

Full Length Research Paper

Ethnopharmacologically important medicinal plants and its utilization in traditional system of medicine, observation from the Northern Parts of Pakistan

Hassan Sher^{1*}, Mohammed N. Alyemeri¹, Leonard Wijaya¹ and Abdul J Shah²

¹Department of Botany and Microbiology, College of Science, King Saud University, Riyadh, Saudi Arabia.

²Department of Pharmacy, COMSATS Abbottabad Campus, Pakistan.

Accepted 11 August, 2010

Wild medicinal plants gathering for the treatment of various human ailments is an ancient tradition that has endured in mountainous areas of Pakistan. In order to understand the pattern and uses of plants, a study on the Ethnopharmacologically important medicinal plants of Shawar valley, District Swat was conducted during summer 2008. Information's about these plant resources were collected through semi-structured interviews, field observation and group discussion. In order to documents the preset use of medicinal plants growing in and around the study area an elderly person up to age group 60 was mostly interviewed. The study revealed that 87 plants species of 58 families of having ethnomedicinal importance. There were 50 Dicotyledonous families, 3 Monocotyledons families (Aliaceae, Iridacea and Poaceae), 2 Gymnosperms families (Pinaceae and Taxaceae) 2 Pteridophytes families (Polypodiaceae and Pteridaceae) and family Halvelaceae of fungi. These species were used for the curing of various human ailments in indigenous system of medicines. Some plants are used singly while many others are used in combination with other plants or edible items. Similarly, few plants species are considered for the treatment of only one specific disease while several other have multiple such medicinal uses. These are mostly used for the curing of gastro-intestinal problems, emmenagogue and antispasmodic and also for general body tonic. The detail local uses, local method of recipe preparation and application along with their local name and disease treated were reported for each species. The study also observed that the availability of pharmaceutically and therapeutically important MAP species is declining and the number of rare and threatened species among the MAPs is increasing in the area. Further study is, therefore, required to quantify the availability of species and to suggest suitable method for their production and conservation. Recommendations are, therefore, given in the spheres of training in identification, sustainable collection, value addition, trade monitoring and cooperative system of marketing of medicinal plants.

Key words: Medicinal plants, human ailments, traditional system of medicines.

INTRODUCTION

The study area "Shawar Valley" is located in the Northern most part of Pakistan. Topographically the area is rugged mountainous and varying in elevation from 1200 m at Sigram to 3600 m at Chotasar peak. The valley comprises of 5 big villages and 10 small hamlets with a population of about 15,000 people (Census Report, 1998).

The population of the area is mostly dependent upon agriculture and livestock rearing. About 1600 people of the total population are gathering different forest resources including medicinal plants in the valley.

Ethnobotany allows interaction between researcher with the local people that have the knowledge about use of plants. These people manage and conserve amounts of biological resources useful for industry and world community (Hussain and Sher, 2005; Ozcan, 2005). Ethnobotany also can provide useful information in drug

*Corresponding author. E-mail: hassan.botany@gmail.com.

development thus saving time and money (Sher et al., 2010, Joshi, 1982). Medicines made from plants with a history of traditional use, confirming the safety and effectiveness are used in many regulatory systems to guide the approval of commercial products.

The study of medicinal plants from traditional use by local people can lead to valuable information, allowing research to be done based on the empirical knowledge that should be tested scientifically. For that, there should be an analysis of medicinal plants in several aspects: anthropological, social, chemical, pharmacological, botanical, ecological, agronomic, and others (Sushila et al., 2010). Medicinal plant use has persisted as a long standing tradition in Indo-Pakistan. In the recent years, one can notice a global trend for survival interest in the traditional system of medicines. Screening of medicinal herbs has become a potential source of biodynamic compounds of therapeutic value. Ethnopharmaceutical studies have become increasingly valuable in the development of health care and conservation programs in different parts of the world (Balck, 1996).

The mountainous area of the study is covered by moist temperate coniferous forest. This forest helps in maintaining a microclimate in the area and also helps to keep several fresh water springs and a perennial stream alive. This region has been regarded as a natural reservoir for the collection of a variety of wild medicinal and aromatic plants. These species are collected without reference to conservation needs, and with limited tangible benefits occurring to local communities. It is, therefore, important to create awareness amongst communities, particularly for the species, which are under high bioenvironmental pressure in the area.

Forest resources in Malakand Division of Pakistan in general and "Shawar Valley" of District Swat in particular represent unique and enormous diversity of flora and fauna within a relative small geographical area due to variations in topography, altitude and climate. Pakistan host about 6000 species of flowering plants, out of which about 2000 species have medicinal, aromatic and economic values (Karki and Walliams, 1999). So far, 350 species have been reported from District Swat having medicinal and aromatic value (Sher et al., 2004). The high dependency of rural people on medicinal and aromatic plants for subsistence and unsustainable harvesting practices has resulted over exploitation of resources in different sites of the study area. Similarly, conversion of natural habitats into agricultural land has greatly decreased the population size of many economically important forest resources including medicinal and aromatic plants in different sites of the study area. As a result, many valuable species of medicinal and aromatic plants have become rare and sparse in the area.

