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Ethno-Medico-Botanical Knowledge of Khare-vokkaliga Community in Uttara Kannada District of Karnataka, India

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Ethno-Medico-Botanical Knowledge of Khare-vokkaliga Community in Uttara Kannada District of Karnataka, India*

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Abstract

Khare-vokkaliga is one of the small ethnic communities inhabiting four village hamlets in Uttara Kannada district of Karnataka, which is located in the heart of the Western Ghats in India. They used traditional medicines for the treatment of diseases and disorders that affected the community. A survey of ethnomedicinal practices followed by the community was conducted during 2003-04 which indicated that Khare-vokkaliga used 57 plant species of 56 genera and 38 families for the treatment of 39 diseases and disorders in human beings. Among them, 20 species of 19 genera of 16 families are being used to treat 6 infectious diseases and 44 species of 43 genera of 33 families are used to treat 33 non-infectious diseases. The high informant consensus factor (ICF=1.0) was assigned to jaundice category followed by moderate ICF (0.37) to the poisonous bite category and lowest (ICF=0.00) to the treatment of skin and eye related problems. This study reports 11 new claims for the treatment of human diseases and disorders.

KEYWORDS: Khare-vokkaliga, traditional medicine, human ailments, Uttara Kannada, Western Ghats, India

*The authors express thanks to the Khare-vokkaliga community for revealing their traditional medical knowledge for the benefit of everyone.

INTRODUCTION

The people who live in and around forest area utilize plants for their basic needs including 'medicine'. The knowledge of plants to cure diseases and disorders is inherited to these people from generations. 'Traditional medical knowledge' is declining rapidly, mainly due to the attraction of folk or tribal people towards the modern allopathic medicine. It has been pointed out that 80% of the population, globally, still depends on traditional medicine for their primary health care needs (Farnsworth et al., 1985; Anon, 2002). It is mainly because of the fact that plant based drugs are cheap, reliable and have less side-effects. Interestingly, many modern medicines have been developed based on the 'traditional medical knowledge'. A considerable number of researchers have documented ethno-medico-botanical information from many parts of India (Shah and Gopal, 1985; Bhandary et al., 1996; Huidrom, 1997; Parinitha et al., 2005; Mishra et al., 2006; Purkayastha and Nath, 2006; Pattanaik and Reddy, 2008; Shivanna et al., 2008; Pesek et al., 2008; Rajakumar and Shivanna, 2009, 2010). The knowledge treasure has been collected from tribes, ethnic, folk/local and rural communities. A survey of ethno-botanical information from Uttara Kannada district of Karnataka, indicated that Siddis (Bhandary et al., 1995), Gowlis (Bhandary et al., 1996) and Kunabis (Harsha et al., 2000) have been studied for their ethnic knowledge. However, Khare-vokkaliga, one of the other ethnic communities inhabiting Uttara Kannada district situated in the Western Ghats region of Karnataka state, have not been studied for their indigenous knowledge. Until now, they have been deprived of primary health-care and other facilities. Transportation facility is available to some extent to only two villages. The people of this community still rely only on their traditional medicines for their health care needs. However, recently, young people of this community have started depending on the allopathic medicine rather than on their own traditional system of medicine. The knowledge of the community may be lost over a period of time. Hence, an attempt has been made to collect and document their herbal medicine knowledge in this study.

METHODOLOGY

The study area, Uttara Kannada district of Karnataka in India, lies between 13° 55'-15° 31' N latitude and 74° 09'-75° 04' E longitude. The total area of the district is about 10,292 sq km. Medani (Kumta taluk), Hosagodu (Honnavaara taluk), Dodmane and Udolli (Siddapura taluk) village hamlets in Uttara Kannada district predominantly resided by Khare-vokkaliga community were selected for the study (Fig. 1).

