Annals of Phytomedicine 5(1): 135-141, 2016

Journal homepage: www.ukaazpublications.com

ANNALS OF PHYTOMEDICINE
An International Journal

ISSN: 2393-9885

A rare study on indigenous uses of medicinal plant home-made remedies for the treatment of chilblains in Bandipora, Kashmir, India

Parvaiz Ahmad Lone, Ajay Kumar Bhardwaj*, Fayaz Ahmed Bahar and Kunwar Wajahat Shah**

Department of Botany, Government Narmada Post Graduate College, Hoshangabad-461001, Madhya Pradesh, India

**Department of Biotechnology, Institute for Excellence in Higher Education* (IEHE), *Kaliyasot Dam, Kolar Road, Bhopal- 462016, Madhya Pradesh, India*

***Dryland Agricultural Research Station* (DARS), *Sher-e-Kashmir University of Agricultural Sciences and Technology, Shalimar, Srinagar-190001, Jammu and Kashmir, India*

Received February 5, 2016: Revised February 21, 2016: Accepted February 29, 2016: Published online June 30, 2016

Abstract

Chilblains or perniosis is a common health disorder of people living in cold and humid climate. The disease occurs due to sudden warming of the skin after exposure to cold temperatures. The temperature change causes the blood vessels to quickly expand, leading to leakage of blood into the nearby tissues. The symptoms of the disorder include burning sensation, intense itching, redness on the affected area, pain, swelling, inflammation, and dryness. In severe cases, affected areas may develop blisters and infection and ulceration can also set in. Bandipora, a northern biodiversity rich temperate Himalayan district of Jammu and Kashmir state, experiences heavy snowfall during harsh winters when minimum temperature falls a few degrees below freezing point. Local people of the district often fall victim of this cold related body disorder (chilblains). Though allopathic medicine against this ailment is sufficiently available in markets but the local people have not yet lost their faith on herbal medicine and still prefer to practice traditional mode of treatment. Present paper gives a detailed account on some home-made herbal remedies that are still used by the local populace of district, to reduce the intensity of symptoms or discomfort of this disease. Moreover, it is through this study that the people can take advantage by knowing the efficacy of a particular medicinal plant against chilblains. The medicinal plants, documented in this study, can also be subjected to phytochemical and pharmacological studies so that active principles against various pharmacological targets can be discovered and isolated.

Key words : Perniosis, Bandipora, herbal formulations, drug development, harsh winters

1. Introduction

Chilblains is a common dermatological problem, sometimes familial condition (Hunter and Dahl, 2002). People who live at places characterized by extreme sub-zero temperature in winters, high wind velocity and high wind-chill usually develop cold related body disorders like chilblains (Singh *et al*., 2015). The disease is characterised by patches of discoloured, swollen and itchy skin, believed to be caused by abnormal reaction to cold (Wall and Smith, 1981) and, hence, is seen during the cold months of winter (Hunter and Dahl, 2002; Crowson and Magro, 1997). It may also be caused due to poor peripheral circulation (Spittell and Spittell, 1992). People living in environments where heating is inadequate for a few months of the year, seem to be more commonly affected by this disease while as the people living in localities characterised by harsh frigid winters where adequate home heating is the norm seem to be less commonly affected by this disorder. Some common symptoms of chilblains include burning sensation, intense itching, redness on the affected area, pain, swelling, inflammation, dryness leading to splits and crack, and ulceration, in severe cases. The toes are particularly vulnerable, but other extremities that can develop chilblains include fingers, earlobes and the nose (Goette, 1990). In these areas of the body, circulation is last to reach. Tight shoes may further contribute by reducing circulation to the toes.

Despite the discomfort, most chilblains do not cause any permanent damage to tissue. It is believed that not every one exposed to cold and moist conditions will develop chilblains and the disease affects those who are overly sensitive to changes in weather and temperature. The disease can affect people of any age, but it is more common in children (Simon *et al*., 2005) and elderly people. The condition also affects more women than men (Raza *et al*., 2008; Sarteel-Delvoye *et al*., 1998). The people considered to be most susceptible to this disease are elderly, sedentary, teenagers and those with medical conditions (such as anaemia).