Harvesting practices used by untrained collectors may endanger the recovery of some plants populations. Studies have revealed that commercial collectors have

non-selective harvesting habits where changes in population size and structure of important plant species occurred. Lack of knowledge about the part used and time of collection of medicinal plants lead to misuse of species. The appropriate timing to collect the desired parts of medicinal plant of certain age will determine the yield percentage and quality of therapeutically active biochemical ingredients. Secondly, lack of knowledge concerning economic value of medicinal and aromatic plants has led to their mismanagement and least profitable exploitation not entirely by local residents but also by visiting collectors.

Gathering and processing of medicinal and aromatic plants for family use in human and livestock treatment is a centuries old practice, and have also been used virtually in all cultures (Hussain et al., 2004). The use of traditional medicine for maintenance of health in most of the developing countries has been widely observed as a custom. Furthermore, an increasing reliance on the use of medicinal and aromatic plants in the developed societies has been traced to the extraction and development of several drugs and chemo-therapeutics from these plants as well as from traditionally used rural herbal remedies. Moreover, in these societies, herbal medicines have become more popular in the treatment of minor ailments and also on account of the increasing costs of personal health maintenance.

Collection and sale of medicinal and aromatic plants and other non timber forest resources is an important economic activity in the Northern parts of Pakistan including our study valley, and about 5000 families are involved in the collection and processing of medicinal plants in the region (Olsen and Larsen, 2003). The most active members of plants gathering and processing are women and children from middle hills. These collectors receive the minimum in the trade chain of medicinal herbs (Sher et al., 2005). Therefore, the local people are losing the preservation of traditional knowledge of medicinal plants and other important forest resources. Secondly, with the growing population of human being couple with the livestock population the pressure on wild plant resources is increasing, resulting in an alarming decrease in the biomass coverage of certain economically and pharmaceutically valuable plant species. Different research workers undertook some work on the documentation of ethnobotany of District Swat including the investigated area. But no literature exists on the Ethnopharmaceutically important species of coniferous forest of "Shawar valley". Therefore, the present endeavour was initiated with the aim of preparing an inventory of the ethnomedicinally and Ethnopharmaceutically important plants of the valley along with their traditional uses in traditional system of medicine, as the valley is ethnomedicinally unexplored and rich in plants resources. The finding may be of help for further research and for those working in the relevant disciplines of ethnopharmacy and medicines.

MATERIALS AND METHODS

A study on the Ethnopharmacologically valuable plants species of "Shawar Valley" of District Swat was conducted during spring and summer, 2008. Prior to exploring the ethnomedicinally important plant resources, topo-sheet map and other general informations of the investigated area were obtained from Forest Department Swat, Pakistan. The area was accordingly divided into different sites and then frequent visits were made first in May, second in June and July, and third in August and September 2008. A semi-structured questionnaire was devised to document the traditional knowledge of local people regarding medicinal plants.

Pre-test

To identify any amendments required to the questionnaire, a pre-test was conducted in the nearby village of the valley. This was conducted in the first week of April, 2008. Any revisions needed as a result of this pre-test were noted and undertaken in the following day of the pre-test.

Field survey

The traditional uses of ethnomedicinal plant resources were gathered from the local people. Participatory techniques were used to collect information and the main techniques and tools used to gather ethnobotanical data were household surveys, key informant interviews and focus group discussions. Generally, the respondents were elderly person and their age group varies from 40 - 60 years and total 153 households out of 200 were contacted and interviewed during the household survey. Their interest as local user, collectors and traders of medicinal plants were documented through questionnaire. Generally, those elder persons whose practical knowledge was respected by others and those who practice popular folk medicines were contacted and interviewed about the plants. Information about the local names, local uses, parts used, time of collection, processing and method preparation were known and recorded from those local people.

Plants specimens were collected, dried, preserved and mounted on standard herbarium sheets and were identified with the help of available literature (Nasir and Ali, 1971; 95; Stewart, 1972). The nomenclature was later on confirmed from National Herbarium, NARC, and Islamabad. A set of voucher specimens was deposited to National Herbarium, NARC, Islamabad and Botany Department, Islamia College University, Peshawar for record and reference as well. The plants were arranged and documented according to their evolutionary division.

RESULTS

Ethnomedicinal uses

The current study revealed that the flora of the investigated area is rich and provides diverse useful species of medicinal plants. The study documented 87 plants species classified among 58 families of ethnomedicinal importance. There were 50 Dicotyledones families, 3 Monocotyledones families (Aliaceae, Iridaceae and Poaceae), 2 Gymnosperms families (Pinaceae and Taxaceae) 2 Pteridophytes families (Polypodiaceae and Pteridaceae) and family Halvelaceae of fungi. These plants were used for the treatment of

various ailments in traditional system of medicines, mostly for stomach and gastro-intestinal problems. The results of the study also revealed that some plants are used singly while many others are used in combination with other plants or edible items. Similarly, few plants species are considered for the treatment of only one specific disease while several other have multiple such uses. Based upon the habit, the reported plants were classified into herbs (53), shrubs (12), trees (19), climbers (2) and one species of fungi. List of all the recorded plant species and ethnomedicinal uses are presented as follows.

