Upaḡasarī</i>	Climber	Roots	Y[3,13,14,18,19,23,25]	7	The root powder 2 g in a glass of milk - twice a day.
**	<i>Pergularia daemia</i> (Forsk.) Choiv.	<i>Utarāṇa/</i> <i>Utarāṇicā vela</i>	Climber	Leaves	Y[8,13,14,19]	4	A fresh leaf juice 10 ml - twice a day.
34	Family- Convolvulaceae						
**	<i>Argyrea nervosa</i> (Burm.F.) Boj.	<i>Samudrasoka</i>	Climber	Roots	Y[14]	1	5 g root powder in milk - twice a day.
#	<i>Evolvulus alsinoides</i> L.	<i>Viṣṇukrāṇta</i>	Herb	Whole plant	Y[8,10,13,18,23]	5	-
35	Family- Solanaceae						
#	<i>Physalis angulata</i> L.	<i>Popaḡī</i>	Herb	Whole plant	Y[4]	1	-
**	<i>Solanum nigrum</i> L.	<i>Kāmonī</i>	Herb	Leaves	Y[18,19,23]	3	The fresh juice 15 ml prepared from the leaves - to relieve thirst.
**	<i>Solanum virginianum</i> L. Syn. <i>Solanum xanthocarpum</i> Schrad & Wendl.	<i>Bhuī-riṃḡaṇī,</i> <i>Kāṭe-riṃḡaṇī</i>	Herb	Dried mature roots	Y[8,14,20,23,25]	5	Decoction of dried mature roots 25 ml mixed with that of Gulvel (<i>Tinospora cordifolia</i>) 25 ml - as a source of energy in dengue fever.
#	<i>Withania somnifera</i> (L.) Dunal.	<i>ḡhora guṃja</i> <i>Āṣkaṃda,</i> <i>Aśvagaṃdhā</i>	Under-shrub	Dried mature roots	Y[4,11,13,14,18,19,23]	7	-
36	Family- Oleaceae						
**	<i>Nyctanthes arbor-tristis</i> L.	<i>Pārijāta,</i> <i>Pārijātaka</i>	Tree	Leaves	Y[7,13,16,18,19,20,22,23,25]	9	10 ml of fresh juice from the boiled leaves with honey - twice a day.
37	Family-Scrophulariaceae						
**	<i>Bacopa monnieri</i> (L.) Pennel.	<i>Brāhmī,</i> <i>Nīrbrāhmī</i>	Herb	Leaves	Y[18,19,20,26]	4	A fresh leaf juice 10 ml (5 ml for children) - twice a day.
#	<i>Centranthera indica</i> (L.) Gamble	<i>Uṃḡīrakāṇī</i>	Herb	Dried Whole	Y[8,14,23]	3	-