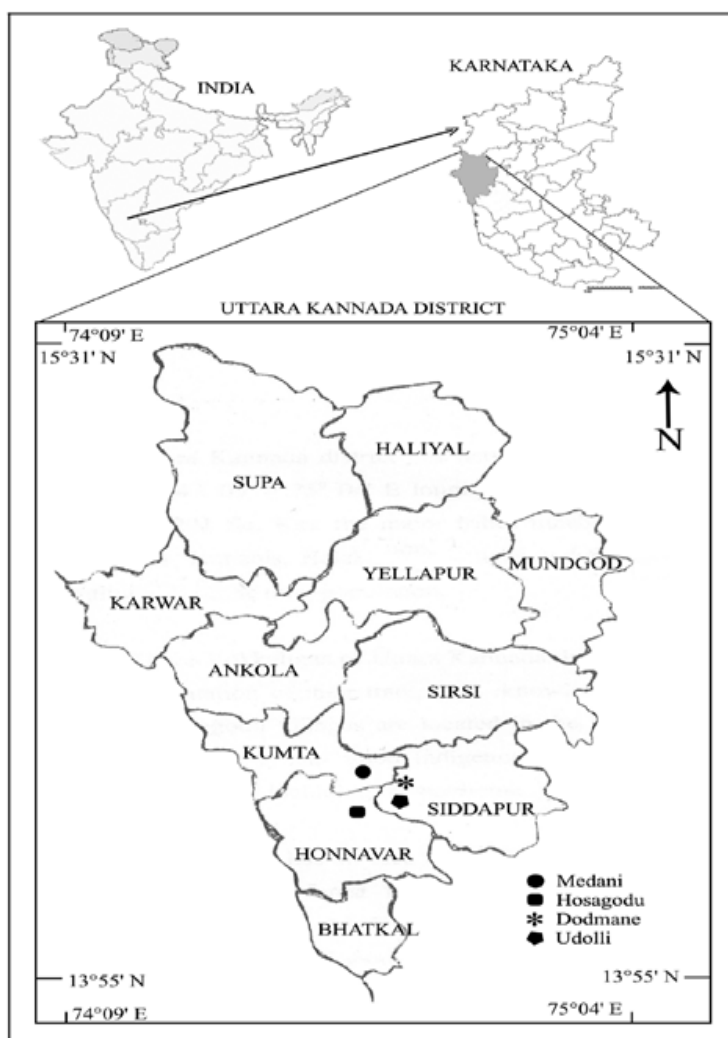


Fig. 1 - Location map of the Uttara Kannada district showing study sites

Dodmane and Udolli villages are surrounded by semi evergreen forests and are located by about 25 km from the Siddapura taluk head quarter and are connected by roads. However, Medani village is located on a hilltop surrounded by thick semi evergreen and evergreen forests, while, Hosagodu village is located in the valley and is surrounded by hillocks completely covered by evergreen forest. Hosagodu and Medani villages are situated at 35 and 40 km, respectively from Honnavara taluk head quarter. These villages are not connected by the road. People walk through the forest by foot to reach the nearby bus station, located at a distance of 12-14 km. The phyto-ethno-medical information of Khare-vokkaligas was collected through frequent field visits and interviews of the local

communities. People of the community were grouped into young, middle aged and elders. Information regarding the human diseases, disorders, methods of disease diagnosis, plant part used, mode of use, and the local plant name was collected through a modified questionnaire prepared by Parinitha et al. (2005). After each interview, medicinally important plants were collected and identified with the help of knowledgeable persons within the study area. Later, plants were identified systematically with the help of floras (Gamble, 1995; Yoganarasimhan et al., 1981; Ramaswamy et al., 2001; Shetty et al., 2002) and by comparing them with specimens in the herbarium centre of the Department of Applied Botany, Kuvempu University. A set of voucher specimen was prepared and deposited at the Department of Applied Botany, Kuvempu University.

Data analysis

Informant consensus originally described by Trotter and Logan (1986) and later adopted by Heinrich et al. (1998) was used to identify potentially effective medicinal plants of the study area. The product of informant consensus factor (ICF) range from 0 to 1.0; a high value (close to 1.0) indicate relatively less plant species used by a large proportion of informants, while the low ICF (0.1) value indicate the informants disagreement on the species used for the particular ailment category. Based on the information gathered during the interview, ailments were grouped into 10 categories.

ICF is calculated by using the formula-

$$ICF = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Where n_{ur} is the total number of use reports for particular category of ailment and n_t is the number of plant species for particular category of ailment.

RESULTS AND DISCUSSION

Khare-vokkaliga is the major community in the study area and they depend mainly on the forest resources for their livelihood. They are hindus and believe in spiritual and supernatural existence and did not follow any specific system of alternative health-care. They cultivate indigenous rice, sugarcane and areca varieties, collect minor forest products and sell them at the nearby towns in exchange for money. People in these four villages were treated for their diseases and disorders by medicine men and elders. Medicine men were cordial but revealed their knowledge only after persuasion and educating them about the importance of documentation of their knowledge for the sake of mankind.

