

New ethnomedicinal claims from *Magar* community of Palpa district, Nepal

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The aim of present study was to identify medicinal plant species used for the management of healthcare problems prevalent among the *Magar* tribal community of Palpa district, Nepal. Data about medicinal uses of plants were collected by questionnaire, personal interview and group discussion with pre-identified informants. The present study includes a total of 171 new ethnomedicinal claims for 70 plant species from Nepal. *Magar* tribes used these species in the treatment of 104 different ailments of human being. Use Value (UV), Fidelity level (FL), Relative Frequency of Citation (RFC) and Factor of Informants Consensus (Fic) were used for identification of the popularity level, efficiency medicinal importance of the plants among the community. In the study area, the informants' consensus about usages of medicinal plants ranges from 0.4 to 0.76 with an average value of 0.7. Only 8.6 % of the ethnomedicines are from cultivation and rest 91.4 % from wild resources. While study we have identified twenty of the popular medicinal plants used by *Magar* tribes, which are not scientifically evaluated so far for their claimed ethnomedicinal uses. These species may be used in phytochemical and pharmacological investigations in future.

Keywords: Ethnomedicine, Traditional Knowledge, Palpa, *Magar* tribe, Western Nepal

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Man has been dependent on plants for healthcare management since the beginning of civilization. The documentation and scientific investigations of this traditional knowledge has so often gives the path of new drugs development. In addition, ethnobotanical approaches are able to establish close relationship among the people and nature. Thus, it facilitates to create management strategy to avoid adverse impact on their life and environment¹⁻³.

The indigenous people living in remote areas of Nepal have significant knowledge about the medicinal properties of the surrounding flora. The medicinal plants are second most valuable bio-resources of Nepal after water resources⁴. With the advent of modern medicines, socio-economic and cultural transformation in the area the traditional medicines are losing the ground⁵. Consequently, the young generation is not interested in this valued knowledge about the plants. Therefore, it is urgent to protect this treasure by documenting it in the printed form. Palpa district of Western Nepal is potential in terms of

ethnomedicine and little works have been carried out by some workers⁶⁻⁹. Keeping these things in mind, the purpose of this study was to: (i) explore and document the ethnomedicinal knowledge available with the *Magar* tribal community; (ii) study how the people employ the plants in healthcare management. The following questions were addressed through the study: (a) Is there any new ethnomedicinal information is available among the *Magar* tribal community of Palpa district? (b) Which medicinal plant species are used for the management of healthcare problems prevalent among the ethnic group community? (c) Is there any consensus among informants for usages of ethno-medicines in the study area?

Methodology

Study area

Palpa, a hilly district of western Nepal is located at 27°34' to 27°57' N and 83°15' to 84°22' E with an altitude ranging from 152 m to 1936 m above the sea level. It lies on the Churia and Mahabharat ranges of Himalayas. Most of the areas have low, high

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mountains and foothills. It is surrounded by Gulmi and Arghakhanchi districts from West; Gulmi, Syangja, and Tanhun districts from North; Nawalparasi and Tanhun from East, Rupandehi, and Nawalparasi from South (Fig. 1). Geographically Palpa district is divided into medium height mountain areas (82 %) and Chure hill region (18 %). The change in elevation provides variation of climate from tropical, subtropical to temperate while most of the area lies under subtropical region. The average temperature of the district is highly fluctuating from maximum 32 °C in summer to minimum 4 °C in winter.

Ethnography

The total population of the district was 2, 68, 558 and it is inhabited by many ethnic groups, viz. *Magars*, *Brahmin*, *Newar*, *Chhetri*, *Gurung*, *Kumal*, *Sarki*, etc. *Magar* is one of the indigenous ethnic nationalities of Nepal⁹. It shares 50.92 % of the total district population. As per Nepal's 2001 census, it is the largest indigenous ethnic group in the country, about 7.13 % of Nepal population is belongs to

Magar ethnolinguistic group¹⁰. They follow Buddhism with priest called *Bhusal*; the social process of Sanskritization has drawn some southern *Magar* population to develop a syncretic form of Hinduism that combines animate and Buddhist rituals under the main ones' beings. Among *Magars* there are more than 700 sub THARS (family name) like *Ale*, *Thapa*, *Pun*, *Rana*, etc. The *Magar* has their own language which is rooted in the Tibeto-Burman family and the script called "*Akha Lipi*". *Magar* language is old and native spoken. It is used by *Magar* community. There are four dialects which marginally differ in some aspects to each other. The *Magar* tribe is genetically isolated because they marry among their community. They have *Mongol* features, medium built, whitened in complexion, oval, or round face, black hair, razor cut eyes generally describes the physiques of *Magar*, and in nature they are gentle, honest, brave, charm and happy people.

Ethnobotanical surveys and data collection

The ethnomedicinal field survey was conducted in different *Magar* dominated VDCs namely Kachal, Dobhan, Koldanda, Gothadi, Rahabas, and Jyamire. The study was conducted from December 2009 to November 2013, while investigation we explored the remote villages of the indigenous tribe three times in a year (summer, monsoon, and winter) to cover all the flowering seasons of the plants. The *in situ* method of the exploration was preferred over *ex situ* methods due to two reasons: (i) it provides more information, better quality and reliable data; (ii) identification of plants is convenient. Therefore, "walk-in-the-wood" method was selected¹¹. The interaction with people was informal based and an open-ended questionnaire was used in local language³. Prior informed consent was obtained from the respondents before interview.

