Ethnopharmacology of Some Important Medicinal Plants of Nanda Devi National Park (NDNP) Uttarakhand, India

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Abstract: Ethnopharmacology deals with the applied aspects of plants and has been emerged as an important discipline of traditional botany with modern sciences. With the increasing demands of vegetational resources in developing world, it has been attracted much attention in recent past. The paper presents few of the important medicinal plants present in alpine and sub alpine regions of core and buffer zone of Nanda Devi National Park (NDNP), district Chamoli, Uttarakhand. Since inhabitants and tribal communities have strong faith and belief in Indigenous Health Care system, they have been interviewed along with herbal practitioners, priests and shepherds during the entire study. Establishing small scale industry on medicinal plants may be helpful in capacity building of unprivileged inhabitants of this remote region. [Nature and Science 2010;8(11):9-14]. (ISSN: 1545-0740).

Key words: medicinal plants; folk recipes; NDNP, U.K.

Introduction

The Nanda Devi National Park is the first and foremost highly valued core of the Nanda Devi Biosphere Reserve. It has an area of 624.6 sq. km. and has an average altitude exceeding 4500 m asl surrounded by high mountain ridges and peaks on all sides. Some of the important peaks encircling the National Park are Dunagiri (7066 m), Rishi Pahar (6992 m), Mangraon (6765 m), Nanda Khat (6631 m), Maiktoli (6803 m), Mrigthuni (6655 m), Trishul I–II (7120- 6319m), Nanda Devi (7817 m), Devisthan I- II (6529 -6678 m) and Hanuman Peaks (6070 m), situated in the park. The park is situated in the form of a cup, with lush-green meadows, cluttering white water falls, and rich wild flora and fauna (Hajra and Balodi, 1995; Gaur et al, 1995; Samant and Joshi, 2003).

Ethno-medicinal plants, as a group, comprise approximately 8000 species and account for about 50% of all the higher flowering plant species in India. A large number of the country's rural population depends on medicinal plants for treating various illnesses (Gaur and Tiwari, 1987; Uniyal 1977). India has rich biodiversity and one among the 12 mega diversity centers, the growing demand for medicinal plants is putting a heavy strain on the existing resources, causing a number of species to be either threatened or endangered (Rawat, et al. 2001).

SOME GENERAL NOTIONS

The common preparations for internal application are: decoction (crushed plant parts boiled with water), extract (pounded plant parts steeped in hot or cold water, and finally sieved out through a clean cloth), infusion (plant parts steeped in hot or cold water), aqueous paste (plant part is pasted into thin layer and diluted with hot or cold water), powder (dry plant parts pounded into powder) and juice (fresh product obtained from crushed plant parts). Externally applied preparations are poultice (plant parts applied when it is hot), and paste (plant part's paste made into a thin layer application). It is interesting to note from the local people of the area that, if decoction from roots of the some species is taken with cold water, it is used as cold efficacy, while it is taken with hot water is used as hot efficacy (Rana, 2007).

Collection: The inhabitant of NDBR uses to follow some guidelines. They never visit forests on some occasion like month of Shrawan (a rainy month) and Posh (an autumn month). They also avoid Tuesday and Saturday for collection of bio produce. Normally use to collect the mature stages of most plant materials. When they collect alpine plants, they never dry them in low altitudes, and in case of low altitudes particularly from moist shady places, the plants are dried in the same habitat.

Preparation: The medicine men prepare the medicine from a particular plant for particular ailment however, it has been observed that they believe to use different parts of different plants such as root powder of one plant and bark powder of other plant or powder of other plant parts to promote the activity of curing the diseases.

Dosage Pattern: The medicines are prepared in the form of powder, decoction, infusion, paste, pill etc. Medicine in liquid form is given as teaspoon, the powder as "Chutki' (0.5 g) or in the form of locally made pills. Medicines are usually taken with water or milk, some times with hey, twice or thrice a day, after or before the meals. The duration of treatment depends on the effectiveness of the drug, from a week to months.

Doses of children and infants are reduced to half to one fourth or lower tractions as per the requirement.

Material and Methods

The information has been gathered during the years 2004-2007, through personal contact with the inhabitants, local herbal practitioners, old women folk, priests, shepherds etc. The species have been identified by consulting the Herbarium of Botanical Survey of India, Dehradun (BSD), the herbarium of Forest Research Institute, Dehradun (DD) and the Garhwal University Herbarium (GUH), Srinagar. Chemical compositions of the plants have been mentioned secondary information as published (Humayun, et al. 2003).

Enumeration

In the following text, plant species are arranged alphabetically with their Botanical names, Citations, Family in brackets, Vernacular names, Herbarium No., Folk Medicine Recipe (FMR) and Chemical Constituents (CC).