Ethnomedicinal flora of Shawar Valley

Group A (Fungi)

Family: Helvelaceae
Morchella esculanta L. pers ex Fr.
 Habit: Fungus
 Parts used: Fruiting body
 Local name: Gujay
 Voucher specimen number: NH-ICUP / 08-10
 Local uses: Locally the morels are fried with cow's ghee and eaten after dinner which is considered as a general body tonic.

Group B (Pteridophytes)

Family: Polypodiaceae
Adiantum venustum D. Don.
 Habit: Herb
 Parts used: Frond (leaves)
 Local name: Sumbal
 Voucher specimen number: NH-ICUP / 08-11
 Local uses: Extract from the leaves is prepared locally and is mixed with the extract taken from *Cichorium intybus* and is used to treat fever, backache and also as blood purifiers.

Family: Pteridiaceae
Dryopteris jaxtaposta Christ.
 Habit: Herb
 Parts used: Young shoots
 Local name: Kwanjay
 Voucher specimen number: NH-ICUP / 08-12
 Local uses: It is used as a local vegetable and is believed to improve digestive power.

Group C (Gymnosperm)

Family: Pinaceae
Pinus wallichiana L.
 Habit: Tree
 Parts used: Resin

Local name: Strap (peoch)
 Voucher specimen number: NH-ICUP / 08-13
 Local uses: Locally 3-4 drops of resin are mixed with mustard oil and is applied to the ruptured skin as a healing agent.

Picea Smethina L.

Habit: Tree
 Parts used: leaves
 Local name: Kandal (Managazai)
 Voucher specimen number: NH-ICUP / 08-14
 Local uses: Tea made from fresh leaves is used once in a day for one week to remove kidney stone. It is also used in rheumatism.

Family: Taxaceae

Taxus wallichaina L.

Habit: Tree
 Parts used: Bark
 Local name: Banrraya
 Voucher specimen number: NH-ICUP / 08-15
 Local uses: Powdered bark is used with a cup of milk orally as emmenagogue and antispasmodic.

Group D (Angiosperm)

Sub group a: Dicot

Family: Amaranthaceae

Amaranthus viridis L.

Habit: Herb
 Parts used: Shoots and leaves
 Local name: Chalwai
 Voucher specimen number: NH-ICUP / 08-16
 Local uses: Leaves and shoots are boiled in water and the extract is used for curing of cough and asthma after dinner. Also used as a local vegetable.

Family: Anacardiaceae

Pistacea integerrima Stew. ex Brandis.

Habit: Tree
 Parts used: Leaves and Bark
 Local name: Shnai
 Voucher specimen number: NH-ICUP / 08-17
 Local uses: Powdered bark and leaves are taken with a glass of water before breakfast to cure jaundice. Also used as antiseptic.

Family: Apiaceae

Coriandrum sativum L.

Habit: Herb
 Parts used: Fruit
 Local name: Dhania
 Voucher specimen number: NH-ICUP / 08-18
 Local uses: The Powdered fruit is mixed with sugar and is taken orally for the curing of stomachache. It is also used as a carminative agent.

Foeniculum vulgare Mill.

Habit: Herb
 Parts used: Fruit
 Local name: Kaga Velanay
 Voucher specimen number: NH-ICUP / 08-19
 Local uses: Powdered fruit is mixed with sugar and is taken with a cup of milk for curing of dysuria. Dried fruits are also considered as laxative.

Family: Asteraceae

Artimisia vulgaris L.

Habit: Herb
 Parts used: Young shoots
 Local name: Tarkha
 Voucher specimen number: NH-ICUP / 08-20
 Local uses: The floral parts and leaves are taken in powdered form with a glass of water as antispasmodic and stomachache.

Cichorium intybus L.

Habit: Herb
 Parts used: Root
 Local name: Han
 Local uses: The decoction of fresh root is mixed with sugar and is taken orally for the treatment of jaundice and fever. It is also used in combination with powdered bark of *Pistacea integerrima*.

Taxaxacum officinale Weber.

Habit: Herb
 Parts used: Leaves and roots
 Local name: Ziarr Gulay
 Voucher specimen number: NH-ICUP / 08-21
 Local uses: Leaves are ground and are taken with a glass of milk as tonic. Decoction of roots is used orally to cure the disorder of kidney and liver.

Family: Berberidaceae

Berberis lycium Royle.

Habit: Shrub
 Parts used: Root
 Local name: Kwaray
 Voucher specimen number: NH-ICUP / 08-22
 Local uses: Locally the dried bark of roots in powdered form is used as tonic in rephorological complaints. It is also used as astringent in Gynecological disorders. It is also used in jaundice.

Family: Bracissicaceae

Capesella bursa pastoris L.

Habit: Herb
 Parts used: Leaves and stem
 Local name: Bambesa
 Voucher specimen number: NH-ICUP / 08-23
 Local uses: The fresh leaves are crushed into paste and two-table spoon are taken with milk to treat diarrhea.

Nasturtium officinale R. Br.