Khare-vokkaliga community used about 57 species of plants of 56 genera and 38 families for the treatment of 39 diseases and disorders in human beings. Diseases and disorders were grouped into infectious (Table-1) and non-infectious (Table-2) diseases. In each table, the data on disease, botanical as well as the local and common name, voucher number, family, plant part used, and method of preparation of medicine, dosage, duration, and ingredient were presented.

TABLE 1- Medicinal plants used in the treatment of infectious human diseases by Khare-vokkaliga community

Sl no.	Ailment	Botanical and Local/common Name voucher No.	Family	Part and mode of use
1	Cough	i. <i>Glycyrrhiza glabra</i> L. (<i>Jhesta madhu</i> /Liquorice) KU/UK/KV/HG 311	Fabaceae	Stem and sugar candy crushed, given orally for 2-3 days.
		ii. <i>Acorus calamus</i> L. ^{EW} (<i>Baje</i> / Sweet flag) KU/UK/KV/HG 305	Araceae	Stem juice with honey, given orally until cure.
		iii. <i>Allium sativum</i> L. (<i>Belluli</i> / Garlic) KU/BS/SM 054	Liliaceae	Roasted bulbils crushed with sugar, mixed with water and given orally for 2-3 days.
2	Diarrhoea	<i>Curcuma zedoaria</i> (Christm.) Rosc. (<i>Kadarishina</i> / Zedoary) KU/UK/KV/HG 282	Zingiberaceae	Dried tuber powder mixed with water and filtered. The filtrate is dried to obtain white pellets. 100 g of pellets and 1 g sugar dissolved in a cup of cow's milk and given orally for 1-2 days. (Over dose might cause cold).
3	Dysentery	i. <i>Holarrhena pubescens</i> (Buch-Ham.) Wall ex G. Don (<i>Kodasiga</i> / Conessi bark tree) KU/BS/KG 024	Apocynaceae	Root paste prepared with lime (<i>Citrus medica</i> L.) juice or water and given orally for 1-2 days.

		<p>ii. <i>Coccinia grandis</i> (L.) Voigt (Tonde / Ivy gourd) KU/SJ/JS 136</p>	Cucurbitaceae	Root paste prepared with rice (<i>Oryza sativa</i> L.) washed water, given orally (For children).
		<p>iii. <i>Amaranthus spinosus</i> L. (Mullanne soppu / Prickly amaranth) KU/BS/TH 048</p>	Amaranthaceae	Bark juice given orally for 1-2 days.
		<p>iv. <i>Apama siliquosa</i> Lam.^{TR?} (Chakrani) KU/UK/KV/MD 310</p>	Aristolochiaceae	1. Fruit decoction given orally. Or 2. Root paste prepared with lime juice, given orally for one day.
4	Fever	<p>i. <i>Zingiber officinale</i> Rosc. (Shunti / Ginger) KU/SG/JS 187</p>	Zingiberaceae	Decoction of rhizome, along with cumin (<i>Cuminum cyminum</i> L.) and pepper (<i>Piper nigrum</i>) given orally for 2 days.
		<p>ii. <i>Allium cepa</i> L. (Eerulli / Onion) KU/UK/KV/HG 278</p>	Liliaceae	Decoction of onion and pepper was prepared. 1 cup of decoction given orally along with 1-2 teaspoonfuls honey, twice a day for 2 days.
		<p>iii. <i>Adhatoda zeylanica</i> Medikus (Baeli gurige / Malabar nut tree) KU/SG/NS 077</p>	Acanthaceae	Leaves warmed over flame and placed on chest.
5	Skin problems a) Chicken pox	<p>i. <i>Azadirachta indica</i> Juss.^{TR?} (Kahibevu / Neem tree) KU/SG/MH 068</p>	Meliaceae	Powdered bark, <i>Psidium guajava</i> L. and <i>Ocimum tenuiflorum</i> leaves boiled in water and decoction used for bathing until cure.