Preservation and identification of plant species

The specimens were collected in flowering stage while investigations and identity were confirmed by the key informant. The specimens were preserved in the form of herbarium and identified by using pertinent floras and literatures^{4,12-16}. The botanical identity of voucher specimens and photographs were reconfirmed by taxonomist and finally deposited in the Herbarium of the Maharani Lal Kuwanri Post Graduate College, Balrampur and department of Botany, Butwal Multiple Campus, Tribhuvan University, Nepal for future references. All the botanical names were updated according to the

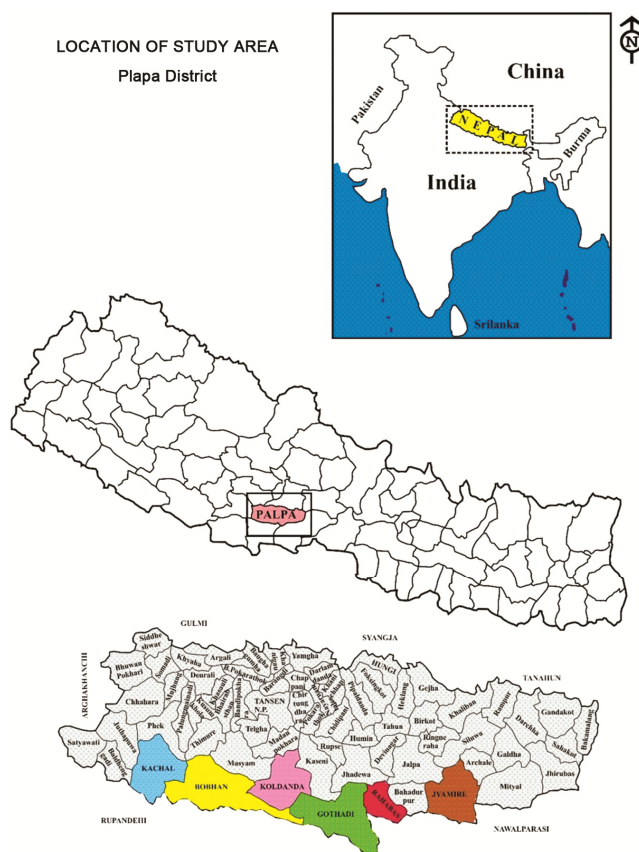


Fig. 1 — Location map of study area

International Plant Names Index
(<http://www.ipni.org>).

Data Quantification analysis

The Quantitative ethnomedicinal techniques have great significance as they provide relative importance of plant species to the ethnic group, preference information on different species and may also aid in the conservation of biodiversity¹⁷.

Relative frequency of citation (RFC)

The popular medicine among community was identified by citation-frequency. Logically, popular medicine received very high citations; it is calculated by the following formula¹⁸:

$$\text{Relative frequency of citation (\%)} = \frac{\text{Frequency of citation}}{\sum \text{Frequency of citation of all species}} \times 100$$

$$\text{Frequency of citation (\%)} = \frac{\text{No. of informants who cited the medicine}}{\text{(Total No. of informants interviewed)}} \times 100$$

Informant consensus factor (F_{ic})

In ethnobotanical studies, consensus analysis provides a measure of reliability for any given claim providing reliable evidence. For this purpose the informant consensus factor (F_{ic}) was employed to determine the consensus between the informants for specific use category. It is calculated as the number of mentions in each usage category (n_{ur}) minus the number of taxa used in each category (n_t), divided by number of mentions in each usage category minus one¹⁹. The F_{ic} values range between 0 and 1:

$$F_{ic} = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Use value (UV_{is})

The use value provides information on the relative usefulness of the plants to the cultural group/community²⁰, it was calculated as follows:

$$UV_{is} = \frac{\sum UV_{is}}{n_{is}}$$

Where U_{is} equals the number of uses mentioned in each event by informant (i) and n_{is} is number of events for species (s) with informants (i). The n_{is} varies with day to day work even a single person is

counted more than one individual. In some case, informants give information in instalments, then, each instalment is counted as separate event and $\sum U_{is}$ was separately counted³.

Fidelity Level (FL)

Fidelity level helps in identification of species according to their relative effectiveness²¹; it was calculated as follows:

$$FL = \frac{I_p \times 100}{I_u}$$

Where I_p refers to the number of informants who independently suggested the use of a species for same major purpose and I_u refers to total number of informants who mentioned the plant for the treatment of any given disease.

Results

During present study 44 informants were interviewed and altogether of 114 plants species were documented during the survey which were claimed to be used in about 216 remedies. However, 44 species and about 67 remedies are similar to earlier publications from different parts of the Nepal. Hence, we have omitted the repeated information and provided only new claims for 70 species of medicinal plants with 171 remedies (Table 1). A comparative study was performed to find out the novelty of these ethno-medicinal claims.

Discussion

Observations

Out of 70 species, 64 are wild and six are cultivated. Except *Adiantum capillus-veneris* (Pteridophyte), all the species are angiosperms distributed in 68 genera and 47 families. The most important families in terms of number of taxa were Fabaceae (10 species), Araceae (5 species), Asteraceae and Verbenaceae (4 species each), Acanthaceae and Labiatae (3 species each). The rest of the families are represented by either two or one species each. Among the 171 remedies recorded, fruit is most frequently used plant part and herbs are most frequently used life forms. There are number of methods for remedy preparations, viz. decoction, tea, infusion, juice, oil, latex, smoke, poultice, paste, powder, etc. (Fig. 2).

The females have better therapeutic knowledge than males because most of the year male members moved

Table 1 — Enumeration of plant species used in Ethno-medicine by *Magar* tribes of Palpa district, Nepal