Aconitum heterophyllum Wall.ex Royle, (Ranunculaceae) Vern. *Atish,* CSR-GUH 19377.

Folk Medicinal Recipe: Root mixed with *Ajuga parviflora* leaves and *Podophyllum hexandrum* roots are dried in shade and powdered. The powder is given half teaspoonful twice a day early in the morning and at night after meals up to three months for the treatment of diabetes, leucorrhoea and as carminative. The aqueous extract of the root 5-10 ml is given twice a day, early in morning empty stomach and at night after meals for 7 to 28 days in chronic fever, in diarrhea and as cold efficacy.

Chemical Constituents: The plant contains aconitic acid, aconitine, tannic acid, mixture of oleic, palmitic and stearic glycerides and ash. The roots contain 4.3% indacotinine, aconitic acid and starch.

Aconitum violaceum Jacq. ex Stapf (Ranunculaceae) Vern. *Dudya Atish,* CSR- GUH 19240.

FMR: Root extract is given half teaspoonful twice a day early in morning and at night after meals up to three months as tonic, analgesic in fever, and in cardiac complaints.

CC: The plant contains aconitine, aconine, sparteine, benzoic acid, resins and tannins. The roots contain 4.3% indacotinine, aconitic acid and starch.

***Achyranthus aspera* L.** (Amaranthaceae) Vern. *Kuru* Sans. *Apamarga,* CSR-GUH 19166.

FMR: Plant decoction is given approximately half teaspoonful twice a day in morning and at night for 7 to 21 days for the treatment of bronchitis. Root infusion given in malarial fever. Decoction of root with honey is given thrice a day for a week to facilitate smooth delivery.

CC: The plant contains oleanolic acid, saponins, galactose, xylose, rhamnose, glucose and ash.

Acorus calamus L. (Araceae) Vern. *Bauchu,* CSR-GUH 18906.

FMR: Decoction of root is given 5-10 ml twice a day for a long time in the treatment of abdominal and cardiac complaints, asthma, and as anti-colic. Root powder is mixed *Selinum vaginatum* root, *Paeonia emodi* root powder and given half teaspoonful twice a day, in hysteria and epilepsy. Tuber powder approximately half teaspoonful is given twice a day for 7 to 21 days, for the treatment of pharyngitis.

CC: The plant contains oxalic acid, essential oil, volatile oil, humulene, tricyclic sesquiterpene, calamine, azulene, enanthylic acid, palmitic acid, starch and mucilage.

Ajuga parviflora Benth. (Lamiaceae) Vern. *Neelkanthi, Neelbati*, CSR- GUH 19425.

FMR: Leaf powder mixed with *Aconitum heterophyllum* tuber powder is given a quarter teaspoon twice a day for a long period in the treatment of leucorrhoea, high fever, colic and in diabetes.

CC: The plant contains ceryl alcohal, cerotic acid, palmitic acid, oleic acid, linoleic acid, phenolic acids and neutral bitter components, alkaloids, diterpenoids and triterpenoids.

***Artemisia scoparia* Walds & Kit**. (Asteraceae) Vern. *Kunjaa*, CSR-GUH 19102

FMR: Leaf paste applied on cuts and wounds. Powder of leaves is given half teaspoonful twice a day, early in morning prior to meals and at night after meals for the treatment of diabetes, and as a blood purifier. Roasted leaf powder is given half teaspoonful twice a day for a month in the treatment of abdominal complaints, colic, cough and cold.

CC: The plant contains artemisin, santonin, essential oil, scoparone, alkaloids, scoparin, palmatic acid, stearic acid, oleic acid, terpenes, bicyclic hydrocarbons, celluloses and hemicelluloses.

***Berberis lycium* Royle**.(Berberidaceae) Vern. *Kingore, Kirmode,* CSR-GUH 19257.

FMR: Decoction of root is given 2.5 ml. twice a day for two months in the treatment of urinary complaints, and also as blood purifier. Root juice dropped into eyes thrice a day for a week in ophthalmic infections. Root powder is given 2.5 g twice a day, early in morning and at night after meals for three months in diabetes.

CC: The major alkaloids are umbellatine and berberine.

Bergenia ciliata (Haw.) Sternb. (Saxifragaceae) Vern. *Chon Silpadi*, CSR-GUH 19443.

FMR: Root dipped into mustard oil for a night, extraction of root applied on hairs twice a day for a month, as a hair tonic and for shiny hairs. The decoction of root is given ½ teaspoonfuls twice a day, early in

morning and at night after meals for 30 to 45 days for the treatment of cough and cold, abdominal ailments, liver complaints, asthma, piles, and as a tonic.