		ii. <i>Mangifera indica</i> L. (<i>Maavu</i> / Mango tree) KU/SG/V 058	Anacardiaceae	Leaf paste applied externally over the infected area until cure.
	b) Dhobi's itch	<i>Xylia xylocarpa</i> (Roxb.) Taub. (<i>Jambe</i> / Burma iron wood) KU/SG/V 069	Mimosaceae	Leaf paste applied externally over itching part until cure.
	c) Ear itching	<i>Ocimum tenuiflorum</i> L. (syn. <i>O. sanctum</i> L.) (<i>Kari tulasi</i> / Holy basil) KU/SG/V 062	Lamiaceae	Leaves boiled in coconut (<i>Cocos nucifera</i>) oil, applied over the affected region until cure.
	d) Ring worm	<i>Cassia fistula</i> L. (<i>Kakkayi</i> / Indian laburnum) KU/BS/MG 008	Caesalpiniaceae	i) Leaf paste applied over the infected area until cure. ii) Leaves boiled in coconut oil and applied over the infected area until cure.
	e) Scabies	<i>Nothapodytes nimmoniana</i> (Graham) Mabb. ^{VU} (Syn. <i>Mappia foetida</i> Miers.) (<i>Helu kodashiga</i> / Ghanera) KU/UK/KV/MD 294	Icacinaceae	Root ground with lime juice or rice washed water, applied over the infected region until cure.
	f) Urticaria	i. <i>Graptophyllum hortense</i> Nees. (<i>Daasa patre</i>) KU/UK/KV/MD 291	Acanthaceae	Leaves crushed in rice washed water, applied over the affected part and given orally also.
		ii. <i>Cassia fistula</i> L. (<i>Kakkayi</i> / Indian laburnum) KU/BS/MG 008	Caesalpiniaceae	Leaf paste applied externally over infected part.
6	Throat infection	i. <i>Leucas aspera</i> Spreng. (<i>Tumbe</i> / Common leucas) KU/BS/MV 013	Lamiaceae	a) The root paste applied on throat. b) Lime and root are ground and applied externally on throat.

<p>ii. <i>Lobelia nicotianifolia</i> Roem. & Schult. (<i>Heddumbe</i> / Wild tobacco) KU/UK/KV/MD 289</p>	<p>Campanulaceae</p>	<p>Root ground with lime juice and applied externally on throat.</p>
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^{EW}-Extinct in the wild, ^{VU}- Vulnerable, ^{LR}- Lower risk, ^{TR?} - Under threat

TABLE 2- Medicinal plants used in the treatment of non-infectious human diseases by Khare-vokkaliga community

Sl. no.	Ailment	Botanical and Local/common Name voucher No.	Family	Parts and Mode of Use
1.	Alopecia	<i>Terminalia arjuna</i> (Roxb.) Ex. De. Wight and Arn. (<i>Matti mara</i> / Arjuna myrobalan) KU/SG/NS 207	Combretaceae	Young shoots ground into paste and applied over the head.
2.	Asthma	<i>Achyranthes aspera</i> L. (<i>Kove gida</i> / Prickly chaff-flower) KU/BS/GG 034	Amaranthaceae	Leaves warmed over a banana (<i>Musa paradisiaca</i> L.) leaf on a warm ash; warmed leaves crushed in water and juice given orally for 15-20 days.
3.	Body ache	<i>Colocasia esculenta</i> Schott. (<i>Vata Kesa</i> / Kopeh) KU/UK/KV/HG 306	Araceae	Leaves crushed in water and given orally early in the morning for three days.
4.	Cancer	i. <i>Dracaena terniflora</i> Roxb. (<i>Ettina Kalina Hejjegida</i>) KU/UK/KV/HG 281	Liliaceae	Leaf or bulb of <i>D. terniflora</i> and bark of <i>A. nervosa</i> ground in water and given orally once a day for a month.
		ii. <i>Argyrea nervosa</i> (N. Burman) Bojer. (<i>Malematti</i> / Elephant creeper) KU/UK/KV/HG 280	Convolvulaceae	
		<i>Rauwolfia serpentina</i> (L.) R. Br. ^{EW} (<i>Sarpagandha</i> / Snake dog-bane) KU/BS/HG 025	Apocynaceae	Barks of <i>R. serpentina</i> and <i>A. nervosa</i> ground in water and given orally once a day for a month.