Although the exact cause of chilblains is largely unknown, it is thought to be associated with the body's reaction to cold weather (Dowd, 2004). The body's circulatory system is very sensitive to temperature and it comprises arteries, veins and capillaries that carry blood to every cell. In hot conditions, blood vessels close to the skin expand quickly so that excess heat can be lost to the air, thereby, cooling the body. In cold weather, however, these blood vessels constrict to conserve body heat. This constriction can starve extremities, such as the toes of blood and warmth, if peripheral

Author for correspondence: Dr. Parvaiz Ahmad Lone
Department of Botany, Government Narmada Post Graduate College Hoshangabad-461001, Madhya Pradesh, India
E-mail: parvaizphd@gmail.com
Tel.: +91-8803350290

circulation is sluggish. Due to sudden temperature changes, the symptoms of chilblains are made worse, for example, entering a warm house after being outside in the cold. Similarly heating cold feet too quickly also worsens the condition.

In spite of tremendous developments in the field of allopathy during the 20th century, plants still remain as one of the major sources of drugs in modern as well as traditional system of medicine throughout the world (Biradar, 2015). In case of chilblains, although allopathic medicine is sufficiently available in the markets of Kashmir valley in general and Bandipora in particular but local people have not yet lost their faith on herbal medicine and they still prefer to practice traditional mode of treatment. So far, no study regarding the indigenous herbal mode of chilblains treatment has been carried out in the entire state of Jammu and Kashmir. Therefore present study is rare of its kind and gives a detailed account on some home made herbal remedies that are still used to reduce the intensity of symptoms or discomfort of this disease. The knowledge base, concerning the medicinal uses of some plants against chilblains, obtained in this investigation, requires to be rigorously subjected to phytochemical and pharmacological investigations in order to validate their authenticity and future prospects in the drug development, with due benefit-sharing with the primary stake holders.

2. Materials and Methods

Bandipora, one of the newly created northern districts of Jammu and Kashmir State, has geographical area of 398 Sq.km's, and is located on the northern bank of the Wular Lake- the largest fresh water lake in Asia. The district lies at 34^0 64' N latitude and 74^0 96' E longitude and is situated at an average height of 1701 meters (AMSL). The district is naturally gifted with breathtaking scenic beauty in the form of snow-capped mountains, lush green forests and meadows, sparkling streams and rivers, and picturesque Wular lake (Figure 1). The total cultivable land in the district is 27028 hectares which is mostly under orchards while as the area under forests is about 199396 hectares. The district has deciduous vegetation and is the site of diverse flora. Plants like *Plantinus orientalis* L. (locally called 'Bouin'- State tree), *Crataegus songarica* K. Koch, *Populus caspica* Bornm., *Salix acmophylla* Boiss., *Ailanthus altissima* (Mill.) Swingle, *Cedrus deodara* (Roxb. ex D. Don) G. Don, *Ulmus wallichiana* Planch, *Celtis australis* L, *Robinia pseudoacacia* L., *Abies pindrow* Spach, *Pinus wallichiana* A. B. Jacks., *Morus nigra* L., *Juglans regia* L., *Ziziphus jujuba* Mill. and other fruit trees (temperate Rosaceae fruit trees- apple, pear, cherry, almond, peach, plum and apricot) grow throughout the district (Lone *et al.*, 2014). This floristically rich area has sizable population of tribal communities and forest dwellers. The climate of the district has its own peculiarities and is usually moderate. The seasons are marked with sudden change and the climate can be divided into six seasons of two months each. These include, Spring (16 March to 15 May), Summer (16 May to 15 July), Rainy Season (16 July to 15 September), Autumn (16 September to 15 November), Winter (16 November to 15 January) and Ice Cold (16 January to 15 March). All these seasons are locally called Sont, Retkol, Waharat, Harud, Wandh and Shishur, respectively (Lone *et al.*, 2014). The coldest months are January and February, when minimum temperature falls a few degrees below freezing point. Each part of the district experiences heavy snowfall during winter on account which the winters are usually harsh.