CC: The plant contains tannic acid, gallic acid, glucose, mucilage, wax, metarbin, albumen and mineral salts.

Cedrus deodara (Roxb.ex D.Don) G. Don (Pinaceae) Vern. *Devdar, Diwar,* CSR-GUH 19225.

FMR: Wood oil approximately a drop is given twice a day for a month in the treatment of piles. The oil is applied externally on affected part twice a day in arthritic pain, ulcers and skin ailments. The decoction of bark is given a ¼ teaspoonful twice a day to treat fever and dysentery.

CC: Plant contains gum, essential oil, cholesterin. The oil from wood possess balsamic odor. Needles contain ascorbic acid.

Ephedra gerardiana Wall. ex Stapf H. (Ephedraceae) Vern. *Somlata,* CSR-GUH 19195.

FMR: Root and shoot powder is given half teaspoonful with honey twice a day up to three months for the treatment of asthma, bronchitis and cardiac complaints. The paste is applied externally twice a day for a month in arthritis.

CC: Plant contains alkaloids (0.7 to 2.33%), ephedrine (10.0%) and pseudo-ephedrine.

Geranium wallichianum D. Don ex Sweet (Geraniaceae) Vern. *Juyik,* CSR-GUH 19519.

FMR: Root sap filtered and dropped into eyes and ears thrice a day for 7 to 21 days for the treatment of earache and eye ailments and to improve vision. The root paste is given twice a day for a week in the stomach disorders.

CC: The plant contains gallic acid, tannin, red coloring matter, starch, oils, glucoside, genin, enzyme, pectin and sugar.

Juniperus communis L., (Cupressaceae) Vern. *Bhitaru,* CSR-GUH 19597.

FMR: The infusion of leaf given in leucorrhoea and dysmenorrhoea. Leaf paste applied on skin ailments.

CC: It's yields as low as 0.25% of essential oil. Contain resin (about 10%), fermentable sugar (about 33%), a bitter substance, juniperin, tannins, diterpenes and organic acids.

Julans regia L. (Juglandaceae) Vern. Akhod, CSR-GUH 19537.

FMR: The twigs used as toothbrush, once a day in the treatment of toothache and diarrhea. The pericarp of drupe with young leaf of *Lyonia ovalifolia* and cow's urine made into paste and applied externally twice a day to treat eczema, and psoriasis.

CC: Fruit contains oxalic acid. Seeds yield fixed oil, juglandic acid and a resin.

Mentha longifolia (L.) Hudson. (Lamiaceae) Vern. *Potina* CSR-GUH 19319.

FMR: Leaf extract along with onion is given a teaspoonful twice a day for 3-5 days in the treatment of cholera. Leaves used as flavoring and refrigerant made into sauce which is given in vomiting, indigestion, and constipation.

CC: It contains pale yellow oil with mint odour. The plant also contains piperitone oxide (45%), diosphenole, piperitienone, piperitenone oxide and disphenolene.

Origanum vulgare L. (Lamiaceae) Vern. *Bantulsi, Krishtulshi,* CSR-GUH 19244.

FMR: Plant extract is given ½ teaspoonfuls twice a day for 2-3 weeks in the treatment of bronchitis, cough and cold. Leaf paste applied on cuts and wounds.

CC: The plant contains essential oil (0.45-0.525%) containing 50% thymol, carvacol, origanene and tannin.

Paeonia emodi Wall. ex Royle, (Paeonaceae) Vern. *Chandra* CSR-GUH 19000.

FMR: Root powder mixed with *Selinum vaginatum* root powder is given ½ teaspoon twice a day up to 6 months for the treatment of hysteria, convulsion and epilepsy. Leaves are dried in shade, washed with hot water thrice, and then used as vegetable twice a day for the treatment of colic, blood dysentery, diabetes and urinary complaints. It is also used as blood purifier, and to improve lactation and treat menstrual problems.

CC: The plant contains oxalic acid and tannins.

Podophyllum hexandrum Royle, (Podophyllaceae) Vern. *Shon kakadi,* CSR-GUH 19282.

FMR: Root powder with *Ajuga parviflora* given 2.5 g. twice a day for three months in the treatment of diabetes and chronic fever. Root paste applied externally on wounds, cuts and skin ailments. Rhizome powder is given 2.5 g. twice a day, early in morning prior meals and at night after meals for 14 to 28 days in bile complaints, as carminative, in leucorrhoea.

CC: Plant contains podophyllin, podophyllotoxin. Roots of local plants yield higher resin (active principle 10-12%) as compared to American plants (4%). The rhizome gives podophyllol (8%), a sticky resin, quercetin and podophyllotoxin.