5.	Cold	<p>i. <i>Garcinia indica</i> (Du petit.) Choicy (Murugalu / Kokum butter) KU/SG/JS 218</p> <p>ii. <i>Allium cepa</i> L. (Eerulli/Onion) KU/UK/KV/HG 278</p>	<p>Clusiaceae</p> <p>Liliaceae</p>	<p>Fruit ground along with pepper (<i>P. nigrum</i>) and honey, boiled in water and given orally for 2-3 days.</p> <p>Bulb crushed with pepper, <i>Trachyspermum ammi</i> seeds and jaggery, boiled in water and given orally for 2-3 days.</p>
6.	Con- ceiving	<p><i>Wrightia tinctoria</i> R. Br. (Haale / Dyer's oleander) KU/SG/V 087</p>	Apocynaceae	Bark ground in cow's milk and given orally for five days after menstruation.
7.	Colic disorder	<p><i>Azadirachta indica</i> Juss.^{TR?} (Kahi bevu / Neem tree) KU/SG/MH 068</p>	Meliaceae	Root ground in lime juice and given orally before breakfast.
8.	Coolant/ Refri- gerent	<p><i>Hemidesmus indicus</i> (L) R. Br. (Sogade / Indian sarsaparilla) KU/BS/MG 001</p>	Asclepiadaceae	Root decoction given orally.
9.	Delirium in confine- ment	<p><i>Adathoda zeylanica</i> Medikus (Baeli gurige / Malabar nut tree) KU/SG/NS 077</p>	Acanthaceae	Leaves warmed in a flame and fomented over the head.
10.	Diabetes	<p><i>Syzygium cumini</i> Skeels. (Nerale / Black plum) KU/SG/V 060</p>	Myrtaceae	Bark boiled in water and decoction given orally early in the morning in empty stomach.
11.	Ear ache	<p>i. <i>Allium sativum</i> L. (Bellulli / Garlic) KU/BS/SM 054</p>	Liliaceae	2-3 drops of bulb juice put into ear lobes.

		ii. <i>Vanda tessellata</i> (Roxb.) Hook. Ex. G. Don (Seethale / Indian groundsel) KU/SG/JS 163	Orchidaceae	Leaves warmed on warm ash and leaf juice put into ear lobes drop by drop.
		iii. <i>Areca catechu</i> L. (Adike / Areca nut) KU/SH/MH 063	Arecaceae	Husk juice put into ear lobes and retained for 2 min.
12.	Eye disorder	<i>Allium cepa</i> L. (Eerulli / Onion) KU/UK/KV/HG 278	Liliaceae	Bulb crushed in cow's milk, filtered; Filtrate mixed with pepper powder, made into small pellets, kept on eye lids and covered with a piece of cloth.
13.	Fatigue	<i>Centella asiatica</i> (L.) Urban (Ondane soppu / Indian penny wort) KU/BS/MV 014	Apiaceae	Leaf decoction given orally.
14.	Food poisoning	<i>Crinum asiaticum</i> L. (Visha munguli) KU/UK/KV/HG 307	Amaryllidaceae	Leaves homogenized in water and given orally.
15.	Hand fracture	<i>Diospyros embryopteris</i> Pers. ^{EW} (Male bandi / Indian perimon) KU/UK/KV/HG 283	Ebenaceae	Bark and pepper paste applied on fracture part, tied for 4 days. Bark and coconut endocarp given orally once in a day for a week.
16.	Head ache	i. <i>Cyclea peltata</i> (Lam.) Hook. F. & Thomson ^{LR} (Hwade) KU/SG/JS 156	Menispermaceae	Leaf crushed in water and applied over forehead.
		ii. <i>Calotropis gigantea</i> (L.) R. Br. ^{TR?} (Ekkada gida / Giant swallow wort) KU/SG/NS 192	Asclepiadaceae	Dry stem smoked like cigarette. It is also useful in partial headache.

		iii. <i>Elephantopus scaber</i> L. (<i>Nelaganigilu</i> / Elephant's foot) KU/BS/MG 002	Asteraceae	Root paste applied over the opposite side of affected part.
		iv. <i>Psidium guajava</i> L. (<i>Perale gida</i> / Guava) KU/BS/MG 010	Myrtaceae	Young fruit decoction given orally and leaf paste rubbed on forehead.
17.	Hornet bite	<i>Cassia auriculata</i> L. (<i>Tagani</i> / Eared senna) KU/SG/NS 200	Caesalpiniaceae	Leaf juice applied over the bitten area and juice given orally.
18.	Indigestion	<i>Trachyspermum ammi</i> Spargue (<i>Omu</i> / Carum seeds) KU/UK/KV/HG 308	Apiaceae	Seed decoction given orally for 1-2 days.
19.	Intestinal worms	i. <i>Cuminum cyminum</i> L. (<i>Jeerige</i> / Cumin seed) KU/UK/KV/DM 292	Apiaceae	Cumin seed decoction given orally twice a day.
		ii. <i>Apama siliquosa</i> Lam. TR ² (<i>Chakrani</i>) KU/UK/KV/MD 310	Aristolochiaceae	i. Decoction of fruits given orally. ii. Root paste with lime juice given orally.
20.	Impotency	<i>Artocarpus heterophyllus</i> Lam. (<i>Halasu</i> / Jack tree) KU/SG/JS 233	Moraceae	Dry bark powder mixed with cow's milk and given orally.
21.	Jaundice	<i>Saccharum officinarum</i> L. (<i>Kabbu</i> / Sugar cane) KU/UK/KV/MD 309	Poaceae	Cane juice given orally early morning in empty stomach for 15-20 days.
22.	Menstrual pain	<i>Hibiscus rosa-sinensis</i> L. (<i>Daaswala</i> / China rose) KU/BS/SM 052	Malvaceae	Leaves and flowers soaked overnight in water and given orally early in the morning in empty stomach for 2-3 days.
23.	Pregnancy problems	<i>Coccinia grandis</i> Voigt. (<i>Thonde</i> / Ivy gourd) KU/SG/JS 136	Cucurbitaceae	Stem boiled in water and decoction given to pregnant women to facilitate easy delivery.