Many regions of the district were surveyed from September 2011 to March 2012. Informants including local knowledgeable elders and tribals (Gujjars and Bakkerwals) were sampled during random visits made to houses in the study area. Besides, efforts were made to approach as many as herbal practitioners (Bhoeris). In total, 61 informants were randomly selected and approached whose age ranged from 37-98 years. But before the start of interviews, informed consent was obtained from each informant who participated in this study after explaining the purpose of the study and assuring them of the most responsible judicial use of the resulting information (Lone *et al.*, 2015). Data concerning the first hand information about indigenous uses of medicinal plants were collected using semi-structured interviews and focus group discussions. With the view to collect the medicinal plants cited during interview, a guided tour was undertaken with the interviewer after the end of each interview session. A standard herbarium procedure (Miller and Nyberg, 1995) was followed to mount the collected plants/plant parts on herbarium sheets of standard size (41.25 × 28.75 cm). Plant specimens were then identified and accessioned by matching them with the already labelled herbarium specimens housed at the departmental herbarium (KASH Herbarium) of Kashmir University, Srinagar (Jammu and Kashmir). For authenticity and future use, the collected herbarium specimens were deposited at KASH herbarium and herbarium section of the Department of Botany, Government Narmada Post Graduate College, Hoshangabad (M.P). Further, for the botanical nomenclature of each plant species, the International Plant Names Index (http://www.ipni.org) was strictly followed.

To show the local importance of each plant species, the collected ethnomedicinal information was finally quantitatively analyzed using Relative Frequency of Citation, RFC (Tardio and Pardo-de-Santayana, 2008). RFC is given by the frequency of citation (FC, the number of informants mentioning the use of the species) divided by the total number of informants participating in the survey (N), without considering the use-categories.

$$RFC = FC/N$$

where $(O<RFC<1)$

RCF values will be high (near 1) if there are many use reports for a plant, implying that the plant is ethnomedicinally important, and near 0 if there are few reports related to its use.

3. Results

Chilblains, locally called as "SHUH", is a common health disorder causing discomfort to people of the region during winters when the entire district remains in the intense grip of bone chilling cold. In the present investigation, a total of 61 informants including male and female belonging to age groups 37 to 98 years were interviewed. Elderly men were reported more knowledgeable about medicinal plants and their uses than females. During surveys, a total of 14 plant species belonging to equal number of genera and 11 different families were reported to be used indigenously/traditionally by local populace for curing chilblains and associated symptoms. All the collected and identified species are enumerated alphabetically with their botanical name, followed by local name, family, accession number, flowering period, plant part(s) used, mode of administration (Table 1). Only one plant species, namely: *Adiantum capillus-veneris* L. was pteridophyte while all others were angiosperms. Majority

of the species were perennial trees (5 species), followed by equal number of annual (4 species) and perennial (4 species) herbs. Only one species, namely : *Adiantum capillus-veneris,* was pteridophytic perennial fern. Majority of the plant species were collected from wild sources than cultivation. Plant families such as Asteraceae, Solanaceae and Lamiaceae included 2 plant species each while all other families such as Pteridaceae, Hippocastanaceae, Brassicaceae, Juglandaceae, Rosaceae, Fabaceae, Salicaceae and Polygonaceae were monotypic and included only one plant species each. Maximum numbers of collected plants were reported in flowering stages during summer months (June-July).

Different plant parts such as leaves, fronds, roots, tubers, rhizomes, flowers, seeds, fruits and sometimes whole plant bodies were used in the preparation of crude drugs. However, most commonly used plant parts for the preparations of crude drugs were flowers. Sometimes plants were completely uprooted for medicinal purposes. Plant parts were mostly used in dried form rather than in fresh form and these dried parts were stored in homes in order to be used for the treatment of chilblains in winter, when life in the entire district becomes very tough and medicinal plants become scarce. Herbal formulations were mostly prepared from a single plant species. However, a mixture of two plant species was sometimes used to prepare the formulations. Plants such as *Datura stramonium* L., *Cotula anthemoides* L., *Brassica compestris* L. and *Aesculus indica* Colebr. ex Wall. were comparatively preferred for the chilblains treatment. Various preparation forms of medicinal plants were hot water extract, paste, oil and lotion. However, hot water extract constituted the highest type of preparation form, followed by paste. The most frequently used solvent/dilutant in the preparation of formulations was water. Plant-water mixtures were often boiled thoroughly to prepare hot water extract. It was further reported that the disease mostly affected children especially students whose age ranged from 6-12 years. In terms of sex ratio, women were reported affected more frequently than men (Table 1 and Figure 2).

