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---------- *ORIGINAL RESEARCH ARTICLE*

The Use of Ethnomedicinal Plants by the People of Bharat Pokhari, Kaski

Suraj Raj Adhikari[1]
Kusum Pokhrel[2]
Narayan Dutta Bastakoti[3]
Bimal Kuwar (PhD)[4]
[1,3,4]Department of Botany, Prithvi Narayan Campus, Pokhara
[2]Research, Community Development and Conservation Centre (C3DR), Pokhara

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Corresponding Author:
Suraj Raj Adhikari
Email: adhikarisr@gmail.com

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Tel.: +977-61-576837
Email: research@pncampus.edu.np
URL: www.pncampus.edu.np

ABSTRACT

Ethnomedicine is the study of traditional uses of plant by people who live in rural areas. The present study is the documentation of traditional knowledge on plant utilization by local people in Bharat Pokhari, Kaski and was conducted during February-July 2020 by using the following methods. Data about medicinal uses of plants were collected using the questionnaire, personal interview and group discussion. Voucher specimens were collected from informants and identified with the help of available literature and taxonomic experts. The plant species were then categorized based on their medicinal uses. During the study, 56 medicinal plant species belonging to 36 families were documented. These plants have been used to treat various diseases. The highest number of species (20) being used for gastro-intestinal disorders, followed by bone and muscular ailments (13), cold and cough (11) and respiratory system ailments (10). In the study area, the popularly used medicinal plant species are Acacia pennata Willd, Acorus calamus L., Aloe vera (L.) Burm.f., Azadirachta indica A. Juss., Cassia fistula L., Centella asiatica (L.) Urb., Ocimum sanctum L., Terminalia chebula Retz., and Viscum album L.

KEYWORDS: Medicinal plants, traditional healers, treatments, species

INTRODUCTION

Traditional medicines are the primary health care resources in the local community in several countries (Fidelis *et.al.* 2018). They are cost-effective, safe and

affordable (WHO 2002). About 80% of people in the world depend upon traditional medicines, according to the World Health Organization (WHO) (Yabesh 2014). The medicinal use of plant is gradually increasing in the developed countries (Bernal 2011) because they have minor or no side effects (Jordan 2010). Ethnomedicinal studies are significant to discover new drugs from indigenous medicinal plant resources (Njoroge 2004; Mahmood 2000). Ethnomedicine is the study of traditional uses of plant by people who live in rural areas, and this ethnomedicine is affected by various factors such as economic activity, socio-economic level, and access to new health care systems, age, gender, and urbanization (Pérez-Nicolás 2017). The documentation of traditional knowledge of native plant species has contributed the source of vital drugs (Colvard 2006). The fundamental role of natural products in the development of new drugs has been reported (Verpoorte 2006; Cordell 2012).

About 90% of Nepali people reside in rural areas where access to government health care facilities is scarcity (Bhattarai *et.al.* 2006). Thus, rural people mostly rely on traditional medicinal practices. However, the valuable traditional knowledge is not properly promoted; it is mainly transmitted generation-by-generation in the oral form (Cussy-Poma *et.al.* 2017). Due to this fact, there is high potentiality of loss of the traditional knowledge although the documentation of indigenous and traditional knowledge is very important for future to sustainable utilization of natural resource. This study aims to document the traditional knowledge of medicinal plants in different communities of Bharat Pokhari, Kaski, Gandaki Province, Nepal. The present study was proposed to document the medicinal flora and ethnomedicinal knowledge of local communities on indigenous plants used for medicinal purposes in Bharat Pokhari.