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
1.	<i>Acacia nilotica</i> (L.) Willd. ex Del., Leguminosae, Wild, Tree. AGS- 188	<i>Babool</i> (N/M)	1.37	Sbk:diarrhoea, and dysentery Lf: tooth ache Tsh: bleeding gums	1.54 1.54 1.04	37.5 37.5 25	100 g boiled in 2 L of water for 30 min Decoction Toothbrush	Oral; 2 × 1 Mouthwash 2 × 1
2.	<i>Achyranthes aspera</i> L., Amaranthaceae, Wild, Herb. AGS- 33.	<i>Datiwan</i> (N), <i>Apamarga</i> (M)	1.62	Wp: kidney stones Wp: urinary tract infection Rt: fever	1.04 2.06 1.03	25 50 25	Juice A small piece tied around neck	Oral; 2 × 1 External; till cure
3.	<i>Acmella calva</i> (DC.) Jansen. Compositae, Wild, Herb. AGS- 121	<i>Marethi</i> (N)	1.50	Wp: skin diseases	1.03	100	Crushed	Ointment; 4 × 1
4.	<i>Adiantum capillus-veneris</i> L., Adiantaceae, Wild, Herb. AGS- 162	<i>Uneu</i> (N/M)	1.33	Lf: stop bleeding form cuts and wounds Lf: fever	1.54 1.54	50 50	Paste 10 g of fresh leaves crushed and boiled in one liter of water for 15 min	Ointment Oral; 2 spoons, 2 × 1 for 7 days
5.	<i>Ageratum conyzoides</i> L., Compositae, Wild, Herb. AGS- 49	<i>Ganauneghans</i> (M), <i>GandheJhar</i> (N)	1.33	Lf: antiseptic in piles	1.54	100	Decoction	External
6.	<i>Amaranthus tricolor</i> L., Amaranthaceae, Wild, Herb. AGS-57	<i>Raato latte</i> (N)	1.20	Lf: abscesses and septic ulcers Lf &sd: check bleeding in prolonged menstruation Lf: fever	3.09 2.57 2.06	40 33.3 26.6	Leaf paste Decoction Decoction	Ointment Oral; 2 × 1 Oral; 2 × 1
7.	<i>Amorphophallus campanulatus</i> (Decne) Sivad, Araceae, Wild, Tuberos herb. AGS-72	<i>Kaan</i> (N)	1.36	corms: dysentery corm: hydrocele corm: asthma Corm: piles	1.03 1.54 1.54 1.54	18.1 27.2 27.2 27.2	Uncooked corms Uncooked corms Dried corm powder with warm water About 100 g corm crushed with 20 g <i>Titari</i> (<i>Tamarindus indica</i>)	Oral Oral; 3 × 1 Oral; 3 × 1 Oral; 2 × 1 for 2 weeks
8.	<i>Ampelocissus divaricata</i> (Wall. ex Lawson) Planch. Vitaceae, Wild, Trailing herb. AGS-124	<i>AiriLahara</i> (N), <i>Pureni</i> (M)	1.33	fr: flatulence & indigestion	1.54	100	Juice	Oral; 2 × 1
9.	<i>Anagalis arvensis</i> L., Primulaceae, Wild, Herb. AGS-355	<i>Armale</i> (N)	1.28	Wp: expectorant in arthritis & lung diseases Wp: skin itching	1.54 2.06	42.8 57.1	Decoction Juice	Oral; 2 × 1 Ointment; 3 × 1
10.	<i>Ananas comosus</i> (L.) Merr. Bromeliaceae, Cultivated, Herb. AGS- 336	<i>BhuinKathar</i> (N/M)	1.33	fresh lf: constipation ripe fr: skin diseases	0.51 2.06	6.6 26.6	Juice Fresh juice	Oral; 1 × 1 Ointment; 3 × 1

Contd.

Table 1 — Enumeration of plant species used in Ethno-medicine by *Magar* tribes of Palpa district, Nepal (*contd.*)

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
				ripe fr:cough	1.54	20	Fresh fruit juice mixed with honey and 2-3 bulblets of <i>Lahsoon</i> (<i>Allium sativum</i>)	Oral; 3 × 1 till cure
				fr: pinworms in intestine	2.06	6.6	Fresh ripe fruit	Oral
				unripe fruit: cause abortion	1.54	20	About 200 mL juice of unripe fruit	Oral; 1 × 1 for one week
11.	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees, Acanthaceae, Wild, Herb. AGS-158	<i>Kaalmegh</i> (N)	1.25	Wp: diabetes	2.06	100	Decoction	Oral; 2 spoonful, 2 × 1
12.	<i>Annona squamosa</i> L., Annonaceae, Cultivated, Small Sized Tree. AGS-129	<i>Sitaphal</i> (N)	1.25	Bk: tonic	2.06	100	About 100 g boiled in 100 mL water	Oral; 1 × 1
13.	<i>Arisaema tortuosum</i> (Wall.) Schott, Araceae, Wild, Herb. AGS- 403	<i>Baanko, Sarpako Makai</i> (N)	1.33	Rh: scorpion sting	1.54	100	Paste	Ointment
14.	<i>Barleria cristata</i> L., Acanthaceae, Wild, Shrub	<i>Bhendekuro</i> (N)	1.50	Rt&lf: muscular swelling	1.03	100	Paste	Ointment; 2 × 1
15.	<i>Basella alba</i> L., Basellaceae, Wild, Climbing, Herb. AGS- 124	<i>Poi Sag</i> (N/M)	1.33	tender sh: refrigerant & appetizer	2.06	66.6	Decoction	Oral; 1 × 1
				lf:constipation	1.03	33.3	Decoction	Oral; 2 × 1
16.	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr, Sapotaceae, Wild, Tree. AGS- 90	<i>Mahuwaa</i> (N)	1.18	Bk:rheumatic pain	3.60	43.7	Tea	Oral; one cup, 2 × 1
				Sd:rheumatic pain	3.60	47.7	Seed oil	External; 3 × 1
				Bk:stop bleeding from cuts & wounds	1.03	12.5	Paste	Ointment
17.	<i>Berberis asiatica</i> Roxb., ex DC, Berberidaceae, Wild, Shrub. AGS- 135	<i>Chautari</i> (N), <i>Chautra</i> (M)	1.33	Bk: testis swelling	1.54	100	Decoction prepared from bark mixed with an equal amount of cow's urine	Oral; 25 mL 2 × 1
18.	<i>Bergenia ciliata</i> (Haw.) Sternb. Saxifragaceae, Wild, Herb. AGS- 241	<i>Paakhanved</i> (N/M)	1.25	Rh: bone fracture & break	2.06	100	Rhizome pounded with <i>Hadchur</i> (<i>Viscum album</i>) and <i>Pureni</i> (<i>Ampelocissus divaricata</i>) in ratio of 3:1:1, respectively	Applied as plaster; tied with bamboo sticks
19.	<i>Blumea lacera</i> (Burm. f.) DC., Compositae, Wild, Herb. AGS-119	<i>Kukurghans</i> (N/M)	1.33	Lf: head ache	1.54	100	Extract acts as sedative	Orally; 200 mL, 1 × 1
20.	<i>Boerhavia diffusa</i> L., Nyctaginaceae, Wild, Herb. AGS- 91	<i>Punarnaava</i> (N)	1.50	Tender shoot: anemia	2.06	66.6	Decoctions along with jaggery or common salt	Oral; 15-20 mL, 2 × 1
				Tender shoot: cough & asthma	1.03	33.3	Decoctions along with jaggery	Oral; 20-30 mL, 2 × 1
21.	<i>Bryophyllum pinnatum</i> (Lam.) Oken, Crassulaceae, Wild, Succulent Herb. AGS- 128	<i>Ajammarijhar</i> (N), <i>Pattharchatta</i> (M)	1.50	Lf: refrigerant & anti-inflammatory	1.54	50	Decoctions	Oral; 15-20 mL, 2 × 1
				Lf: cholera	1.54	50	Juice	Oral; 10-15 mL, 2 × 1