24.	Snake bite	i.a. <i>Ophiorrhiza mungos</i> L. (Garuda patala / Mongoose plant) KU/UK/KV/MD 287	Rubiaceae	Roots of <i>O. mungos</i> and <i>A. precatorius</i> ground in lime juice and given orally.
		b. <i>Abrus precatorius</i> L. ^{LR} (Gulaganji / Crab's eye) KU/SG/JS 166	Fabaceae	
		ii. <i>Ervatamia heyneana</i> (Wall.) T. Cooke (Syn. <i>Tabernaemontana heyneana</i> Wall.) (Maddarasa / Ceylon jasmine) KU/UK/KV/MD 288	Apocynaceae	
25.	Sprain	iii. <i>Dillenia pentagyna</i> Roxb. (Bettakanigilu / Dog teak) KU/BS/MG 011	Dilleniaceae	a. Dried fruit ground with lime juice and given orally. b. Bark ground with lime juice and the paste is licked.
		<i>Myristica fragrans</i> Houttuym (Jaakaayi / Nut meg) KU/UK/KV/MD 286	Myristicaceae	Fruit ground with pepper into powder, mixed with water and given orally twice a day for 2-3 days.
26.	Stomach ache	i. <i>Momordica charantia</i> L. (Haagala gida / Bitter gourd) KU/SG/JS 137	Cucurbitaceae	Leaf warmed and homogenized in cow's milk, given orally (for Children).
		ii. <i>Cyclea peltata</i> (Lam) Hook. F and Thomson. ^{LR} (Hwade) KU/SG/JS 156	Menispermaceae	Root ground in lime juice and given orally twice a day.
27.	Stye of eye	<i>Macaranga indica</i> W. (Chinukalu / Lotus croton) KU/UK/KV/HG 285	Euphorbiaceae	Resin from stem used to remove the stye from eye.
28.	Swelling of leg	<i>Alpinia galanga</i> (L) Sw. ^{VU} (Reshmi gedde / Greater galangal) KU/SG/JS 184	Zingiberaceae	Rhizome juice applied over the swollen part until cure.

29.	Tooth ache	i. <i>Piper nigrum</i> L. (Bolukalu balli / Black pepper) KU/BS/SM 053	Piperaceae	Root crushed and kept on the aching tooth.
		ii. <i>Clematis gouriana</i> Roxb. ex. Dc (Hallugurina balli / Indian traveller's joy) KU/SD/SH 274	Ranunculaceae	Stem and common salt chewed and kept on the affected region until cure.
30.	Vomiting	i. <i>Cocos nucifera</i> L. (Tengu / Coconut tree) KU/SG/JS 266	Areaceae	Tender leaves crushed in rice washed water and given orally.
		ii. <i>Citrus medica</i> L. (Nimbe / Citron) KU/SG/JS 257	Rutaceae	Fruit juice mixed with tea (<i>Camellia sinensis</i> (L.) Kuntze) decoction and given orally.
31.	Weakness	<i>Hemidesmus indicus</i> (L) R. Br. (Sogade / Indian sarsaparilla) KU/BS/MG 001	Asclepiadaceae	Root powder mixed with cow's milk and given orally once a day for a week.
32.	Wound	i. <i>Cocos nucifera</i> L. (Tengu / Coconut tree) KU/SG/JS 266	Areaceae	Fried tender leaves tied around the wound until cure.
		ii. <i>Chromolaena odorata</i> (L.) King & H. Robinson (Syn. <i>Eupatorium odoratum</i>) (Congress gida / Siam weed) KU/SG/JS 109	Asteraceae	Leaf crushed and applied over the wound until cure.