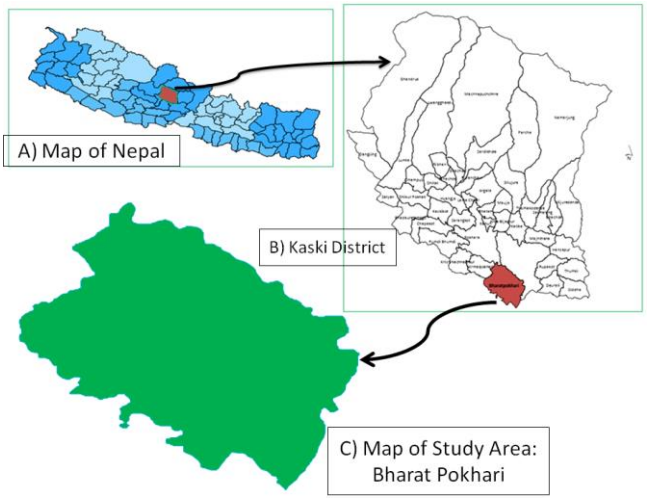
MATERIALS AND METHODS

Description of the study area

The study was conducted in Bharat Pokhari (Pokhara Metropolitan City, Ward No. 33), Kaski, Gandaki Province, Nepal (Fig. No. 1). Bharat Pokhari is a small village situated about 12 Km east-south from Pokhara Airport, Kaski. It is located at 28.074731-28.161749N, 84.000692-84.086007 E, surrounded by Shukla Gandaki Municipality of Tanahu to south and east-south; Taxar of Syanja to the west; Ward No. 30 and 32 of Pokhara Metropolitan to the north-east and Ward No. 14 and 21 to the north-west. The survey site spreads over an area of 44.18 km^2, which is the largest ward of the Pokhara Metropolitan City along with altitudinal variation of 657 m to 1600 m above sea level. According to National Population and Housing Census 2011, a total human population of the study area was 9806, which includes 44.40 % males and 55.60 % females. The vegetation of the study site ranges from tropical to temperate vegetation. The area is inhabited by diverse

Figure 1

Map of Study Area (Bharat Pokhari)



group of people like Chhetri, Brahmin, Magar, Gurung, Newar, etc. The forest resources in this area are under great threat due to the rapid population growth, developmental activity like road construction, deforestation and habitat encroachment.

Data collection and identification of plant species

This study was conducted among the key informants between February-July, 2020 by using semi structured interviews with local people. The ethnomedicinal information was collected via a number of open discussions and interactions with male and female respondents with traditional healers. All the interviews and discussions were conducted in different community of Bharat Pokhari, Kaski. The ethnobotanical data for this research were collected from seven traditional healers (two females and five males) and 41 local respondents (25 females and 16 males). Information regarding the local plant names, part(s) used, methods of preparation and application were documented. After that, the field survey was carried out with the help of the local people to collect information on the available medicinal plants and their conservation status. The collected plant specimens were photographed, and some of them were collected and preserved as herbarium specimens at Prithvi Narayan Campus.

The data were entered in the Microsoft Office Excel 2007 to analyze the information regarding plant families, parts used, ethnomedicinal uses and other uses; data were expressed in terms of number and percentage. The plants were first identified by using literature (The Plant List. 2013; Polunin and Stainton 1984; Press *et. al. 2000*) and consulting with taxonomist; similarly, the reported uses were verified by using the available literature of Nepal (Manandhar 2002; Malla *et. al*. 2015; Uprety *et. al*. 2016).

RESULTS

The study found 56 plant species belonging to 36 families (Table No. 1 shows the details of them). Fabaceae were the most dominant families (with five species), followed by Zingiberaceae (four species), Rutaceae and lamiaceae (three species each), Amaranthaceae, Asteraceae, Combretaceae, Convolvulaceae, Euphorbiaceae, Lauraceae, Poaceae, Polygonaceae and Polypodiaceae (two species each) while other families were represented by only one species. During the interviews, we found that adult people were most familiar with the different types of medicinal plant. In between males and females, females well identified wild plant species than males because they regularly visit forests for firewood or fodder collection.