Contd.

Table 1 — Enumeration of plant species used in Ethno-medicine by *Magar* tribes of Palpa district, Nepal (*contd.*)

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
22.	<i>Callicarpam acrophylla</i> Vahl, Verbenaceae, Wild, Shrub. AGS- 198	<i>Daheechaunle</i> (N)	1.50	Fl & Fr: fever Fl&sd: rheumatoid arthritis	1.03 1.03	50 50	Raw Paste	Oral; 2 × 1 Ointment; 2 × 1
23.	<i>Calotropis procera</i> (Aiton) Dryander, Asclepiadaceae, Wild, Shrub. AGS-184	<i>SetoAank</i> (N/M)	1.57	Latex: sprains Lf: abdomen pain and muscular swelling Lf: cold and cough	1.03 1.54 1.03	28.5 42.8 28.57	Fresh latex Warm the leaves along with cow's ghee on the fire Smoke of leaves	External; 3 × 1 External Inhale; 2 × 1
24.	<i>Capparis zeylanica</i> L., Capparaceae, Wild, Climbing Shrub. AGS- 176	<i>KukurKande</i> (N), <i>BaghMukhe</i> (M)	1.37	rtbk: stomach ache Lf: glandular swelling Lf: syphilis	1.03 1.03 2.06 1.03	25 25 50 25	Paste Paste Decoction	Oral; 2 spoonful, 2 × 1 Ointment Oral; 20 mL, 1 × 1
25.	<i>Carum copticum</i> C. B. Clark, Umbelliferae, Wild, Herb. AGS-141	<i>Jwaano</i> (N/M)	1.20	Sd: rheumatic pain	2.57	100	Seed oil	External
26.	<i>Cassia alata</i> L., Leguminosae, Wild, Shrub. AGS- 139	<i>Adharphool</i> (N)	1.28	Lf: ringworm Rt: indigestion	2.06 1.54	57.1 42.8	One handful leaves are crushed Decoction along with a pinch of common salt	Ointment; 3 × 1 till cure Oral; one spoonful, 2 × 1
27.	<i>Cassia occidentalis</i> L., Leguminosae, Wild, Herb AGS- 134	<i>Chakmake</i> (N)	1.50	Rt: intestinal worms	1.03	100	A handful of root is boiled in 2 L of water till volume remains half	Oral; spoonful, 1 × 1 for a week
28.	<i>Cassia tora</i> L., Leguminosae, Wild, Herb. AGS- 138	<i>Tapre</i> (N), <i>ChhinchhineJhar</i> (M)	1.28	Sd: insomnia	2.06	100	Chewed after dinner	Oral; 3-4 seeds 1 × 1 after dinner
29.	<i>Celosia argentea</i> L., Amaranthaceae, Wild, Herb. AGS- 376	<i>Sahastrajari</i> (N)	1.50	Sd: inflammation of cornea	1.03	100	Paste diluted in water	Eye drop; 3 × 1
30.	<i>Cissampelos pareira</i> L., Menispermaceae, Wild, Climbing Herb. AGS- 182	<i>BatuleLahara</i> (N), <i>Badal pate</i> (M)	1.50	Lf: bone fractures	1.03	100	Bruised	Bandage
31.	<i>Cleome viscosa</i> L., Capparaceae, Wild, Herb. AGS- 115	<i>Ban Methi</i> (N), <i>Hurhure</i> (M)	1.27	Lf: ear pain Lf: head ache Sd: wound	2.06 1.54 2.06	36.3 27.2 36.3	Leaf juice boiled in mustard oil Poultice of leaves Paste	Ear drop; 3 × 1 External Ointment
32.	<i>Clerodendrum viscosum</i> Vent., Verbenaceae, Wild, Shrub. AGS- 148	<i>Bhait</i> (N)	1.33	Lf: sugar	1.54	100	Raw or are mixed with vegetable	Oral; 1 × 1
33.	<i>Clitoria ternatea</i> L., Leguminosae, Wild, Climbing Shrub. AGS- 117	<i>Gokarna</i> , <i>Sankhpushpi</i> (N/M)	1.28	Rt: head ache Sd: nerve tonic Lf/ rt: dysentery	2.06 1.03 2.06	28.5 28.5 28.5	Paste Decoction Extract	External Oral; 2 spoonful, 1 × 1 Oral; 2 spoonful, 2 × 1
34.	<i>Commelina paludosa</i> Blume, Commelinaceae, Wild, Herb. AGS- 85	<i>Kane Sag</i> (N)	1.25	Sd: muscular pain Rt: indigestion	1.03 2.06	14.2 100	Paste Juice	External Oral; 5-10 mL, 2 × 1

Contd.