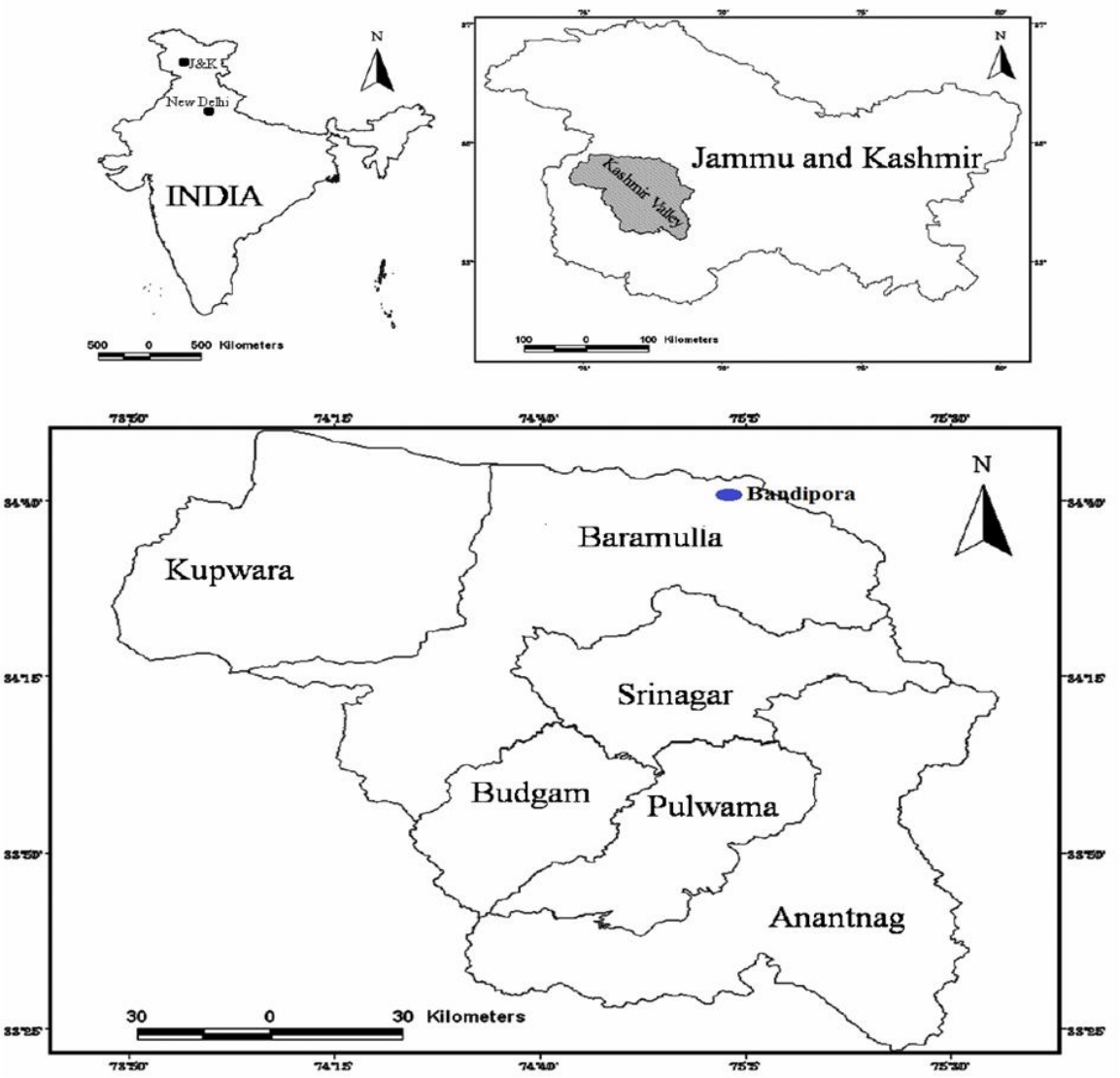


Figure 1: Map of the Kashmir valley showing the location of newly created Bandipora district

Table 1: List of indigenously used medicinal plants documented in this study with their RFC's values