Rheum australe **D. Don** (Polygonaceae) Vern. *Archu.* CSR- GUH 19188.

FMR: Root powder roasted with clarified butter and made into pills, one pill given twice a day for 30-45 days in the treatment of chronic bronchitis, asthma, abdominal disease.

Chemical constituents: The chief constituents of roots are glucosiderhaponticin and chrysophanic acid, essential oil (0.05%) eugenol, a terpene alcohol and methyl heptyl ketone, anthraquinone, rhein and emodin derivative. The leaves contain oxalic acid (1.34%).

Saussurea lappa (Dcne.) Sch. Bip. (Asteraceae) Vern. *Kuth,* CSR-GUH 19278.

FMR: Root dried in shade powdered mixed with

honey and given half teaspoonful twice a day early in morning and at night after meals for a month in the treatment of asthma, bronchitis, and as a tonic. Root paste applied externally thrice a day for 2-3 weeks in eczema, ring worm.

CC: Root contains essential oil, alkaloid, saussurine, kushtine and bitter resin.

***Skimmia laureola* (DC.) Sieb. & Zucc. ex** Walp. (Rutaceae) Vern. Nairpat, CSR-GUH 18992.

FMR: Leaf paste mixed with cow's urine and the paste applied twice a day for 14 to 28 days for the treatment of psoriasis, leucoderma.

CC: Plant contains essential oil containing terpines, l-linalool, l-linalyl acetate, azuline and bergaptene. It also contains alkaloid skimnianin, furocoumarin, isopimpinellin, umbelliferone, laureoline.

Thymus linearis Benth. (Lamiaceae) Vern. *Marchya ghass* CSR-GUH 19384.

FMR: Whole plant is powdered and given approximately half teaspoonful twice a day for 30-45 days in the treatment of weak vision, and regulating menstruation. Powdered leaf along with honey is applied externally on affected area thrice a day for a week in the treatment of eczema and psoriasis. Roasted plant is given twice a day for a month to treat bronchial asthma, and abdominal disease.

CC: Thyme contains 0.15-0.6% volatile oil containing phenol, thymol, linalool, terpenes, terpene alcohol, tannins and resin).

Verbascum thapsus L. (Scrophulariaceae) Vern. *Akulya-bir* CSR-GUH 19243.

FMR: Plant extract taken in bronchitis and asthma. Whole plant is rubbed thrice a day on tongue for the treatment of excessive growth locally known as 'Daudjeeb'. Leaf paste along with cow's urine is applied externally on affected area for the treatment of 'Chhwrraya' a kind of boils.

CC: Roots contain bitter substance, saponin, mucilage, volatile oil, tannin and wax.

Viola canescens Wall. ex Roxb. (Violaceae) Vern. *Vanfsa* CSR-GUH 19284.

FMR: Extract of whole plant is given approximately half teaspoonful twice a day, early in morning and at night after meals for 14 to 28 days for the treatment of leucorrhoea, fever, headache and regulating menstruation. Decoction of whole herb is given ½ teaspoon twice a day for a month to treat bronchial asthma, cough, colic, and also used as aphrodisiac. Paste of plant applied externally on cuts boils and wounds as antiseptic.

CC: The plant contains glucosides, methyl salicylate, alkaloid violine, a glycoside violaquercitrin, saponin.

Some important ethno-medicinal plants of **Nanda Devi National Park (NDNP)**

Fig. 1-Ephedra geradiana

Fig. 2-Aconitum violaceum

Fig. 3-Podophyllum hexandrum

Fig 4-Geranium wallichianum

Fig. 5-Bergenia ligulata

Fig. 6-Origanum vulgare

Fig. 7-Paeonia emodi

Fig. 8-Rheum australe

Fig. 9-Rheum australe

Fig. 10-Thymes linearis

Discussion

Ethnobotany is perhaps most important method to study natural resources and their management by indigenous people. It enables us to work with local people to explore knowledge based on experiences of ages. Today, herbal medicine plays an important role in rural as well as urban areas and various locally produce drugs are still being used as household remedies for various diseases especially in these areas for different ailments. However study ascertains the value of great number of plants used in medicine, which could be of considerable interest to the development and formulation of new herbal drugs.

A large number of the NDNP rural populace depends on medicinal plants for treating various diseases. Inhabitants have significant reservoir of primitive knowledge about the medicinal uses. The natural remedies related to external and internal produce ailments and diseases are generally treated and improved health but these species as mentioned above is due to having chemical properties with alkaloid and acidic nature which is imperative for improvement of good health and curative against three bad effects (Tridosh) like Caph, Pitt and Baat especially.

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