Table 1 — Enumeration of plant species used in Ethno-medicine by *Magar* tribes of Palpa district, Nepal (*contd.*)

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
35.	<i>Curcuma aromatica</i> Salisb., Zingiberaceae, Wild, Herb. AGS- 166.	<i>Ban Haledo</i> (N), <i>Ban Beswar</i> (M)	1.25	Rh: back ache	2.06	100	Decoction	Oral; 15 mL, 1 × 1
36.	<i>Desmodium gangeticum</i> (L.) DC., Leguminosae, Wild, Shrub. AGS- 168.	<i>Kachaurijhar</i> (N)	1.33	Rt: diarrhoea	1.54	100	Juice	Oral; spoonful, 2 × 1
37.	<i>Eleusine coracana</i> (L.), Gaertn, Gramineae, Cultivated, Herb. AGS- 156	<i>Kodo</i> (N), <i>Rangkwa</i> (M)	1.60	Sd: diuretic	1.54	60	Powder	Oral; spoonful, 2 × 1
				Sd: ring worm	0.51	20	Paste	Ointment; 3 × 1
				Sd: fractured bone	0.51	20	Seeds are crushed with <i>Hadchur</i> (<i>Viscum album</i>) and <i>Shikari Lahara</i> (<i>Scindapsus officinalis</i>) in 3:1:1 ratio, respectively	Bandage
38.	<i>Heliotropium indicum</i> L., Boraginaceae, Wild, Herb. AGS- 186	<i>Haatisude</i> (N)	1.66	Young shoot: rabies	1.03	33.3	Extract is mixed with equal amount of <i>Pyaz</i> (<i>Allium cepa</i>) extract	Oral; one cup, 2 × 1
				Lf: fever	1.54	50	Juice	Oral; 2 × 1
				LF: eye redness & conjunctivitis	0.51	16.6	Juice	Eye drop; 4 × 1
39.	<i>Leucas cephalotes</i> (Roth) Spreng., Labiatae, Wild, Herb. AGS- 120	<i>Dronpushpi</i> (N), <i>Gumpati</i> (M)	1.66	Lf & Fl: cough & fever	1.54	100	Extract is mixed with a pinch of <i>Kalo Marich</i> (<i>Piper nigrum</i>) powder	Oral; one cup, 2 × 1
40.	<i>Lycopodium clavatum</i> L., Lycopodiaceae, Wild, Trailing shrub. AGS-197	<i>Naagbeli</i> (N/M)	1.33	Spore: indigestion	1.54	100	A pinch of spore chew	Oral; 2 × 1
41.	<i>Macrotyloma uniflorum</i> (Lam.) Verdcourt, Leguminosae, Cultivated, Herb. AGS- 205	<i>Gahat</i> (N/M)	1.40	Sd: Jaundice	1.54	60	Decoction	Oral; one cup, 2 × 1
				Sd: leucorrhoea	1.03	40	Infusion	Oral; one cup, 2 × 1
42.	<i>Moringa oleifera</i> Lam., Moringaceae, Wild, Tree. AGS- 93	<i>Shitalchini</i> (N)	1.20	Lf: choked voice	1.03	20	Leaves squeezed with salt on palm and mixed with few drops of lime juice	External around the neck
				Sd: blood pressure	4.12	80	Eaten raw	Oral; 4-5 seeds, 1 × 1
43.	<i>Morus indica</i> L., Moraceae, Wild, Tree. AGS- 386	<i>Kimmukafal</i> (N), <i>Kimbu</i> (M)	1.43	Bk: inflammation of vocal cords	2.06	25	Decoction	Gargle after food
				Rt: anthelmintic	2.06	25	Decoction	Oral; one cup after dinner, 1 × 1 for 3 days
				Bk: gingivitis	1.03	12.5	Paste	Ointment
				Fr: diarrhoea and dysentery	2.06	25	Eaten raw	Oral
				Fr: cough & cold	1.03	12.5	Juice	Oral; one cup, 2 × 1
44.	<i>Nephrolepis cordifolia</i> (L.) C. Presl., Nephrolepidaceae, Wild Herb. AGS- 354	<i>Paaniamalla</i> (N/M)	1.55	tuberous rt: indigestion	2.06	44.4	Juice	Oral; 2 spoonful, 2 × 1
				tuberous rt: appetizer	1.54	33.3	Eaten raw	Oral
				tuberous rt: cold, cough & fever	1.03	22.2	Juice	Oral; one cup, 2 × 1 till cure

(contd.)

Table 1 — Enumeration of plant species used in Ethno-medicine by *Magar* tribes of Palpa district, Nepal (*contd.*)