				plant			
38	Family- Acanthaceae						
*#	<i>Adhatoda vasica</i> Nees. Syn. <i>Justicia adhatoda</i> L. Syn. <i>Adhatoda zeylanica</i> L.	<i>Aḍḍasā</i>	Shrub	Leaves, Flowers	Y[7,16,18,19, 20,21,22, 26]	8	A cup of decoction made from the fresh leaves 10 g and flowers 2 g boiled in water -twice a day in malarial fever.
*#	<i>Andrographis paniculata</i> Nees. Syn. <i>Justicia paniculata</i> Burm. f.	<i>Olī Kirāyat</i>	Herb	Dried mature stem and leaves	Y[8,13,14,16, 18,19,20,22, 23,26]	10	The cold infusion of the <i>kade of Chirayat</i> i.e. the dried stem pieces 10 g soaked in a glass of water for about 6-8 hours a day/night – 2 tablespoons twice, also recommended for dengue and malarial fever.
#	<i>Barleria prionitis</i> L.	<i>Kāṭe korāmṭī</i>	Shrub	Leaves	Y[3,18,19,20, 26]	5	-
**	<i>Hygrophila schulli</i> (Ham.) M.R. & S.M. Almeida	<i>Koḷīsṇā,</i> <i>Koḷasumḍā,</i> <i>Koḷaṣimḍā,</i> <i>Tālimakhānā</i>	Herb	Whole Plant	Y[13]	1	A decoction of root 4-5 teaspoonful - twice a day.
**	<i>Peristrophe bicalyculata</i> Nees.	<i>Pitta pāpaḍā,</i> <i>Rāna-kirāyata</i>	Herb	Roots	Y[18]	1	A teacupful of the extract of the roots - twice a day.
#	<i>Rostellularia japonica</i> (Thrub.) Ellins	<i>Kāḷamāṣī</i>	Herb	Whole plant	Y[8]	1	-
#	<i>Rostellularia procumbens</i> (L.) Nees.	<i>Karambala,</i> <i>Ghāṭī</i> <i>Pittapāpaḍā</i>	Herb	Whole plant	Y[8,14]	2	-
#	<i>Rungia repens</i> (L) Nees	<i>Ghāṭī</i> <i>Pittapāpaḍā</i>	Herb	Whole plant	Y[8,18,23]	3	-
39	Family- Bignoniaceae						
#	<i>Pachyptera hymenaea</i> (DC.) Genetry	<i>Lasūṇa vel</i>	Woody climber	Leaves	Y ^[8]	1	-
40	Family- Verbenaceae						
*#	<i>Clerodendrum serratum</i> (L.) Moon.	<i>Bhāraṅga,</i> <i>Bhāraṅgī</i>	Shrub	Dried roots	Y[8,18,19,20, 23]	5	A teaspoonful of root decoction - twice a day in malarial fever.
**	<i>Lantana camara</i> L.var. <i>aculeata</i> Moldenke.	<i>Ghāṇerī</i>	Shrub	whole plant	Y[14,18]	2	A teacupful of decoction of whole plant - twice a day.
*#	<i>Vitex negundo</i> L.	<i>Nirguḍī</i>	Shrub	Leaves	Y[3,8,11,14, 18,19,20,23]	8	A teaspoonful of extract of young leaves - twice a day for 3 days.
41	Family- Lamiaceae						
#	<i>Hyptis suaveolens</i> (L.) Poit.	<i>Vilāyatī tuḷas</i>	Shrub	Leaves	Y[8,14]	2	-
*#	<i>Ocimum americanum</i> L.	<i>Rāna tuḷas</i>	Herb	Leaves	Y[11,14,23]	3	A pill made from 2-3 leaves mixed with jaggery - thrice a day.
**	<i>Ocimum basilicum</i> L.	<i>Sabjā</i>	Herb	Leaves	-		The fresh juice made from 10 tender leaves and 10 <i>kale mire</i> (fruits of <i>Piper nigrum</i>) crushed in a glass of water - in early morning.
#	<i>Ocimum tenuiflorum</i> L.	<i>Kāḷī tuḷas</i>	Under shrub	Leaves	Y[11,13,14, 20]	4	-
**	<i>Pogostemon benghalensis</i> (Burm .f.) Kuntze	<i>Pāṅgaḷī</i>	Shrub	Leaves	Y[14,17]	2	The fresh leaves powdered and dissolved in a glass of milk – once a day.
42	Family- Asteraceae						
**	<i>Artemisia nilagirica</i> (Clarke) Pamp.	<i>Davanā</i>	Herb	Leaves	Y[14,20]	2	1-2 g leaf powder dissolved in a glass of