^{EW} -Extinct in the wild, ^{VU} - Vulnerable, ^{LR} - Lower risk, ^{TR?} - Under threat

Among 57 plant species, 3 species (*Acorus calamus*, *Rauwolfia serpentina*, *Diospyros embryopteris*) are extinct in wild, 3 species (*Nothapodytes nimmoniana*, *Alpinia galanga*, *Garcinia indica*) vulnerable, 2 (*Cyclea peltata*, *Abrus precatorius*) in lower risk category (Gowda, 1997) and 3 species (*Apama siliquosa*, *Calotropis gigantea*, *Azadirachta indica*) are under threat (?) (Anon., 2001). The healers of the study area were found cultivating these plants in their 'home gardens' and areca orchards and used them whenever required. By doing

so, the herbal healers of the Khare-vokkaliga community helped in the conservation and sustainable utilization of threatened and vulnerable medicinal plant species besides conserving their own traditional medical knowledge.

Khare-vokkaliga used 20 species of medicinal plants of 19 genera and 16 families for the treatment of 6 infectious diseases in human beings. For the treatment of 33 non-infectious diseases, they used 44 species of plants of 43 genera in 33 families. Leaf (28.76%) was the major plant part used followed by root (20.54%), bark (13.69%), fruit (9.58%), stem (8.21%), bulbils (6.84%), rhizome (4.10%), and seed (2.73%). In most cases, they used single plant species rather than the combination. They preferred leaf to other parts and external application rather than the oral to treat skin problems. They used plant and animal based adjuvants and carriers while formulating certain herbal drugs. Notable among them were cow's (malnad dwarf local) milk, honey, lime juice and coconut oil.

The community used certain plant species to treat specific ailments which are not so far recorded in the literature for such purposes, but they are used to treat other diseases. For example, dried fruit and bark of *Dillenia pentagyna* are used for snake bite, rhizome of *Curcuma zedoaria* for diarrhoea, dry stem of *Calotropis gigantea* for headache, root of *Lobelia nicotianifolia* for throat infection, leaf or bulb of *Dracaena terniflora*, bark of *Argyreia nervosa*, and bark of *Rauwolfia serpentina* for cancer, bark of *Diospyros embryopteris* for bone fracture, bark of *Artocarpus heterophyllus* to treat impotency, stem exudate of *Macaranga peltata* for sty of eyes, tender leaves of *Cocos nucifera* for vomiting, and root and fruit of *Apama siliquosa* for dysentery. Some of the plant species used by the community were also reported for the same purposes in ayurveda and homeopathy systems of medicine. For example, the use of *Acorus calamus*, *Allium sativum* for cough, *Holarrhena pubescens*, and *Coccinia grandis* for dysentery, *A. cepa* and *Adhatoda zeylanica* for fever, *A. indica*, *Ocimum tenuiflorum* and *Cassia fistula* for skin diseases, *Syzigium cumini* for diabetes, *Hibiscus rosa-sinensis* for menstrual problems, *Citrus medica* for vomiting, and *Cocos nucifera* for wound healing (Kirthikar and Basu, 1986; Joshi, 2000).

The community used different parts of plant species to treat multiple ailments. For example, bulbils of *A. sativum* to treat cough and ear-ache, and bulb of *A. cepa* to treat fever, cold, and eye disorders, leaves of *Cassia fistula* to treat ringworm and urticaria, leaves of *Adhatoda zeylanica* to treat fever and delirium in confinement, and tender leaves of *Cocos nucifera* to cure vomiting and wound. In contrast to the above, different parts of the same plant are used to cure various ailments such as bark of *A. indica* to cure chicken pox, and roots to cure colic disorder, fruits and root of *A. siliquosa* to treat intestinal worms and bark to treat dysentery, leaves of *Cyclea peltata* to treat headache and roots for stomachache.