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
45.	<i>Nerium oleander</i> L., Apocynaceae, Wild, Shrub. AGS- 209	Karbir (N)	1.44	Lf: ringworm & scabies	2.06	44.4	Paste	Ointment: 2 × 1
				Fr latex: expel spines	2.06	44.4	Fresh latex of fruit	Ointment; 4 × 1
				Lf: inflammation	0.51	11.1	Roasted leaves	External; bandage
46.	<i>Nyctanthes arbor-tristis</i> L., Oleaceae, Wild, Shrub. AGS- 383	Paarijaat (N)	1.27	Fl: diabetes	2.06	36.3	Juice	Oral; one spoonful, 2 × 1
				Fl: inflammation	2.06	36.3	Juice	Oral; 2 spoonful at morning
				Sd: scurvy	1.54	27.2	About 10 g crushed	Oral; 2 × 1 for 2 weeks
47.	<i>Ocimum gratissimum</i> L., Labiatae, Wild, Herb. AGS- 200	BanTulsi (N/M)	1.50	Lf: gonorrhoea	0.51	12.5	Decoction	Oral; one cup, 2 × 1 till cure
				Sd: head ache	2.06	50	Paste	External
				Wp: rheumatic pain & swelling.	1.54	37.5	Fresh juice	External; 2 × 1
48.	<i>Oxalis corniculata</i> L., Oxalidaceae, Wild, Herb. AGS- 152	Chariamilo (N)	1.28	Lf & tender shoot: scurvy	1.54	50	Fresh juice	Oral; spoonful, 3 × 1
				Lf: jaundice	2.06	50	Fresh juice	Oral; one cup, 2 × 1
49.	<i>Phoenix humilis</i> Royle ex Beccari and Hook. f., Palmae, Wild, Small Sized Tree. AGS- 223	Thakal (N)	1.33	Fr: persistent cough	2.06	66.6	Eaten raw	Oral
				tuber: lung diseases	1.03	33.3	Paste of tuber, water sap of root of <i>Kera</i> (<i>Musa paradisiaca</i>), and powder of kernel of <i>Aam</i> (<i>Mangifera indica</i>) are mixed thoroughly in equal amount	Oral; 3 × 1 till cure
50.	<i>Phyla nodiflora</i> (L.) Greene, Verbenaceae, Wild, Herb. AGS- 221	Jal pippali (N)	1.50	Lf: gonorrhoea	1.03	50	Infusion with a pinch of <i>Jira</i> (<i>Cuminum cyminum</i>) fruit powder	Oral; spoonful, 2 × 1
				Wp: cough	1.03	50	Decoction	Oral; spoonful, 3 × 1 till cure
51.	<i>Phyllanthus amarus</i> Schumach. & Thonn., Euphorbiaceae, Wild, Herb. AGS- 178	Bhuinamala (N)	1.28	Lf: diarrhoea	1.54	42.8	Extract	Oral; 10 ml, 3 × 1
				Fresh rt: fever	2.06	57.1	Decoction	Oral; 10 ml, 3 × 1
52.	<i>Piper longum</i> L., Piperaceae, Wild, Climber. AGS- 374	Ban Pipla (N)	1.14	Fr: rheumatic pain	3.60	100	Two fruits taken with milk at bed time	Oral; 2 fruits, 1 × 1 for 1 months
53.	<i>Plumbago zeylanica</i> L., Plumbaginaceae, Wild, Shrub. AGS- 173	Chitu, Teete (N/M)	1.40	Wp: cold and cough	2.06	80	Paste is taken with milk	Oral; spoonful, 2 × 1
				RT: muscular pain	0.51	20	Paste	External
54.	<i>Pogostemon benghalensis</i> (Burm. f.) Kuntze, Labiatae, Wild, Shrub. AGS- 240	Rudilo (N)	1.42	Wp: head ache	2.06	57.1	Juice	External
				Rt: hematuria	1.54	42.8	About 50 g root boiled in 1 L of water till the volume remains two cup	Oral; one cup, 2 × 1

(contd.)

Table 1 — Enumeration of plant species used in Ethno-medicine by *Magar* tribes of Palpa district, Nepal (*contd.*)

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
55.	<i>Pongamia pinnata</i> (L.), Pierre, Leguminosae, Wild, Tree. AGS- 357	<i>Kaarengae</i> (N)	1.37	Rt: wounds	2.06	25	Juice mixed with equal amount of coconut water and boiled	Ointment; 3 × 1
				Sd: fever	2.06	25	4-5 seeds crushed with 2 seeds of <i>Kalomarich</i> (<i>Piper nigrum</i>) and 4-5 pellets are prepared	Oral; 2 pellets, 2 × 1
				Sd: rheumatic pain & swelling	1.03	12.5	The seed oil is applied externally twice a day for rheumatic pains and swelling until recovery.	
				Bk: ringworm	3.09	37.5	Bark crushed and boiled in in <i>Aduwa</i> (<i>Zingiber officinale</i>) oil for 10 min	Ointment; 2 × 1
56.	<i>Premna barbata</i> Wall. ex Schaure, Verbenaceae, Wild, Small Sized Tree. AGS- 233	<i>Gineri</i> (N/M)	2.0	Bk: fever	1.03	50	Juice	Oral; 10-15 ml, 2 × 1
				Wd: stop bleeding from cuts & wounds	1.03	50	Paste	External
57.	<i>Pterocarpus marsupium</i> Roxb., Leguminosae, Wild, Tree. AGS- 377	<i>Bijaysaal</i> (N/M)	1.42	Wd: anti-inflammatory	2.06	57.1	Decoction of heart wood	Oral; spoonful, 2 × 1
				Wd: diabetes	1.03	28.5	Decoction of heart wood	Oral; spoonful, 2 × 1
				Lf: boils	0.51	14.2	Decoction of bruised leaves	Ointment
58.	<i>Punica granatum</i> L., Punicaceae, Cultivated, Small Sized Tree. AGS- 242	<i>Anar</i> (N), <i>Darim</i> (M)	1.25	Rt& Bk: week gums	2.06	100	Juice of root and stem barks	Oral; one cup, 1 × 1
59.	<i>Rubus ellipticus</i> Sm., Rosaceae, Wild, Shrub. AGS- 390	<i>Aisenlu</i> (N), <i>Chighwong</i> (M)	1.75	Rt: wounds	2.06	100	Paste	Ointment; 2 × 1
60.	<i>Scindapsus officinalis</i> (Roxb.) Schott, Araceae, Wild, Climber. AGS- 382	<i>Kanchiro</i> (N), <i>ShikariLahara</i> (M)	1.60	Rt: cough & bronchitis	2.57	50	About 10 g root powder taken with lukewarm water	Oral; 2 × 1
				Rt: bone fracture	1.54	30	Roots of <i>Shikari Lahara</i> (<i>Scindapsus officinalis</i>), <i>Hadchur</i> (<i>Viscum album</i>) and grains of <i>Kodo</i> (<i>Eleusine coracana</i>) are pounded together in ratio of 3:1:1, respectively.	External; bandage with support of Bamboo stick
61.	<i>Scoparia dulcis</i> L., Scrophulariaceae, Wild, Herb. AGS- 360	<i>Mithajhar</i> , <i>Patalmisri</i> (N)	1.22	Fr: cuts & wounds	1.03	20	Powder	External
				Wp: cuts & wounds	2.06	44.4	Juice mixed with leaf juice of <i>Kurkure Jhar</i> (<i>Blume alacera</i>) in equal amount	External; 2 × 1
				Aerial parts:tooth ache	2.06	44.4	Decoction	Gargled; 3 × 1
				Rt: tooth cavity	0.51	11.1	Extract	Applied on cavity after food

(contd.)