Habit: Herb
 Parts used: Young shoots
 Local name: Talmira
 Voucher specimen number: NH-ICUP / 08-24
 Local uses: Its leaves and young shoots are boiled in water and are taken as local vegetable for the treatment of constipation and stomachache.

Family: Buxaceae

Sarcococa saligna (D. Don) Muell.

Habit: Herb
 Parts used: Leaves
 Local name: Ladanrr
 Voucher specimen number: NH-ICUP / 08-25
 Local uses: The leaves are heated in mustard oil and are applied to muscular pains, twice a day. Infusion of leaves is also taken orally for curing of rheumatism.

Family: Canabinaceae

Cannabis sativa L.

Habit: Herb
 Parts used: Shoots and leaves
 Local name: Bhang
 Voucher specimen number: NH-ICUP / 08-26
 Local uses: The leaves are used in bandage (poultice) for wounds healing. In powdered form leaves are taken orally twice a day as anodyne (Pain relieving agent).

Family: Caprifoliaceae

Viburnum grandiflorum Wall. Ex, Dc

Habit: Shrub
 Parts used: Fruit
 Local name: Ghaz meva (Asos)
 Voucher specimen number: NH-ICUP / 08-27
 Local uses: The fresh mature fruits of *Viburnum grandiflorum* are eaten to cure stomach disorders.

Family: Caryophyllaceae

Silene vulgaris (D. Don) Muell. Arg.

Habit: Herb
 Parts used: Leaves and shoots
 Local name: Bashka
 Voucher specimen number: NH-ICUP / 08-28
 Local uses: Young shoots and leaves are used as a local vegetable for stomachache. It is also used as emollient.

Stellaria media (L.) Cyr.

Habit: Herb
 Parts used: Whole plant
 Local name: Oulalai
 Voucher specimen number: NH-ICUP / 08-29
 Local uses: The decoction of plant is considered as purgative.

Family: Chenopodiaceae

Chenopodium album L.

Habit: Herb

Parts used: Whole plant
 Local name: Sarmay
 Voucher specimen number: NH-ICUP / 08-30
 Local uses: The young shoots are cooked in milk, and are eaten with maize (corn) bread, as a local vegetable.

Family: Cuscutaceae

Cuscuta reflexa Romb.

Habit: Climber (parasite)
 Parts used: Whole plant
 Local name: Niladaria
 Voucher specimen number: NH-ICUP / 08-31
 Local uses: The powdered plant is taken with a glass of milk twice a day after meal for the treatment of diabetes.

Family: Convolvulaceae

Convolvulus arvensis L.

Habit: Climbing Herb
 Parts used: Whole plant except root
 Local name: Prewathai
 Voucher specimen number: NH-ICUP / 08-32
 Local uses: Decoction of the plant is used to remove dandruff, when hairs are washed with it.

Family: Ebenaceae

Diospyrus lotus L.

Habit: Tree
 Parts used: Fruit
 Local name: Tor Amlook
 Local uses: Local people, boil the fruit in milk and takes the decoction twice a day orally to cure dysentery and constipation.

Family: Eleagnaceae

Eleagnus umbellata Thumb.

Habit: Shrub
 Parts used: Flowers heads
 Local name: Ghanam ranga
 Voucher specimen number: NH-ICUP / 08-34
 Local uses: The decoction of flowers is used twice a day to combat the heart problem, cough and chest pain.

Family: Euphorbiaceae

Euphorbia helioscopia L.

Habit: Herb
 Parts used: Root and milky juice
 Local name: Mandanroo
 Voucher specimen number: NH-ICUP / 08-35
 Local uses: Locally it is considered as poisonous but Hakims use it in the tablets of other plants and are used as laxative.

Euphorbia wallichii Hook.f

Habit: Herb
 Parts used: Shoots
 Local name: Shangla

Voucher specimen number: NH-ICUP / 08-36

Local uses: Dried leaves and seeds are given to children in small amount in bowl complains and also used for the removal of ring worms.

Family: Fagaceae
Quercus incana (Husskn.) H.N
 Habit: Tree
 Parts used: Fruit
 Local name: Banj

Voucher specimen number: NH-ICUP / 08-37

Local uses: The powdered fruit is given to children before going to bed for curing of enuresis and dysuria, for a period of three weeks.

Quercus dilatata Lindle, ex. Royle.

Habit: Tree
 Parts used: Fruit
 Local name: Toor Banj

Voucher specimen number: NH-ICUP / 08-38

Local uses: The powdered fruits are used to treat gonorrhoea and urinary tract diseases.

Quercus semicarpifolia Sm.

Habit: Tree
 Parts used: Fruit
 Local name: Mer (tarra)

Voucher specimen number: NH-ICUP / 08-39

Local uses: Powdered fruits are mixed with wheat flour and then fried in desi ghee which is considered as a general body tonic.

Family: Fumariaceae

Fumaria indica (Husskn.)
 Habit: Herb
 Parts used: Whole plant
 Local name: Paprra

Voucher specimen number: NH-ICUP / 08-40

Local uses: Powder of the whole plant is mixed with honey and milk and is used for curing jaundice also used as blood purifier.