Certain plant species used as medicine by Khare-vokkaligas are also used by other tribes and folk communities for treating the same or different ailments. For example, village folk in Shimoga district (Parinitha et al., 2005) and tribes of North Gujarat (Shah and Gopal, 1985) use *Holarrhena pubescens* to cure dysentery whereas, the Siddis of Uttara Kannada district use it as depurative (Bhandary et al., 1996). Khare-vokkaliga as well as people of Ilorin, Nigeria (Ajibade et al., 2005) used *Calotropis gigantea* to cure headache, while the same plant is used for stomachache and inflammatory swellings by tribes of North Gujarat in India (Shah et al., 1985); on the other hand, the hill tribes of Northern Thailand use it for skin rash (Anderson, 1986). While, Khare-vokkaliga used *Ophiorhiza mungosa* and *Abrus precatorius* in combination, Meitei community in Manipur used *Calotropis procera* for snake bite (Huidrom, 1995). On the other hand, Siddis of Uttara Kannada, local communities in Shimoga district, people in Nigeria, and Mehsana in Gujarat used *Sansevieria roxburghiana* (Bhandary et al., 1995), *Rauwolfia serpentina* (Parinitha et al., 2005), *Pennisetum purpureum* (Ajibade et al., 2005), and *T. cordifolia* (Dabagar, 2006), respectively. Gowlis of Uttara Kannada district (Bhandary et al., 1996), Khare-vokkaliga and Siddis of the same district used *Elephantopus scaber* for curing partial headache (Bhandary et al., 1995). Contrary to the above observations, tribes of Northern Thailand used it for cough (Anderson, 1988). Khare-vokkaliga used *A. siliquosa* for intestinal worms, whereas villagers in Bhadra Wildlife Sanctuary used *Citrus medica* (Parinitha et al., 2004) for this purpose. *Aristolochia trilobata*, on the other hand, was used against the same by the people of Dominica, West Indies (Quinlan et al., 2002). Khare-vokkaliga used *Dracaena terniflora* and *Argyrea nervosa* or *Rauwolfia serpentina* and *A. nervosa* combinations to cure cancer. In Nigeria, tuber of *Dioscorea alata* was used to cure cancer (Ajibade et al., 2005). For bone fracture, tribal groups of Chattisgarh used *Cissus quadrangularis* (Mishra et al., 2006), whereas Khare-vokkaliga used *Diospyros embryopteris*.

Certain ayurvedic drugs have been studied for their pharmacological activities. Auddy et al. (2003) showed that ethanolic extracts of *Sida cordifolia*, *Evolvulus alsinoidis*, and *Cynodon dactylon* had antioxidant activity which is known in the management of neurodegenerative disease in humans. Reports of Dev (1999) and Paul et al. (1999) also suggested that certain ayurvedic formulations are equally as effective as their allopathic counterparts. A quinine compound embelin isolated from an ethnic drug formulation from *Embelia ribes* has been shown to possess wound healing property (Kumaraswamy et al., 2006). Some of the herbal species (*A. indica*, *M. indica*, *O. tenuiflorum*, *C. fistula*) used for treating skin diseases by Khare-vokkaliga community are reported by other workers for the antimicrobial principles in the above species (Purkayastha and Nath, 2006; Rao, 2000; Samy et al., 1998). The above indicate that herbal formulations used by ethnic people were tested over generations and detailed

pharmacological investigations are required to confirm their application in modern health care system.

Diseases of Khare-vokkaliga community were grouped into ten ailment categories. The ICF of medical knowledge of Khare-vokkaliga community ranged from 0.0 to 1.0 with an average ICF value of 0.32. Medicinal plants showing high ICF value are presumed to be the most effective in treating a particular ailment. *Saccharum officinarum* used to treat the jaundice with high ICF (1.0) indicated that all user reports agreed unanimously to the use of the same single plant to treat jaundice. Plants used to treat the general health category ailments showed the ICF of 0.53 indicating that these plants are being frequently used by many respondents. Plants used to treat the poisonous bite category with moderate ICF of 0.37 indicated that people of the study area have good knowledge about antidote properties of native plants. In the study area, gastro-intestinal problems were very common and maximum number of reports (29) and plants (20) were recorded for this category of ailment and this lowered the ICF value to 0.32. Plants used in the treatment of skin diseases and eye disorder category attracted the lowest ICF value (zero) suggesting that there was no general agreement amongst themselves.

TABLE 3. Categories of ailment in Khare-vokkaliga community and the informants consensus factor (ICF)

Sl. No.	Ailment category	Plants used	Number of use reports	ICF value
1	Ache/Pain	10	11	0.10
2	Eye disorders	03	03	0.00
3	Fever	05	07	0.33
4	Gastro intestinal problems	20	29	0.32
5	General health category (Cold, wound, coolant, weakness, fracture)	07	14	0.53
6	Jaundice	01	03	1.00
7	Poison bite	06	09	0.37
8	Respiratory and throat infection	08	11	0.30
9	Skin problems	08	08	0.00
10	Women disorders	04	05	0.25

The survey of Khare-vokkaliga community for ethno medical knowledge indicated that they have unique information on plant-based medicine, some of which are new reveals. Phyto-chemical investigations are necessary to understand the active compound(s) of the herbal drug responsible for curing a specific ailment. The study also revealed that the aged individuals have a lot of information of medicinal plants as compared to the young individuals.

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