#	Plant Species	Local Name	Habit	Part Used	References	Score	Preparation/Use
							water - twice a day.
#	<i>Bidens biternata</i> (Lour.) Merr	<i>Cikaṭā</i>	Herb	Roots	Y[8]	1	-
#	<i>Carthamus lanatus</i> L.	-	Herb	Whole plant	Y[8,23]	2	-
**	<i>Eclipta alba</i> Hassk. Syn. <i>Eclipta prostrata</i> Roxb.	<i>Mākā</i>	Herb	Whole plant	Y[14,16,17,19]	4	The fresh juice of leaves 10 ml added in a glass of milk along with the rock sugar - twice a day.
#	<i>Glossocardia bosvallea</i> (L.f.) DC.	<i>Khaḍaka śepū</i> , <i>Dagaḍ śepū</i> ,	Herb	Whole plant	Y[4,8]	2	-
#	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	<i>Pātharī</i>	Herb	Leaves	Y[8]	1	-
#	<i>Pulicaria wightiana</i> (DC.) C.B. Cl.	<i>Sonaṭikalī</i>	Herb	Whole plant	Y[8]	1	-
#	<i>Vernonia divergens</i> (Roxb.) Edgew	<i>Baṃdara</i>	Shrub	Flowers	Y[8]	1	-
**	<i>Vernonia cinerea</i> Less.	<i>Sādoḍī</i> , <i>Sahadevī</i>	Herb	Entire plant	Y[14,17,19,23]	4	A decoction of herb 10 g - twice a day for 3 days.
**	<i>Xanthium strumarium</i> L. Syn. <i>Xanthium indicum</i> Koenig. Ex Roxb.	<i>Lāṃdagā</i>	Under-shrub	Entire plant	Y[13,17,19,23,25]	5	A decoction of herb 15 g - twice a day.
43	Family- Apiaceae						
**	<i>Coriandrum sativum</i> L.	<i>Dhane</i> , <i>Kothimbīra</i> <i>Kothamira</i>	Herb	Leaves, Fruits	Y[20,25]	2	An infusion of leaves and dried ripe fruits 5 g - added in milk with rock sugar - once a day.

*# Plant species reported from the present field studies and also found in earlier reports in literature for the district [# Earlier ethnomedicinal reports from the district ^[3,4,5,6,7,8,9,10,11,12]]

** Plant species reported from the present field studies and not found in earlier reports from the district (Plant species found exclusively in field studies)

Plant species found exclusively in literature studies.

S Score = The total number of references in which plant is reported.

Table 2. List of abundance of plant families

Sr. No.	Name of the Family	Number of plants used as Ethnomedicine
	Asteraceae	10
	Fabaceae	09
	Apocynaceae	09
	Acanthaceae	08

Table 3. Habit-wise distribution of plant species

Sr. No.	Habit	Number of species
	Climber	019
	Herb	045
	Shrub	017
	Under-shrub	006
	Tree	022
	Total	109

4. Conclusions

Fever is mostly an indication of infection. According to Modern sciences, antipyretic medicines are NSAIDs

(Non-Steroidal Anti-Inflammatory Drugs) that usually act by inhibiting prostaglandin synthesis within the hypothalamus region that acts as temperature regulator in our body.^[30] But as per Ayurveda, the ancient traditional medicinal system of India, plant substances which have dominance of bitter taste (*Tikta Rasa*) like, *Cirāta* (*Andrographis paniculata* Nees.), *Guḍūci* (*Tinospora cordifolia* (Willd.) Hook F. & Thoms or *Nima* (*Azadirachta indica* A. Juss.) contain the property of reducing fever (*Jwara Hara*). *Tikta Rasa* reduces toxins / poisons and checks fever.^[31] Such plants are commonly found in this list made in this study.

The objective behind preparing this list is to attract the attention of those researchers who have interest in folk medicines. The research workers will find the list as a new starting point for further investigation because the newly documented plants have potential for use as source of new drugs for the treatment of fever. Further Pharmacognostic, phytochemical, pharmacological, biotechnological and clinical studies will enable the validity of the present inquired information.



Figure 1. *Artemisia nilagirica* (Clarke) Pamp. (Davna)



Figure 4. *Cocculus hirsutus* (L.) Diels (Wasan vel)



Figure 2. *Sida cordifolia* L. (Chikna)



Figure 5. *Andrographis paniculata* Nees. (Oli Kirayat)



Figure 3. *Momordica dioica* Roxb. ex Willd. (Kartol Root Tuber)



Figure 6. *Aerva lanata* (L.) Juss. Ex Schult. (Kapuri-madhuri)



Figure 7. *Hygrophila schulli* (Ham.) M.R. & S.M. Almeida (*Kolisna*)

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