Family: Geraniaceae

Geranium wallichianum D. Don ex. Sweet
 Habit: Herb
 Parts used: Rhizome
 Local name: Srazela

Voucher specimen number: NH-ICUP / 08-41

Local uses: Root decoction in combination with pods of *Pistacea integerrima* is used for the curing of kidney diseases, cough and fever.

Family: Hippocastinaceae

Aesculus indica (Wall ex Comb) H.K.F
 Habit: Tree
 Parts used: Fruit
 Local name: Jawaz

Voucher specimen number: NH-ICUP / 08-42

Local uses: Powdered fruits are eaten before breakfast and considered as anthelmintic. Oil extract from the fruit is externally applied to treat rheumatism.

Family: Hypericaceae

Hypericum perforatum L.
 Habit: Herb
 Parts used: Leaves
 Local name: Shin Chay

Voucher specimen number: NH-ICUP / 08-43

Local uses: Locally green tea is prepared from their flowers especially from the petals and use three times a day for the curing of epilepsy.

Family: Juglandaceae

Juglans regia L.
 Habit: Tree
 Parts used: Fruit and bark
 Local name: Ghuz

Voucher specimen number: NH-ICUP / 08-44

Local uses: Ripened fruit is used as a brain tonic. The bark of stem and root antiseptic toothbrush locally called "Dandasa".

Family: Lamiaceae

Ajuga Bracteosa Wall. ex Bth.
 Habit: Herb
 Parts used: Whole plant
 Local name: Booti

Voucher specimen number: NH-ICUP / 08-45

Local uses: Decoction of the plant or powder is locally swallowed with water before breakfast for the treatment of sore throat and purifying blood. It is also used in epilepsy.

Mentha longifolia L. Huds

Habit: Herb
 Parts used: Leaves and stem
 Local name: Velanay

Voucher specimen number: NH-ICUP / 08-46

Local uses: The decoction of the leaves is taken orally thrice a day for treatment of diarrhea in children. Powdered plant is mixed with sugar and is eaten for the prevention of vomiting.

Mentha spicata L.

Habit: Herb
 Parts used: Leaves and young shoots
 Local name: Pudina

Voucher specimen number: NH-ICUP / 08-47

Local uses: The powdered plant is taken orally with a glass of water early in the morning before breakfast to control vomiting. The recipe is also considered as a carminative agent.

Micromeria biflora (Buch-hamp ex. D. Don) Benth

Habit: Herb
 Parts used: Whole plant
 Local name: Naray Shamakay
 Voucher specimen number: NH-ICUP / 08-48
 Local uses: It is an aromatic agent and locally milk dealer wash their milk containers with it to avoid bad odour, bacterial growth and milk spoilage. (Antiseptic)

Salvia moorcroftiana Wall. ex Benth
 Habit: Herb
 Parts used: Leaves and stem
 Local name: Khardag
 Voucher specimen number: NH-ICUP / 08-49
 Local uses: The leaves are warmed with mustard oil and applied on the swollen skin to release puss, while the inner part of the stem is chewed which is considered as an aphrodisiac agent.

Thymus linearis L.
 Habit: Herb
 Parts used: Whole plant
 Local name: Zangali Sperkai
 Voucher specimen number: NH-ICUP / 08-50
 Local uses: Locally the green tea is prepared from its leaves and stem, which is considered as a recipe for curing fever, cough and cold.

Plectranthus rogosus L.
 Habit: Shrub
 Parts used: Stem and leaves
 Local name: Sperkay (Butras)
 Voucher specimen number: NH-ICUP / 08-51
 Local uses: The dried leaves are chewed in mouth to get rid of toothache.

Family: Malvaceae
Malva neglecta L.
 Habit: Herb
 Parts used: Leaves
 Local name: Zangali Panerak
 Voucher specimen number: NH-ICUP / 08-52
 Local uses: It is used as a local vegetable (Sag) to remove constipation and enhance digestion.

Family: Meliaceae
Melia azadirach L.
 Habit: Tree
 Parts used: Leaves and fruits
 Local name: Tora Bakyanra (Shandai)
 Voucher specimen number: NH-ICUP / 08-53
 Local uses: Fruits are dried, crushed and taken orally with milk for gastric troubles, fever and cough. Powdered leaves are mixed with wheat flour and are used orally as anthelmintic, in livestock. Decoction of the bark is considered to be an anti-allergenic.

Family: Moraceae
Ficus palmata Forsk.

Habit: Herb
 Parts used: Floral parts (fruit)
 Local name: Inzar
 Voucher specimen number: NH-ICUP / 08-54
 Local uses: The fresh floral parts are taken orally as demulcent. Fruits are edible and are considered to improve digestion.

Morus alba L.
 Habit: Tree
 Parts used: Fruit
 Local name: Toot
 Voucher specimen number: NH-ICUP / 08-55
 Local uses: The mature fruit is eaten to treat constipation, cough and cold.

Family: Myrsinaceae
Myrsine africana L.
 Habit: Shrub
 Parts used: Fruit
 Local name: Marurrang
 Voucher specimen number: NH-ICUP / 08-56
 Local uses: The ripen fruits are edible, and are used to cure toothache, when pressed in between the teeth suffering from pain.