Table 1

Detail about Plants and Their Usages

S.N.	Botanical name	Family	Local name	Parts used	Usages
1	*Acacia catechu* (L.f.) Willd.	Fabaceae	Khayar	Stem	Bark is used to treat toothache; and wood power is used in intestinal pain.
2	*Acacia pennata* Willd	Fabaceae	Areli	Root	Root is used to treat back bone pain and bone fracture.
3	*Achyranthes aspera* L.	Amaranthaceae	Datiwan	Entire plant	Plant is used to treat diuretic, toothache and asthma.
4	*Acorus calamus* L.	Acoraceae	Bojho	Root	Root is used to treat stomach disorders, bronchitis and fever.

5	*Aegle marmelos* (L.) Correa ex Roxb.	Rutaceae	Bel	Fruit, leaf	Fruit is used to treat diarrhoea and dysentery; leaves is used to treat throat and stomach disorders.
6	*Ageratum conyzoides* L.	Asteraceae	Gandhe jhar	Leaf	Leaf is used to cure bleeding from cuts and wounds.
7	*Aloe vera* (L.) Burm.f.	Xanthorrhoeaceae	Ghiu Kumari	Leaf	Leaf is used to treat lung disease, stomach disorders and skin burns.
8	*Amaranthus spinosus* L.	Amaranthaceae	Kande Lundo	Shoot	Shoot is used to treat leucorrhoea.
9	*Amomum subulatum Roxb.*	Zingiberaceae	Alainchi	Fruit	Fruit is used to treat cold and cough.
10	*Artemisia indica* Willd.	Asteraceae	Tite pati	Leaf	Leaf is used to treat bronchitis and skin diseases.
11	*Asparagus racemosus* Willd.	Liliaceae	Kurilo	Root	Root is used as tonic and urinary problem.
12	*Azadirachta indica* A. Juss.	Meliaceae	Neem	Leaf	Fresh Leaf is used to treat purification of blood and control of sugar level.
13	*Bombax ceiba* L.	Bombacaceae	Simal	Root	Root is used to treat urinary problems and bronchial diseases.
14	*Bryophyllum calycinum* Salisb.	Crassulaceae	Ajambari	Leaf	Leaf is used to treat ear pain.
15	*Cassia fistula* L.	Fabaceae	Rajbrikshya	Fruit	Fruit is used to treat urinary problems.
16	*Centella asiatica* (L.) Urb.	Apiaceae	Ghod Tapre	Entire plant	Plant is used to treat diuretic tonic, blood purification and skin diseases.
17	*Cheilanthes albomarginata* C.B.Clarke.	Pteridaceae	Kali Sinka	Leaf	Leaf is used to treat gastric and stomach pain.
18	*Chenopodium album* L.	Chenopodiaceae	Bethe	Shoot	Shoot is used to treat constipation.
19	*Cinnamomum tamala* (Buch. - Ham.) Nees & Eberm.	Lauraceae	Tej Pat	Leaf	Leaves are used in the treatment of Dysentery, stomachache and digestion.
20	*Citrus limon* (L.) Burm.	Rutaceae	Kagati	Fruit	Fruit is used to treat cold, cough, pimples and dandruff.
21	*Curcuma angustifolia* Roxb.	Zingiberaceae	Kalo haledo	Rhizome	Rhizome is used to treat gastric and stomach pain.
22	*Curcuma longa* L.	Zingiberaceae	Besar	Rhizome	Rhizome is used to treat blood purifier, jaundice and liver disorders as well as it is used as tonic.

