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POWERFUL MEDICINAL HERBS USED AGAINST INTESTINAL INFECTIONS BY THE LOCAL POPULACE OF BANDIPORA DISTRICT OF JAMMU AND KASHMIR, INDIA

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ABSTRACT

Helminthic infections continue to be the major health hazard to the people, especially those living in in remote rural areas in the tropical developing countries. Although these infections do not cause significant morbidity and mortality when compared with many other parasitic infections, they do cause substantial, but often less measurable effects like malabsorption, diarrhoea, anaemia and other states of poor health, particularly in infants and school going children. Though at present in the markets there are several synthetic anthelmintics available against these parasites, the fact remains that a large proportion of the world's population still does not have access to, or cannot afford the modern medicines, particularly in remote rural areas. Besides, the continued usage of current anthelmintic drugs is also posing a major problem of drug resistance in several parasite species. Thus, there is an urgent need for newer and inexpensive drugs that are able to act for longer periods before resistance sets in. In this context, traditional medicines, based largely on medicinal plants, offer a major and accessible source of health care to people living particularly in developing countries. Bandipora is a northern biodiversity rich Himalayan district of Jammu and Kashmir state. The people of this district have not yet lost their faith on herbal medicine and they still prefer to practice traditional mode of treatment. Present paper gives a detailed account on some plants used traditionally against helminthic infections by the local people of Bandipora district. A total of 13 species belonging to the equal number of genera and 11 different families were found to be used for effective cure of these infections. It is through this study that the people can know the efficacy of certain medicinal plants against helminthic infections. Further, the medicinal potential and efficacy as vermicidal or vermifugal- of plants documented in this study can be scientifically validated through phytochemical and pharmacological studies.

KEY WORDS: Helminthic Infections, Bandipora, Herbal Formulations, Medicinal Plants.

INTRODUCTION

Plants are essential for human beings as they provide food, fuel, fodder, timber, fruit and medicines (Hameed et al, 2011; Alam et al, 2011; Ahmad et al, 2012). As compared to animals, plants are more important for us due to their diverse collection of biochemicals with a variety of potent biological activities (Arshad et al, 2014; Hameed et al, 2011; Alam et al, 2011; Ajaib et al, 2010; Buckingham, 1999; Cotton, 1996). In traditional healing systems, wild medicinal plants have been used for centuries (Ahmad et al, 2014). Rural people who have century's old traditional knowledge transferred from generation to generation still rely on plant resources for variety of purposes. They heavily depend on natural resources due to lack of modern medical facilities (Sandhya et al, 2006).

Different modes of application have been adopted by local people to exploit the natural flora (Adnan et al, 2014). The drugs which are obtained from plant are effective and have few side effects. This can be best explained by comparison between the synthetic drug aspirin and bark of important medicinal plant *Salix alba* (white willow). It is clear from different studies that aspirin causes many side effects that can be avoided by using the extract of *Salix alba* bark (Shinwari et al, 2002; Mehmood et al, 2011). Thus ethnobotanical knowledge is not only helpful for the conservation of biodiversity and traditional cultures but also useful in drug development and health care. Information obtained from indigenous people can be used as a guideline for drug development under the assumption that a plant which has been widely used for longer period of time may have an allopathic application (Ajaib et al, 2010; Farnsworth, 1993).

Helminthic infections continue to be major health hazard of people, especially those living in tropical developing countries. Current estimates suggest that over half of the world population is infected with intestinal helminths,

such as *Ascaris*, hookworms, *Trichuris*, *Enterobius*, *Strongyloides*, and tapeworms, and that most of these infected people live in remote rural areas in the developing countries (De Silva et al, 2003 and Horton, 2003). Thus, in developing countries these infections pose a large threat to public heath and contribute to the prevellence of anemia, malnutrition, esinophilia and pneumonia (Mali and Mehta, 2008). Although majority of the infections due to worms are generally limited to tropical countries, they can occur to travellers, who have visited those areas and some of them can be developed in temperate climates (Bundy, 1994). Not only humans, helminthes also affect livestock resulting in considerable economic losses in domestic and farm yard animals. Because of limited availability and affordability of modern medicines most of the world's population depends to a greater extinct on traditional medical remedies. The traditional medicines hold a great promise as source of easily available effective antihelmenthic agents to the people, particularly tropical developing countries, including India.

Bandipora, a northern biodiversity rich district of Jammu and Kashmir state, has many remote hilly areas occupied by sizeable number of people especially tribals. The people of these areas largely depend on medicinal plants due to lack of modern medical facilities. Aim of the present study was to document ethnomedicinal plants used against helminthic infections by the local people of Bandipora district.