Family: Oleaceae
Olea ferruginea L.
 Habit: Tree
 Parts used: Leaves, bark and fruits
 Local name: Khona
 Voucher specimen number: NH-ICUP / 08-57
 Local uses: Decoction of the fresh leaves is retained in mouth for sometime to remove toothache and gum disorders. Oil extracted from fruits are applied externally to treat rheumatism. Toothbrush is made from its young shoot and is considered as antiseptic.

Jasminum officinale L.
 Habit: Shrub
 Parts used: Root
 Local name: Chambele
 Voucher specimen number: NH-ICUP / 08-58
 Local uses: Powdered root is taken orally with a glass of water before breakfast as anthelmintic medicine.

Family: Oxalidaceae
Oxalis corniculata L.
 Habit: Herb
 Parts used: Whole plant
 Local name: Tarukay
 Voucher specimen number: NH-ICUP / 08-59
 Local uses: It is mixed in vegetables for taste. Decoction of plant is taken after meal to enhance digestion.

Family: Paeoniceae
Paeonia emodi Wall.ex Hook. F
 Habit: Herb

Parts used: Rhizome
 Local name: Mamekh (Warrd)
 Voucher specimen number: NH-ICUP / 08-60
 Local uses: Powdered rhizome is mixed with prepared halva of wheat flour and is taken with desi ghee, as a general body tonic.

Family: Pappilionaceae
Indigofera heterantha L.
 Habit: Shrub
 Parts used: Leaves and roots
 Local name: Ghwareja
 Voucher specimen number: NH-ICUP / 08-61
 Local uses: The dried powdered root is taken with a glass of water to cure scabies. Powdered dried leaves are also taken with a glass of milk for stomach disorders.

Lathyrus aphaca L.
 Habit: Herb
 Parts used: Seed
 Local name: Kurkamanay
 Voucher specimen number: NH-ICUP / 08-62
 Local uses: The decoction of the seed is applied three times a day for healing wounds.

Family: Papaveraceae
Papaver somniferum L.
 Habit: Herb
 Parts used: Capsule and seeds
 Local name: Qashqash (Apim)
 Voucher specimen number: NH-ICUP / 08-63
 Local uses: Dried capsule is boiled in tea, and is taken orally to cure cough, fever and headache. Seeds are eaten as a general body tonic.

Family: Plantaginaceae
Plantago lanceolata L.
 Habit: Herb
 Parts used: Leaves
 Local name: Jabai
 Voucher specimen number: NH-ICUP / 08-64
 Local uses: Fresh Crushed leaves are applied to treat wounds sores and inflamed surfaces, particularly in feet.

Family: Platanaceae
Platanus orientalis L.
 Habit: Tree
 Parts used: Bark
 Local name: Chinar
 Voucher specimen number: NH-ICUP / 08-65
 Local uses: Powdered dried bark is taken with a glass of milk twice in a day to control diarrhea.

Family: Polygonaceae
Polygonum aviculare L.
 Habit: Herb

Parts used: Root
 Local name: Palpoolak
 Voucher specimen number: NH-ICUP / 08-66
 Local uses: Powdered root is mixed with sugar and is eaten with a glass of milk as a tonic by female.

Rheum webbianum L.
 Habit: Herb
 Parts used: Leaves and Rhizome
 Local name: Shalkhay
 Voucher specimen number: NH-ICUP / 08-67
 Local uses: Both the rhizome and leaves are crushed and taken with a glass of water for the treatment of HBV and HCV.

Rumex hastatus L.
 Habit: Herb
 Parts used: Leaves and young shoots
 Local name: Tarukay
 Voucher specimen number: NH-ICUP / 08-68
 Local uses: The leaves are used as local vegetable, which enhances digestion. It is also used as refrigerant in cooling drinks.

Family: Portulacaceae
Portulaca oleracea L.
 Habit: Herb
 Parts used: Shoots
 Local name: Warkharray
 Voucher specimen number: NH-ICUP / 08-69
 Local uses: It is used as local vegetable. Its decoction is taken before meal for the treatment of kidney and liver diseases.

Family: Primulaceae
Primula denticulata D. Don
 Habit: Herb
 Parts used: Flower
 Local name: Mamera
 Voucher specimen number: NH-ICUP / 08-70
 Local uses: Powdered dried flowers are applied to eyes for control of eye diseases like ophthalmia and also for the improvement of eyesight.

Family: Rhamnaceae
Zizypus vulgaris L.
 Habit: Tree
 Parts used: Fruit
 Local name: Markhanrai
 Voucher specimen number: NH-ICUP / 08-71
 Local uses: Fruits are edible and are considered as recipe for the treatment of cough and cold.

Family: Rosaceae
Crataegus oxycentha
 Habit: Tree
 Parts used: Fruit

Local name: Tampasa
 Voucher specimen number: NH-ICUP / 08-72
 Local uses: Its fruit is edible and is believed as heart tonic.

Fragaria vesica L.