23	*Cuscuta reflexa* Roxb.	Convolvulaceae	Aakashbeli	Entire plant	Plant is used to treat fever, headache, jaundice, stomachache and rheumatism.
24	*Cymbopogon citratis* (DC.ex. Nees) Stapf	Poaceae	Kagati ghans	Leaf	Leaf is used to treat cold, cough, headache and fever.
25	*Cynodon dactylon* (L.) Pers.	Poaceae	Dubo	Entire plant	Plant is used to treat cuts and wounds.
26	*Datura metel* L.	Solanaceae	Kalo Dhaturo	Leaf	Leaf is used to treat epilepsy, asthma, joint pains
27	*Drymaria diandra* Blume.	Caryophyllaceae	Abijalo	Entire plant	Plant is used to treat sinusitis.
28	*Drynaria propinqua* (Wall. ex Mett.) Bedd.	Polypodiaceae	Kamaru	Rhizome	Rhizome is used to treat back bone pain.
29	*Euphorbia hirta* L.	Euphorbiaceae,	Dudhe Jhar	Entire plant	Plant is used to treat cuts and wounds.
30	*Hibiscus rosa-sinensis* L.	Malvaceae	Bara mase phool	Leaf	Leaf is used to treat dysentery , diarrhea and reduce heat stress.
31	*Justicia adhatoda* L.	Acanthaceae	Asuro	Leaf	Plant is used to treat cough, asthma, bronchitis, sinusitis, and jaundice.
32	*Lablab purpurea* (L.) Sweet	Fabaceae	Hiude Simi	Leaf	Leaf is used to treat measles.
33	*Lepidium sativum* L.	Brassicaceae	Chamsur	Entire plant	Leaf and seed is used to treat rheumatism and liver problems.
34	Lindera neesiana (Wall. ex Nees) Kurz	Lauraceae	Sil Timur	Fruit	Fruit is used to treat stomach problem.
35	*Mentha spicata* L.	Lamiaceae	Pudina	Entire plant	Plant is used to treat throat infection and indigestion.
36	*Mimosa pudica* L.	Fabaceae	Lajabati jhar	Entire plant	Plant is used to treat diarrhoea, dysentery and leucorrhoea.
37	*Musa paradisiaca* L.	Musaceae	Kera	Fruit	Unripe fruits are used to treat diarrhoea and dysentery.
38	*Ocimum sanctum* L.	Lamiaceae	Tulsi	Leaf	Leaves are used to treat Cold, Cough, Fever, Asthma, Headache, Toothache and Ear pain.
39	*Ocimum tenuiflorum* L.	Lamiaceae	Kalo Tulsi	Entire plants	Plant is used to treat fever, cold, cough, headache, diarrhoea, dysentery and skin diseases.
40	*Periploca calophylla*	Apocynaceae	Chautajor	Root	Root is used to treat body pain and back bonr pain.