Table 1 — Enumeration of plant species used in Ethno-medicine by Magar tribes of Palpa district, Nepal (contd.)

S. No.	Botanical name, family, growth forms, wild/cultivated, Voucher number	Local name	UV	Parts: ailment treated	RF	FL	Preparation	Application; Dosage & duration
62.	<i>Sida cordifolia</i> L., Malvaceae, Wild, Shrub. AGS- 56	Balu (N)	1.37	Wp: rheumatic pain RT: burning sensation during urination Rt: jaundice	2.06 1.54 0.51	50 37.5 12.5	Juice Juice One cup root juice & one spoon sugar mixed	Oral; spoonful, 2 × 1 Oral; one cup, 2 × 1 Oral; one cup, 1 × 1 till cure
63.	<i>Solanum capsicoides</i> All., Solanaceae, Wild, Spinous Herb. AGS- 125	Ban Kantkari (N/M)	1.66	Rt: cough, asthma & chest pain Fr: sever tooth ache & also expels worms from teeth	2.06 1.03	66.6 33.3	Decoction Smoke from the dried fruits	Oral; 2 × 1 one week Smoke; 3 × 1
64.	<i>Solanum surattense</i> Burm. f., Solanaceae, Wild, Spinous Herb. AGS- 317	Kantkari (N/M)	2.0	Wp: cough, fever & chest pain Fr: sore throat Wp: skin itching Wp: hair fall	1.54 0.51 0.51 0.51	42.8 14.2 28.5 14.2	Decoction Juice Paste Paste	Oral; 2 spoonful, 2 × 1 for a week Oral; 1 × 1 Ointment; 2 × 1 External
65.	<i>Spilanthes paniculata</i> Wall. ex DC., Compositae, Wild, Herb. AGS-46	Bhuintimur (N)/ Entire plant parts	1.50	Fl: stomach pain Wp: snake bite	1.54 0.51	33.3 66.6	Juice Paste	Oral; one cup, 1 × 1 Ointment; 2 × 1
66.	<i>Tamarindus indica</i> L., Leguminosae, Wild, Tree. AGS- 51	Tale amilo, Imali (N), Titari (M)	1.42	Lf: inflammation Lf: chicken pox Lf: boil	2.06 0.51 0.51	57.1 14.2 28.5	Paste Paste Paste	External Ointment Ointment
67.	<i>Trichilia connaroides</i> (Wight and Arn.) Benth., Meliaceae, Wild, Tree. AGS- 87	Aankhtaruwaa (N/M)/ Root bark, Leaf, and Seed.	1.50	BK & lf: cholera Rt: irregular menstrual cycle	0.51 1.54	40 60	Decoctions Root juice	Oral; one glass, 3 × 1 Oral; 2 spoonful, 2 × 1 till recovery
68.	<i>Urtica dioica</i> L., Urticaceae, Wild, Herb. AGS- 108.	Sisnu (N), Gheu (M)	1.50	Lf: dog bite	1.03	100	Juice	Oral; one cup, 2 weeks
69.	<i>Xeromopsis spinosa</i> (Thunb.) Keay, Rubiaceae, Wild, Spiny Shrub. AGS- 98	Mainiphala (N/M)	1.37	Rt: bone ache during fever Bk: rheumatism Fr: persistent cough	2.06 0.51 1.54	50 12.5 37.5	One cup decoction taken orally and also paste applied externally Paste Fruit eaten raw	Oral & external; 1 × 1 External; 2 × 1 Oral
70.	<i>Zanthoxylum armatum</i> DC., Rutaceae, Cultivated, Tree. AGS- 126	Timur (N/M)	1.25	Fr: cold & cough	2.06	100	Powdered fruits	Oral; spoonful, 2 × 1 till cure

Abbreviations: N, Nepali; M, Magar; UV, use value; RF, relative frequency of citation; ap, aerial part; bl, bulb; fl, flowers; fr, fruits; lf, leaves; rt, roots; rh, rhizome; rbk, root bark; sd, seeds; sbk, stem bark; st, stem; wp, whole plant; 1 × 1, once a day; 2 × 1, twice a day; 3 × 1, thrice a day; 4 × 1, four times a day.

away for their livelihood and female deal common ailments in home, similar observations were also reported in other studies^{22,23}. As far as the life form of medicinal plants used by the Magar community in the study area is concerned, highest number of plants belongs to herbs (36), it was followed by shrubs (17), trees (13) and climbers (4). Higher uses of herbs for

medicinal purposes may be due to easy availability and high effectiveness in the treatment of ailments in comparison to other growth forms^{23,24}.