Habit: Herb
 Parts used: Fruit
 Local name: Zmakeen toot (Katal Meva)
 Voucher specimen number: NH-ICUP / 08-73
 Local uses: Its edible fruits are carminative and laxative and thus improve digestion.

Prunus cornuta L.

Habit: Tree
 Parts used: Fruit
 Local name: Changa
 Voucher specimen number: NH-ICUP / 08-74
 Local uses: Decoction of the fruit is taken orally after meal to enhance digestion.

Rosa moschata L.

Habit: Shrub
 Parts used: Flower
 Local name: Zangali Gulab (Khwrach)
 Voucher specimen number: NH-ICUP / 08-75
 Local uses: Decoction of fresh flowers is taken orally, before breakfast to cure stomach disorders.

Rubus fruticosus L.

Habit: Shrub
 Parts used: Fruit
 Local name: Baganrra
 Voucher specimen number: NH-ICUP / 08-76
 Local uses: Ripened fruit is eaten to control stomachache and to enhance digestion.

Spiraea chinensis Maxim.

Habit: Shrub
 Parts used: Flower
 Local name: Krachay
 Voucher specimen number: NH-ICUP / 08-77
 Local uses: Tea made from flowers is given to women to ease delivery.

Family: Rutaceae

Skimmia laureola (DC) Sieb and Zucc.
 Habit: Herb
 Parts used: Leaves
 Local name: Namer (Nazar Panrra)
 Voucher specimen number: NH-ICUP / 08-78
 Local uses: The dried leaves are burnt to expel evils and evil eyes as it is considered as an antiseptic. Tea made from the leaves is used after meal to cure dyspepsia.

Zanthoxylum alatum Steud.

Habit: Shrub

Parts used: Bark

Local name: Dambara
 Voucher specimen number: NH-ICUP / 08-79
 Local uses: Decoction of bark is used twice a day after meal to cure stomachache.

Family: Saxifragaceae

Berginia ciliata (Haw). Sternb.
 Habit: Herb
 Parts used: Rhizome
 Local name: Makanrr path (Gat panrra)
 Voucher specimen number: NH-ICUP / 08-80
 Local uses: Powdered rhizome is eaten with a glass of water as anti-diabetic and expectorant.

Family: Scrophulariaceae

Verbascum thapsus L.
 Habit: Herb
 Parts used: Leaves
 Local name: Khardag
 Voucher specimen number: NH-ICUP / 08-81
 Local uses: Fresh leaves are mixed with mustard oils and applied on swellings as poultice, as it has antibiotic activity.

Family: Simarubaceae

Alanthus altissima Mell.
 Habit: Tree
 Parts used: Seeds
 Local name: Bakyanrra (Shandai)
 Voucher specimen number: NH-ICUP / 08-82
 Local uses: The ripened seeds are crushed to extract oil, which is used for the treatment of a skin disease, "aurticaria" locally called larrama.

Family: Solanaceae

Solanum nigrum L.
 Habit: Herb
 Parts used: Leaves and fruit
 Local name: Karmachu
 Voucher specimen number: NH-ICUP / 08-83
 Local uses: Leaves in the form of paste are applied to skin to cure eczema. The fruits are edible and are used to cure fever.

Datura stromonium L.

Habit: Herb
 Parts used: Root and flowers
 Local name: Harhanda
 Voucher specimen number: NH-ICUP / 08-84
 Local uses: The decoction of fresh root is taken orally twice a day for a weak to treat fever. Drops of the decoction are also applied to the ear for the treatment of earache.

Family: Thymellaeaceae

Dahne mucronata Royle.

Habit: Shrub
 Parts used: Shoots and root
 Local Name: Laighunay
 Voucher specimen number: NH-ICUP / 08-85
 Local uses: Infusion of leaves is used for the treatment of gonorrhoea. Decoction of roots is used before breakfast as anthelmintic.

Family: Ulmaceae
Celtis australis L.
 Habit: Tree
 Parts used: Fruit
 Local name: Tagha
 Voucher specimen number: NH-ICUP / 08-86
 Local uses: The fruits are edible and are used to cure colic and amenorrhoea.

Family: Urticaceae
Urtica dioica L.
 Habit: Herb
 Parts used: Whole plant
 Local name: Seezunkay
 Voucher specimen number: NH-ICUP / 08-86
 Local uses: It is used as a local vegetable (Sag), for curing constipation, also used in pulmonary diseases.

Family: Valerianaceae
Valeriana jatamansi Jones.
 Habit: Herb
 Parts used: Rhizome
 Local name: Mushkebala
 Voucher specimen number: NH-ICUP / 08-87
 Local uses: The powdered rhizome is mixed with desi ghee and is used for the curing of epilepsy. It is also considered antispasmodic agent.

Family: Verbinaceae
Verbena officinalis L.
 Habit: Herb
 Parts used: Whole plant
 Local name: Shamakay
 Voucher specimen number: NH-ICUP / 08-88
 Local uses: The decoction of the fresh plant is taken orally twice a day as anti-malarial and coolant agent.