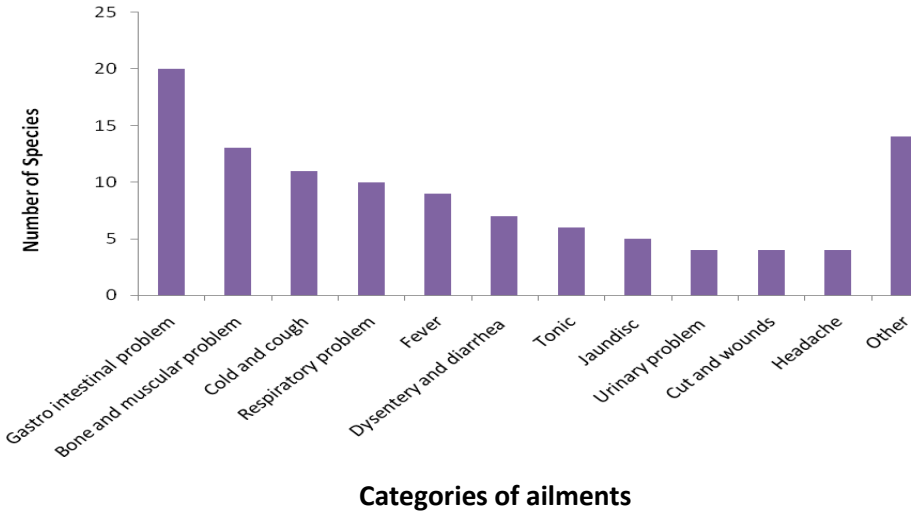
	(Wight) Falc.				
41	*Phyllanthus emblica* L.	Euphorbiaceae	Amala	Fruit	Fruits is used to treat throat pain and as tonic.
42	*Piper chaba* Hunter.	Piperaceae	Chabo	Fruit	Fruit is used to treat cold , cough and fever.
43	*Polygonum barbatum* L.	Polygonaceae	Pire Jhar	Entire plant	Plant is used to treat swelling parts of the body.
44	*Polypodium vulgare* L.	Polypodiaceae	Kambaru	Rhizome	Rhizome is used to treat stomach problem.
45	*Poranopsis paniculata* (Roxb.) Roberty	Convolvulaceae	Sikari lahara	stem	Stem is used to treat back bone pain and muscular pain.
46	*Psidium guajava* L.	Myrtaceae	Betauti	Leaf	Young leaf is used to treat stomach disorders.
47	*Rumex nepalensis* Spreng	Polygonaceae	Halhale Sag	Leaf	Leaf is used to treat cuts, wounds, joint pains and swellings.
48	*Tectaria macrodonta* (Fee.) C. Chr.	Aspidiaceae	Kalinyuro	Leaf	Young leaf is used to treat gastric and stomach pain.
49	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	Barro	Fruit	Fruits is used to treat cold, cough, fever, respiratory problems and indigestion.
50	*Terminalia chebula* Retz.,	Combretaceae	Harro	Fruit	Fruits are used to treat cold, cough, respiratory problem, fever and indigestion.
51	*Tinospora cordifolia* (Willd) Miers.	Menispermaceae	Gurjo	Stem	Stem is used to treat heat stress and blood purification; as well as it is used as tonic .
52	*Viscum album* L.	Loranthaceae	Hadcur	Bark	Bark is used to treat bone fracture and back bone problem.
53	*Vitex negundo L.*	Vitaceae	Simali	Leaf	Leaf is used to treat cold, cough, fever, sinusitis, stomach problems.
54	*Woodfordia fruticosa* (L.) Kurz.	Lythraceae	Dhairo	Flower	Flower is used to treat indigestion, Dysentery, bleeding from nose and mouth, Diarrhea etc.
55	*Zanthoxylum armantum* D.C.	Rutaceae	Timur	Fruit	Fruit is used to treat food poisoning
56	*Zingiber officinale* Roscoe.	Zingiberaceae	Aduwa	Rhizome	Rhizome is used to treat cold, cough, fever, bronchial infections, indigestion, and constipation.

The highest number of plant species was used for gastrointestinal related diseases followed by bone and muscular related diseases, cold and cough (Fig. 2). The plant parts used for various types *i.e.* roots, young shoots, stems, bark, leaves, fruits and seeds, and the whole plant. The plants were used in various forms for

different ailments. The most frequently used form was powder, followed by paste, and juice.

Figure 2

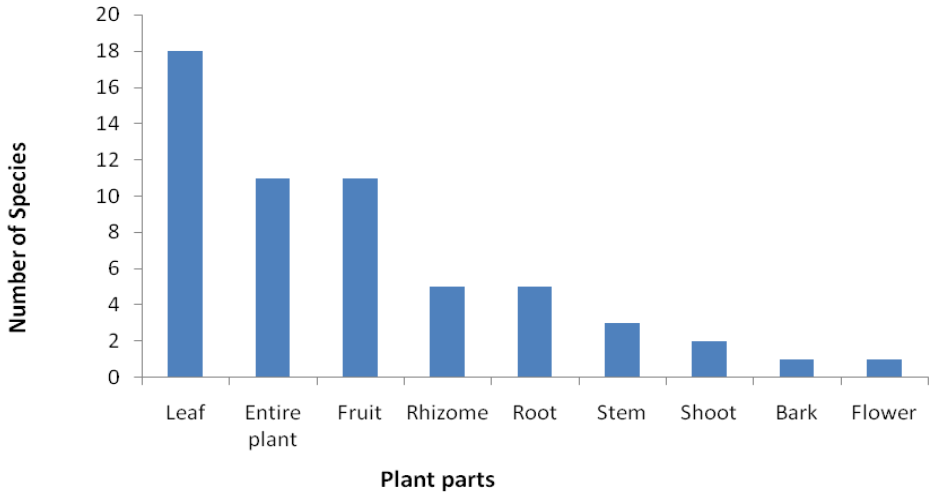
Use Frequency of Plant Species in Different Disease Categories by Local Community of Bharat Pokhari