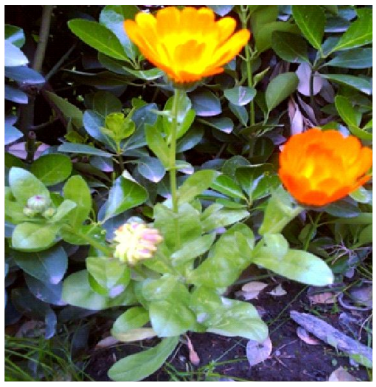
Plant's Scientific/Local Name/Family	AN	FP	Plant Part(s) Used	Mode of administration	No. of use reports	% of all use reports	RFC
***Adiantum capillus-veneris* L.** "Guetheer"/ Pteridaceae	38882	NFL	Fronds	Hot water extract is obtained after boiling a handful of fronds in water. This hot water extract, after dilution with more water, is used to wash feet continuously for 3-4 days before going to bed to give relief from chilblain.	7	3.74	0.11
***Aesculus indica* Colebr. ex Wall.** "Haandoon"/ Hippocastanaceae	38865	MY-JN	Fruits	Hot water extract of crushed fruits is used to wash feet against painful itching and swelling.	16	8.55	0.26
***Brassica compestris* L.** "Telgogul"/ Brassicaceae	38848	AP-JN	Seeds	Oil extracted from seeds is gently warmed and massaged on exposed body parts twice daily, in the morning and at night before going to bed, to ensure good blood circulation and reduce risk of developing chilblains.	28	14.97	0.45
***Calendula officinalis* L.** "Hamesh Bahar" / Asteraceae	38884	AP-D	Flowers	Flowers are crushed and paste is made by mixing with cow butter. Paste is then applied on affected areas to give relief from inflammation and pain.	9	4.81	0.14
***Cotula anthemoides* L.** "Thulibabuel"/ Asteraceae	37780	JN-AU	Whole plant	Hot water extract is obtained after boiling the whole herb in water. This extract is allowed to cool and some salt is added to it. Affected body parts are soaked in this extract for about 15 minutes at bed time daily for 5-6 days to give relief from intense itching and swelling.	29	15.5	0.47
***Datura stramonium* L.** "Datur"/ Solanaceae	37783	JN-S	Seeds	Dried seeds along with dried leaves of *Juglans regia* are boiled in water to prepare hot water extract which is used to wash feet to cure itching and swelling of toes.	37	19.78	0.60
***Juglans regia* L.** "Duon"/ Juglandaceae	38866	MY-JN	Leaves	Dried leaves along with dried seeds of *Datura stramonium* are boiled in water to prepare hot water extract which is used to wash feet to cure itching and swelling of toes.	14	7.48	0.22
***Marrubium vulgare* L.** "Troper"/ Lamiaceae	38889	JL-AU	Whole plant	Hot water extract is prepared by boiling the dried herb in water. Extract, after adding salt to it, is then used to wash feet and other affected body parts to cure chilblains.	4	2.13	0.06
***Prunella vulgaris* L.** "Kalaveuth"/ Lamiaceae	37795	JN-JL	Leaves and flowers	The leaves and flowers of this herb are boiled in water to prepare hot water extract. Hot water extract, after dilution with more water, is used to wash toes, fingers, earlobes and nose to give immediate relief from itching and redness.	5	2.67	0.08
***Prunus persica* (L.) Batsch** "Chenun"/ Rosaceae	38885	AP	Leaves	Dried leaves are boiled in water to prepare hot water extract to which salt is added. Hot water extract, after cooling for some minutes, is used to wash all affected body parts to cure chilblains.	4	2.13	0.06
***Rheum emodi* Wall.** "Pumbchalan"/ Polygonaceae	38899	JN-JL	Rhizome	Paste of rhizome powder in edible oil is applied on ulcers and inflamed areas to stimulate quick healing and give relief from redness, pain and swelling.	13	6.95	0.21
***Robinia pseudoacacia* L.** "Keekur"/ Fabaceae	38864	MY-JN	Flowers	Hot water extract obtained by boiling flowers of the tree is also used wash feet to cure chilblains.	4	2.13	0.06
***Salix acmophylla* Boiss.** "Kril Veer"/ Salicaceae	38891	F-AP	Leaves	Hot water extract obtained by boiling dried leaves of the tree is used wash affected body parts to cure burning sensation and intense itching caused as a result of chilblains.	11	5.88	0.18
***Solanum tuberosum* L.** "Alua"/ Solanaceae	38861	AP-JN	Tuber	Fresh tubers are crushed to prepare lotion which is applied on affected areas to reduce the itching and inflammation and prevent blister formation caused by chilblains.	6	3.2	0.09

Abbreviations used: AN- Accession Number; AP- April; AU- August; D- December; F- February; FP- Flowering Period; JL- July; JN- June; MY- May; S- September; NFL- Non Flowering; RFC- Relative Frequency of Citation