Ailments treated

The common ailments in the community are diarrhoea, cough, cold, fever, asthma, bodyache,

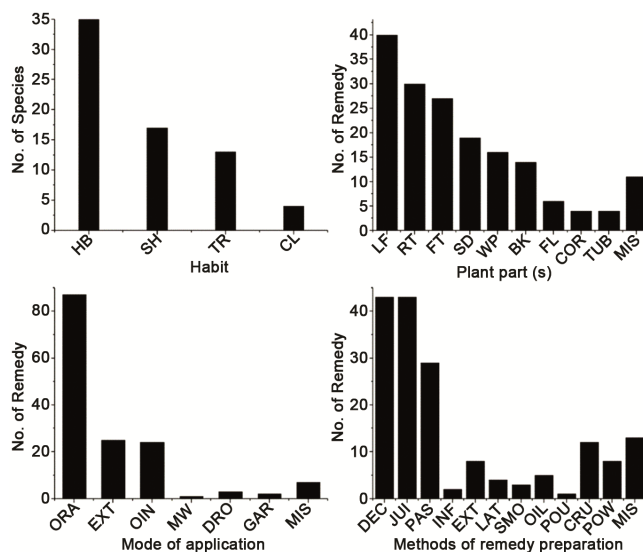


Fig. 2 — Habit, plant parts, mode of application and remedy preparation.

arthritis, cut, wound and constipation. Even after advent of modern medicines, people in remote areas are dependent on traditional therapy for primary healthcare management may be due to faith in system, easy availability and low price. Remedies for the treatment of 104 different ailments were documented during the survey. The reported ailments were categorised in to 11 broad categories: dermatological disorders (22 remedies), gastro-intestinal disorders (21 remedies), skeleto-muscular pain and swelling (18 remedies), respiratory disorders (11 remedies), urogenital problems (9 remedies), fever (8 remedies), oral and dental problems (6 remedies), diabetes (4 remedies), ear, nose, and throat (4 remedies), scurvy (3 remedies) and others (14 remedies). Large number of new ethnomedical claims are recorded against dermatological and gastro-intestinal ailments may be due to people are still using traditional medicines for these ailments and the ailments are prevalent in the study area. Fever is a common ailment but number of new medicines are less. Because slow impact of traditional medicines may complicate the ailment therefore people don't take risk and use modern medicines.

Use value (UV), informant consensus factor (Fic), fidelity level (FL) and relative frequency of citation (RFC)

The quantitative techniques are essential for effective analysis of data and measurement of reliability for any given claim. The user value is used to calculate the relative importance of different

species for the community/cultural group³. Maximum user value of 2.00 was recorded for *Premna barbata* and *Solanum surattense*. *Premna barbata* was employed for fever and as antiseptic whereas *Solanum surattense* is used against fever, cough, chest pain, sore throat, skin itching and hair fall. The minimum user value was 1.14 for *Piper longum*. It was used in the treatment of rheumatic pain. *Piper longum* is very popular medicine for cough and cold in Nepal and in Magar community. But the species is already published as traditional medicines for cough and cold by various authors^{9,25-27}.

In ethnobotanical studies, informant consensus factor (Fic) is the agreement of informants for the treatment of various ailments; it provides a measure of reliability for any given claim providing reliable evidence. The product of Fic ranges from 0 to 1. High value of Fic indicates the agreement of selection of taxa between informants, whereas a low value indicates disagreement. During the present study the informants' consensus about usages of medicinal plants ranges from 0.4 for ear, nose and throat disorders to 0.76 for skeleton-muscular ailments. An average value of 0.70 shows high level of agreements among the informants for the treatment of some ailment categories. The high level of consensus among the informants about the usages of medicinal plants for the treatment and prevention of various diseases and ailments prevalent in the study area suggests that the ethnomedical uses of plants are currently in practice in the study area²⁷.

Some medicinal plants are frequently employed in traditional medicines these are: *Amaranthus tricolor* for (6 informants), *Madhuca longifolia* for rheumatic pain (7 informants), *Moringa oleifera* for blood pressure (8 informants), *Piper longum* for rheumatic pain (7 informants) and *Pongamia pinnata* for ring worm (6 informants). Relative frequency of citations for these remedies is higher than three. The best method to find out the efficiency of the medicine is to consult the patients who have adopted the traditional medicines but it is practically not possible in field. Fidelity level is used to recognize the relative effectiveness of medicinal plants for particular ailment. Logically, plant species popular for treatment of a particular ailment possess healing properties because it is tested over time by healers and patients^{23,27,28}. However, plants with similar FL values have different number of informants thus may vary in their healing potential. It may be corrected by relative

frequency of citations (popularity level). We have considered 50 % of the highest number of informants as threshold of popularity level²³. In present study maximum number of informants for a particular ailment is 8. Therefore, remedies cited by 4 or more informants have been considered as popular. Our study indicates that 2.06 RFC value is equivalent to four informants; it means remedy with 2.06 or higher RFC value is popular among *Magar* communities. Further, we have considered remedies with FL value 50 or more as relatively effective. Hence, FL and RFC values together give more precise information^{21,23}.

The uses of some high value ethnomedicinal claims are similar to other ethnomedicinal and pharmacological studies reported from different parts of the world: *Achyranthus aspera*²⁹, *Anagalis arvensis*³⁰, *Andrographis paniculata*³¹, *Capparis zeylanica*³², *Carum copticum*³³, *Cassia alata*³⁴, *Moringa oleifera*³⁵, *Oxalis corniculata*³⁶, *Phyllanthus amarus*³⁷, *Piper longum*³⁸, *Pterocarpus marsupium*³⁹, *Punica granatum*⁴⁰, *Rubus ellipticus*⁴¹, *Scindapsus officinalis*⁴², *Sida cordifolia*⁴³, *Tamarindus indica*⁴⁴, and *Zanthoxylum armatum*⁴⁵.

Conclusion

The present finding reveals that the peoples of the study area have sound knowledge on the use of different medicinal plant species for their own healthcare management. They have acquired such knowledge from their long-term experiences and practices as well as from their ancestors. Therefore, the remedies having high RFC and FL values may be employed in pharmacological studies for the possible come out with useful medicines, viz. *Moringa oleifera* for blood pressure, *Basella alba* as refrigerant and appetizer, *Carum copticum* and *Piper longum* for rheumatic pain and *Pongamia pinnata* for ringworm. The traditional home remedy knowledge and biodiversity are on decline. Therefore, it is recommended that: (a) forest department should provide suitable guidelines and training to the people on the identification, sustainable harvesting and conservation of medicinal plants; (b) motivation camps for the traditional healers as well as younger generation to practice and conserve the traditional medicinal plants.

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