The most frequently used plant parts were leaf (for 18 different plant species), followed by entire plant and fruit (11 plant species each), rhizome and root (five plant species each), stem (three plant species), shoot (two species), flower and bark (one plant species each) where in our study, fruit and leaf part of *Aegle marmelos* is used to treat different ailments (Fig. 3).

Figure 3

Use frequency of Different Plant Parts by Local Community in Bharat Pokhari



DISCUSSION

Fabaceae have the higher number of plants (with five species), followed by zingiberaceae (four species), rutaceae and lamiaceae (three species each) was found in this study area and the higher number of useful plant families are poaceae, asteraceae, and fabaceae in Nepal was listed by Kunwar *et.al.* 2018. It was found that the people of the Bharat Pokhari had rich in ethnomedicinal knowledge; and various plant are used to treat different common health problems like gastrointestinal disorders, bone and muscular disorders, respiratory disorders, etc. The highest number of plants *i.e.* 20 species are used to treat gastrointestinal disorders was found, which is similar to other studies of Rokaya *et.al.* (2012), Malla *et.al*. (2015) and Singh*et.al.* (2018). Trees and herbs are reported as frequently used medicinal plants for gastrointestinal disorders (Palombo 2006; Kadir *et al.* 2013); similarly, our study showed that most commonly used species for gastrointestinal disorders were trees and herbs.

The family fabaceae has highest number of medicinal plants. Other studies of Bhattarai and Acharya (2015), Pradhan *et. al*. (2020) and Singh *et. al*. (2018) carried out in different parts of the country also found in the similar trends. In general, one ailment can be cured by several plant species. In the present study, a highest number of plants were used to gastrointestinal disorders and such a trends was observed by Bhattarai (2020) in Ilam. The similarities in the uses of plants with the findings of the previous researchers like Oli *et al*. (2005), Poudel (2009), and Subba *et al*. (2016) from the different regions of the country indicating the highly reliable pharmacological usefulness of the reported plants. In the case of herbaceous plants, the whole parts were used for preparation of remedies. The leaves of the herbaceous plants were shown to be the most commonly utilized parts and in other studies of Malla *et al*. (2015) and Bhattarai and Khadka (2016) as well. Among the recorded medicinal plants, leaf was the most commonly used parts followed by entire plant, fruit, rhizome, root, stem, shoot, bark and flower. Different parts of medicinal plants contain chemical compounds that work against various pathogens. The extract of various medicinal plants used by traditional healers have antibacterial, anti-amoebic, antidiarrhoeic and antihelminthic properties recorded by Mc Gaw *et. al*. (2000) and Taylor *et. al*. (2001). But in some studies like Budha-Magar *et. al*. (2020) Tamang *et. al*. (2017) and Shrestha *et. al*. (2016) reported that root was the most widely used parts of the plants.

CONCLUSIONS

In this study, Bharat Pokhari of Kaski District is rich in ethnomedicinal knowledge and local people of this area used plants and their products to treat common health problems like cold, headache, fever, body ache, constipation, indigestion, diarrhea, dysentery, urinary problem, fractures, etc. Ethnomedicinal information obtained from this study suggests an important implication in the development of medicine and the sustainable utilization of medicinal plant species. So, there is a need to document traditional knowledge on medicinal plant usage. This study has identified a number of important traditionally used medicinal plants *i.e.* 56 species in the study area for the treatment of different human diseases.

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