Figure 2 : Some indigenously used medicinal plants against chilblains treatment in Bandipora, Kashmir

***Adiantum capillus-veneris* L.**

***Aesculus indica* Colebr.ex.Wall**



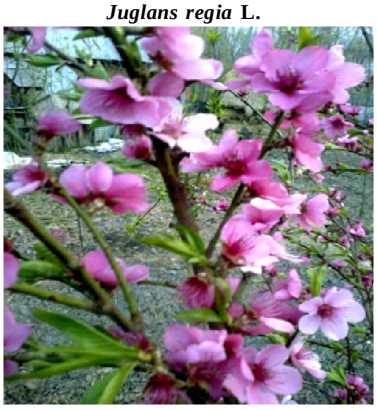
***Calendula officinalis* L.**

***Cotula anthemoides* L.**

***Juglans regia* L.**

***Marrubium vulgare* L.**

***Prunella vulgaris* L.**



***Prunus persica* (L.) Batsch**

***Rheum emodi* Wall**

***Robinia pseudoacacia* L.**

***Salix acmophylla* Boiss**

***Solanum tuberosum* L.**

4. Discussion

There are thousands of plants used in traditional medicine by different cultural groups throughout the world (Subramoniam, 2014). Same is true when we talk about the use of medicinal plants, in the form of crude formulations, for the treatment of chilblains in Bandipora, Kashmir. Plants contain high amounts of antioxidants and biologically active compounds and, thus, act as targets for the discovery of new drugs (Gautam *et al*., 2012; Thakur and Azmi, 2013). Medicinal plants are store-houses of secondary metabolites like alkaloids, glycosides, steroids or other groups of compounds which have marked pharmaceutical action against various dangerous diseases. Plants collected in this study were mostly herbs and the reason for their dominance was perhaps because of their abundance and year round availability. Collection of medicinal plants more from wild sources indicated that people mainly depended on the natural environment for medicinal plant requirement. The occurrence of maximum numbers of collected plants in flowering stages during summer months was probably due to favourable growth condition of suitable temperature, enough moisture and availability of macronutrients in such season (Ahmad *et al*., 2009).

The practice of harvesting flowers for medicinal purposes may pose a negative influence on the survival and continuity of useful medicinal plants because flowers are more important for their survival. Similarly practice of complete uprooting of some plants for medicinal purposes may not only remove the plant from its natural habitat but also may reduce the chances of the seed formation thus hampering increase in plant population. Thus, to keep the plants alive, conservation efforts are utmost important. Some plants such as *Datura stramonium, Cotula anthemoides, Brassica compestris* and *Aesculus indica* were comparatively more preferred for chilblains treatment since their RFC values ranked highest with values of 0.60, 0.47, 0.45 and 0.26, respectively. These positions correspond to the fact that the medicinal uses of these plants against chilblains were reported by highest number of informants and RFC directly depends on the number of informants mentioning use of the plant (FC). Moreover, the more preferred use of these plants could be also because of people's strong belief on the use of these plants for curing chilblains as by generations of experimentation from their forefathers they could have gathered useful knowledge about these plants.

The use of two plant species as mixture for the preparation of crude formulations was perhaps due to the understanding that synergistic effect of different species of plants could improve the cure rates. This was in agreement with the findings of Dilshad *et al*. (2009) and Gertsch (2011). However, it is still very difficult to assess which plant is actually effective in curing the disease and, hence, only clinical trials on these plants can give some indications. The use of water as solvent/dilutant in majority of cases was perhaps because of its easy availability and more effectiveness in isolating the substance/compound of therapeutic value from the medicinal herbs. Further, the reason for boiling of plant-water mixtures was perhaps to enhance the drug extraction rates. The more indigenous medicinal plant knowledge possessed comparatively by men was because of their more involvement in collection, day-to-day practices and trade related activities (Qureshi *et al*., 2006). Furthermore, every nook and corner, particularly higher reaches of the district are under the siege of security forces because such areas are very close to the line of control (LOC), the movement of people is highly restricted. Therefore, the local populace doesn't allow women to move freely and collect medicinal plants and the task is mainly carried out by elderly men.