MATERIALS AND METHODS

Bandipora is a small newly created district with a 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 340 64' N latitude and 740 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 district has deciduous vegetation and is the site of diverse flora. This floristically rich area has sizable population of tribal communities and forest dwellers.

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, 74 informants were randomly selected and approached whose age ranged from 37-98 years. Data pertaining to indigenous uses of medicinal plants was collected using semi-structured interviews and focus group discussions. Afterwards medicinal plants cited during interview were collected. 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.

RESULTS

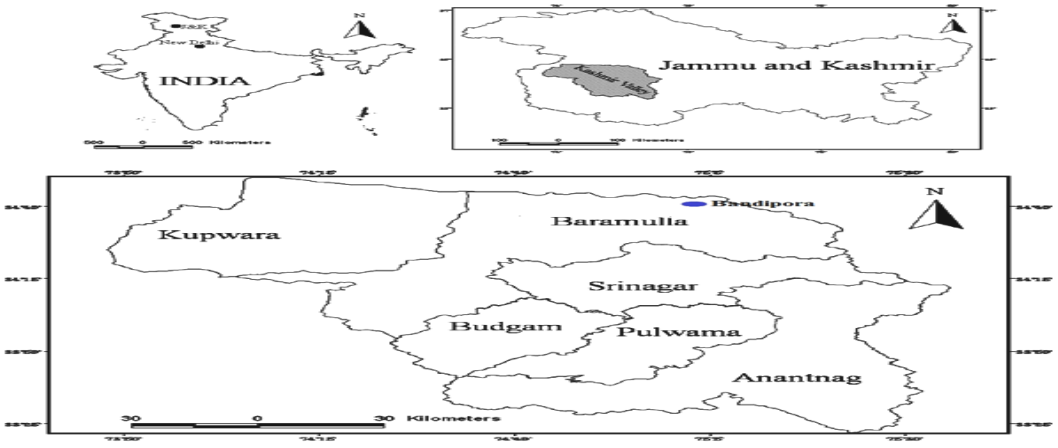

Fig. 1: Map of the Kashmir valley showing the location of newly created Bandipora district.

In this study, a total of 13 species belonging to the equal number of genera and 11 different families were reported to be used traditionally by local populace against helminthic infections. All collected and identified species are enumerated alphabetically in Table 1 with their scientific name, followed by local name, family, accession number, flowering period, plant part(s) used, mode of administration, distribution status.

Table. 1: List of traditionally 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	Distribution status	No. of use reports	% of all use reports	RFC
Aconitum heterophyllum Wall. "Pivak"/ Ranunculaceae	37804	AU-SP	Roots	Powder is made after roots are sun-dried. This powder is administered orally with water once in a day for 5 days to help in evacuation of intestinal worms.	Critically Endangered	5	2.51	0.06
Ajuga parviflora Benth. "Jan-i-adam"/ Lamiaceae	38849	AP-JN	Leaves	Leaf powder is administered orally with water twice a day for 3 days to cure helminthic infections.	Rare	4	2.01	0.05
Artemisia absinthium Linn. "Tithwan"/ Asteraceae	37789	JL-AU	Leaves and inflorescence	Juice is obtained after crushing fresh leaves and inflorescence. This juice is mixed with a glass of lukewarm water or milk and taken orally on an empty stomach early in the morning for 3-4 days to help in evacuation of intestinal worms	Rare	65	32.66	0.87
Dryopteris barbigera (Moore) Kuntze "Dade"/"Kunji"/ Pteridaceae	39276	NFL	Rhizome	Powder is made after rhizome is sun-dried. This powder is administered orally with water or milk everyday at bed time for 4 days to help in evacuation of intestinal worms.	Common	19	9.54	0.25
Euphorbia helioscopia Linn. "Gur-Sochal"/ Euphorbiaceae	38868	MY-SP	Leaves	Leaf decoction is given everyday at bed time for 3 days to help to help in evacuation of intestinal worms.	Common	5	2.51	0.06
Mentha arvensis Linn. "Pudnah"/ Lamiaceae	37788	JN-AU	Leaves	Powder of sundried leaves and diluted curd are mixed to make mixture locally known as 'lassi'. Lassi is administered orally twice a day for one week to cure helminthic infections.	Common	7	3.51	0.09
Nepeta cataria Linn. "Gund Soi"/ Lamiaceae	38911	JL-OC	Leaves	Powder of sundried leaves is administered orally with lukewarm water on an empty stomach early in the morning for 6 days to aid in removal of worms.	Common	14	7.03	0.18
Picrorhiza kurrooa Royle "Koud"/"Kutki"/ Scrophulariaceae	37802	JN-AU	Rhizome	Powder of sundried rhizome is administered orally with water early in the morning for 3 days to aid in evacuation of intestinal worms. Sometimes, semi-solid balls are made after mixing powder with wheat flour, jaggery and water. These balls are given to horses against tapeworms.	Endangered	34	17.08	0.45
Pinus wallichiana A.B. Jacks. "Kayur"/ Pinaceae	38844	MY-JN	Resin	Resin obtained from the young trees is applied externally on the tip of nose of children to stimulate evacuation of worms.	Common	4	2.01	0.05

Prunus persica (Linn.) Batsch "Chenun"/ Rosaceae	38885	AP	Leaves	Juice obtained after crushing fresh leaves is taken orally at bed time for 3-4 days to aid in removal of worms.	Common	11	5.52	0.14
Trillium govanianum Wall "Surmganda"/"Reech Ki Jadi"/ Liliaceae	37797	JN-AU	Rhizome	Crushed rhizome is given in the form of balls to cattle kill intestinal worms.	Common	9	4.52	0.12
Triticum aestivum Linn. "Kanik"/ Poaceae	38875	MR-AP	Seeds	Seed decoction is given to children early in the morning and at bed time continuously for three days to aid in evacuation of intestinal worms.	Common	4	2.01	0.05
Valeriana jatamansi Jones. "Mushkibala"/Valerianaceae	37801	MY-JL	Roots	Root powder is given orally with warm water or milk twice a day for one week to kill and aid in removal of worms.	Vulnerable	18	9.04	0.24

Abbreviations used: AN- Accession Number; AP- April; AU- August; FP- Flowering Period; JL- July; JN-June; MR-March; MY- May; NFL-Non Flowering; OC-October; RFC- Relative Frequency of Citation; SP- September.

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 curing helminthic infections 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). All the 13 medicinal plants of this study were collected from wild sources which indicated that people mainly depended on the natural environment for medicinal plant requirement. Plants were mostly herbs and the reason for their dominance was perhaps because of their abundance and year round availability. In majority of the cases leaves were harvested for medicinal purposes but sometimes underground parts such as roots and rhizomes were also collected. For harvesting of underground portions, plants were completely uprooted. The practice of uprooting may, however, pose a negative influence on the survival and continuity of useful medicinal plants because complete uprooting may not only remove the plant from its natural habitat but also reduce the chances of the seed formation thus hampering increase in plant population. Thus, to keep the plants alive, conservation efforts are extremely important. The frequently used solvent/dilutant in the preparation of formulations was water. This was perhaps because of its easy availability and more effectiveness in isolating the substance of therapeutic value from the medicinal plants. The more indigenous medicinal plant knowledge was possessed comparatively by men because of their more involvement in collection, day-to-day practices and trade related activities (Qureshi *et al.*, 2006). Children were reported to be main victims of helminthic infections perhaps because the living conditions were unhygienic.

Some plants such as *Artemisia absinthium, Picrorhiza kurrooa, Dryopteris barbigera, Valeriana jatamansi* and *Nepeta cataria* were comparatively more preferred for the treatment of helminthic disorders since their RFC values ranked highest with values of 0.87, 0.45, 0.25, 0.24 and 0.18 respectively. These positions correspond to the fact that the medicinal uses of these plants against helminthic disorders were reported by highest number of informants and RFC directly depends on the number of informants mentioning use of the plant (FC). Moreover, the preferred use of these plants could also be because of people's strong belief on the use of these plants for curing helminthic disorders as by trial and error method they could have gathered useful knowledge about various herbal remedies from their forefathers which they have received after generations of experimentation.

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) and uses for the purposes other than medicinal value. This finding is in agreement with the findings of Rashid *et al*. (2008) and Lone and Bhardwaj (2013). Such activities may not only lead to the rapid depletion of these precious resources but also associated traditional medicinal knowledge. Further, 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 plants namely *Aconitum heterophyllum, Picrorhiza kurrooa* and *Valeriana jatamansi* find their places in the critically endangered, endangered and vulnerable list of latest IUCN threat categories. Thus, the population of these medicinal plants will shrink day-by –day. This is a matter of great concern as these plants are backbone of our indigenous medicine system. Therefore, it is of utmost importance to conserve these threatened plants otherwise in near future such plants will completely disappear from their natural habitats.

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. Documenting indigenous knowledge through efforts like this study will be important for the conservation of biological resources and their sustainable development. It is through this study that the people can know the efficacy of certain medicinal plants against helminthic infections. Further, the phytochemical and pharmacological studies of plants documented in this study, can lead to the discovery of some important active principles which can be isolated and used against various pharmacological targets. The study could be also the basis for subsequent research on the plant species that are interesting from phytochemical point of view.

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CONFLICT OF INTEREST

I declare that I have no conflict of interest.

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