In the study area, the victims of chilblains were mainly children especially students whose age ranged from 6-12 years, because they had to attend tuition classes, far away from their homes, in bone chilling cold. Weston and Morelli (2000) in their study also reported that the disease was common in children. The finding that women were affected more frequently than men was also reported by Bolognia *et al*., (2008). The reason for frequent occurrence of chilblains in women than in men could be because of more involvement of women especially housewives in outdoor works such as collection of water during winters when water supply schemes do not work anymore due the freezing of water in pipes. More common occurrence of the disease in outdoor workers with the apparent reason of being more exposed to cold was also reported by Raza *et al*. (2006).

Majority of the plants collected and identified in this study were facing anthropogenic pressure in terms of environmental degradation (over-grazing, deforestation and agricultural expansion), indiscriminate harvesting for smuggling/illegal trade and uses of these plants for the purposes other than medicinal value. Rashid *et al*. (2008) and Lone and Bhardwaj (2013) also reported the same finding in their investigations. Such activities may not only lead to the rapid depletion of these precious God gifted resources from the area but also associated traditional medicinal knowledge. Moreover, due to increasing demand of raw materials at local, national and international markets, some plants are being indiscriminately harvested for commercial purposes and the trade of this kind will continue, till the existence of a seller and a buyer. This is the reason that one of the collected plants, namely; *Rheum emodi* Wall. finds its place in the Endangered list of latest IUCN threat categories. Thus, the population of these medicinal plants is shrinking day-by-day due to aforementioned factors. This is really a matter of great concern as these plants are backbone of our indigenous medicinal system with a large population still depending on indigenous medicine. Therefore, it is of utmost importance to conserve these threatened plants otherwise the day will not be far away when such plants will completely disappear from their natural habitats.

The people of the study area were found to have strong belief on the use of these plants for curing chilblains and associated symptoms. On the basis of field investigations, the disease is not cured by allopathic medicine and they always preferred herbal medicine for its treatment. They have been relying on this mode of treatment for long past, as by trial and error method they have gathered useful knowledge about various herbal remedies which they have received after generations of experimentation. This knowledge is descended to them from their forefathers in the form of oral folklores and is often kept a heavily guarded secret. It is through this study that people can take advantage by knowing the efficacy of a particular medicinal plant against a specific health disorder (chilblains).

The medicinal plants, documented in this study, can also be subjected to phytochemical and pharmacological studies so that

active principles against various pharmacological targets can be discovered and isolated. Thus, the information on ethnomedicinal treasure of knowledge generated in this study will be helpful to the people of our country in general and downtrodden in particular because a major proportion of Indian population lives below poverty line and cannot afford the sky rocketing prices of the modern mode of treatment, and still rely on crude herbal drugs which are in plenty and are available at affordable cost. Documenting indigenous knowledge through efforts like this study will be important for the conservation of biological resources and their sustainable development. The study could be also the basis for subsequent research on the species that are interesting from phytochemical point of view and on the potential use of their active metabolites.

Acknowledgement

We acknowledge the financial support provided by Department of Science and Technology (DST), New Delhi, Government of India for the completion of this work. Thanks are due to the local knowledgeable and experienced persons of the study area who facilitated our research with trust and cooperativeness. We are also very greatful to Mr. Anzar Ahmad Khuroo (Assistant Professor) and Mr. Akthar Hussain Malik (Curator, KASH Herbarium), Centre for Biodiversity and Plant Taxonomy, Department of Botany, University of Kashmir, India for their help in the identification of plant species.

Conflict of interest

We declare that we have no conflict of interest.

References

Ahmad, I.; Ahmad, M.S.A.; Hussain, M.; Hameed, M.; Ashraf, M.Y.; Saghir, M. and Koukab, S. (2009). Spatio-temporal effects on species classification of medicinal plants in Soone Valley of Pakistan. Int. J. Agr. Biol., **11**(1):64-68.

Biradar, D.P. (2015). Medicinal plants and phytomedicines. Ann. Phytomed., **4**(1):1-5.

Bolognia, J.L.; Jorizzo, J.L. and Rapini, R.P. (2008). Bolognia: Dermatology, 2nd ed, Mosby-Elsevier, 2008. Vol II, Chapter 87-Injuries due to cold exposure.

Crowson, A.N. and Magro, C.M. (1997). Idiopathic perniosis and its mimics: A clinical and histological study of 38 cases. Hum. Pathol., **28**:478-484.

Dilshad, S.M.R.; Rehman, N.U.; Ahmad, N. and Iqbal, A. (2009). Documentation of ethnoveterinary practices for Mastitis in dairy animals in Pakistan. Pak. Vet. J., **30**(3):167-171.

Dowd, P.M. (2004). Reactions to cold. In: Burns. T, Breathnach S, Neil Cox, Griffiths C, (eds.). Rook's Textbook of Dermatology. 7th ed., Vol. 2. Oxford: Blackwell Scientific Publishing; pp:21-57.

Gautam, M.; Chandel, M. and Azmi, W. (2012). Therapeutic role of LDOPA produced as secondary metabolite from different legumes and plant sources. Ann. Phytomed., **1**(2):1-8.

Gertsch, J. (2011). Botanical drugs, synergy, and network pharmacology: Forth and back to intelligent mixtures. Planta Med., **77**(11):1086-1098.

Goette, D.K. (1990). Chilblains (perniosis). J. Am. Acad. Dermatol., **23**:257-262.

Hunter, J. and Dahl, M. (2002). Perniosis. Clinical dermatology. 3rd ed. Oxford (UK): Blackwell Publishing, pp:132.

Lone, P.A. and Bhardwaj, A.K. (2013). Potent medicinal herbs used traditionally for the treatment of arthritis in Bandipora, Kashmir. Int. J. Recent. Sci. Res., **4**(11):1766-1770.

Lone, P.A.; Bhardwaj, A.K.; Shah, K.W. and Tabasum, S. (2014). Ethnobotanical survey of some threatened medicinal plants of Kashmir Himalaya, India. J. Med. Plants. Res., **8**(47):1362-1373.

Lone, P.A.; Bhardwaj, A.K. and Bahar, F.A. (2015). Study of indigenous/ traditional medicinal plant knowledge- an endeavour towards new drug discovery. Afr. J. Tradit. Complement. Altern. Med., **12**(2):73-95.

Miller, A.G. and Nyberg, J.A. (1995). Collecting herbarium vouchers. In: Guarino L, Ramanatha Rao V, Reid R.(eds.). Collecting plant genetic diversity: Technical guidelines. Oxfordshire: CABI, pp:561-73.

Qureshi, R.A.; Ghufran, M.A.; Sultana, K.N.; Ashraf, M. and Khan, A.G. (2006). Ethnobotanical studies of medicinal plants of Gilgit district and surrounding areas. Ethnobot. Res. App., **5**:115-122.

Rashid, A.; Anand, V.K. and Serwar, J. (2008). Less known wild edible plants used by the Gujjar tribe of district Rajouri, Jammu and Kashmir State-India. Int. J. Bot., **4**(2):219-224.

Raza, N.; Sajid, M. and Ejaz, A. (2006). Chilblains at Abbottabad, a moderately cold weather station. J. Ayub. Med. Coll. Abbottabad., **18**:25-28.

Raza, N.; Sajid, M.; Suhail, M. and Haroon-ur-Rashid. (2008). Onset of chilblains in relation with weather conditions. J. Ayub. Med. Coll. Abbottabad., **20**(2):17-20.

Sarteel-Delvoye, A.M.; Wiart, T. and Durier, A. (1998). Chilblains [Article in French]. Rev. Prat., **48**:1673-1675.

Simon, T.D.; Soep, J.B. and Hollister, J.R. (2005). Pernio in paediatrics. Paediatrics, **116**:472-475.

Singh, G.K.; Datta, A.; Grewal, R.S.; Suresh, M.S. and Vaishampayan, S.S. (2015). Pattern of chilblains in a high altitude region of Ladakh, India. Med. J. Armed Forces India., **71**(3):265-269.

Spittell, J.A. and Spittell, P.C. (1992). Chronic pernio: another cause of blue toes. Int. Angiol., **11**:46-50.

Subramoniam, A. (2014). Phytomedicines for healthcare. Ann. Phytomed., **3**(1):1-3.

Tardio, J. and Pardo-de-Santayana, M. (2008). Cultural importance indices: A comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). Econ. Bot., **62**:24-39.

Thakur M. and Azmi, W. (2013) Nutraceutical: β-carotene from natural non-conventional sources and its applications. Ann. Phytomed., **2**(1):59-73.

Wall, L.M. and Smith, N.P. (1981). Perniosis: A histopathological review. Clin. Exp. Dermatal., **6**:263-271.

Weston, W.L. and Morelli, J.G. (2000). Childhood pernio and cryoproteins. Pediatr. Dermatol., **17**:97-99.