Family: Violaceae
Viola serpens L.
 Habit: Herb
 Parts used: Flowers and leaves
 Local name: Banafsha
 Voucher specimen number: NH-ICUP / 08-89
 Local uses: Its flowers are eaten directly for the treatment of sore throat, and as carminative agent.

Sub group b: Monocot
 Family: Aliaceae
Allium sativum L.

Habit: Herb
 Parts used: Whole plant
 Local name: Ouga
 Voucher specimen number: NH-ICUP / 08-90
 Local uses: The plant is boiled and the decoction gotten is cooled and is taken twice a day for lowering the high blood pressure.

Family: Iridaceae
Gynandrisis sisyrinchium L. Parl.
 Habit: Herb
 Parts used: Corms
 Local name: Gandechar
 Voucher specimen number: NH-ICUP / 08-91
 Local uses: Decoction of bulb is mixed with *Digitalis* and is taken twice a day as diuretic.

Family: Poaceae
Avena sativa L.
 Habit: Herb
 Parts used: Fruit
 Local name: Jamdaray
 Voucher specimen number: NH-ICUP / 08-92
 Local uses: The fruit is fried in ghee and milk and the obtained paste is considered as general body tonic and an aphrodisiac.

Cynodon dactylon L.
 Habit: Herb
 Parts used: Whole plant except root
 Local name: Kabal
 Voucher specimen number: NH-ICUP / 08-93
 Local uses: The decoction of plant is used as blood purifier and controlling bleeding from nose.

Zea mays
 Habit: Herb
 Parts used: Grains
 Local name: Jwar
 Voucher specimen number: NH-ICUP / 08-94
 Local uses: The flour of maize is poured on fire in a small quantity to get fumigation, and then the body infected from aurticarria (Larrama) is exposed to the fumes for curing.

DISCUSSION

Ethnopharmaceutical knowledge deals with the traditional uses of plants in the indigenous system of medicine. The present study area is rich in medicinal plant diversity, which is most significantly associated with the life and practices of the hill side dwellers of the area. The present study reported that the people of the area rely on plants for medicines and other daily products. There were 87 such medicinal species used in traditional system of medicine by the inhabitants of the investigated site for

curing various diseases. These plants are used to treat about 20 different types of human ailments. Among various classes of traditional uses, all across the globe, various types of gastrointestinal disorders are predominant, and a sizeable number of plant species have been discovered to cure such illness across different ethnic communities (Sher et al., 2010). This finding agrees to that of Yazicioglu and Tuzlaci (1996). Who reported 88 medicinal plants along with their preparation and administration in Turkey used by the local people for the treatment of bronchitis and wound healing. Most of the species, including *V. serpens*, *Z. mays*, *P. lonceolatus* and *B. lycium* were used for the curing of various intestinal and stomach problems. Arshad and Akram (1999) reported that most of the wild plants were used for curing constipation, diarrhea and intestinal disorder by the people of Rawalpindi, Pakistan. However, the species used by them were different from those of the present study. The plants were used either individually or in mixture with other plants or even in combination with item such as sugar and wheat flour etc. Similar information were gathered from local people in Shushunia Hills, India, where in most cases medicines were prepared by the combination of 2 or more medicinal plants (Goshi, 1997).

The present study also revealed that with the increase in elevation and remoteness of the area within the study valley, the involvement of children and women in the collection of, and dependence on medicinal plants increased. This agrees with the studies of Sher et al. (2005) who reported that women and children usually collect medicinal plants as a part time business, in the northern areas of Pakistan. The inhabitants of the area get significant benefits from forest which comes mainly in the form of vast array of forest products especially medicinal plants. Similar observation on the use and dependence of hill side community on forest resources were reported by Sher et al. (2004). However, the natural bio-resources are not scientifically managed and, therefore, they are disappearing in many parts of the world (FAO, 1995). In spite of the economic and pharmaceutical importance of many of these species is either endangered or appears at the verge of extinction in local area. The medicinal flora of the study area is under heavy pressure as a result of overgrazing, illicit cutting, unabated urbanization and unauthorized collection of medicinal plants and conversion of forest land into agricultural land. Although, these plants have varied ethnomedicinal uses, yet they are not properly managed. Olsen and Larsen (2003); Hussain et al. (2004); Sher and Hussain (2009) reported that the number of endangered species is increasing due to environmental degradation, over grazing and over exploitation in the form of medicinal plants extraction and deforestation. Medicinal plants were mostly used in crude form even today in the area. However, with the advancement of pharmaceutical research, there is increasing exploitation of such

resources. Due to over exploitation, the number of such plants have been decreasing in the area.

Most of the species especially medicinal plants reported here have multiple uses. These were invariably used for curing various diseases and for earning livelihood. However, the reported plants were severely grazed by the local livestock. Overgrazing has caused the destruction, as green parts are being removed and damaged due to trampling. It therefore, becomes important to manage the grazing system and encourage the regeneration of medicinal plants (Sher et al., 2010). The present study, therefore, suggest that some management measures should be taken with the participation of local communities through village organization to conserve medicinal plant resources from becoming extinct. The foremost important thing is to give awareness/training to local communities on multidimensional basis about sustainable exploitation of medicinal plant wealth in hillsides and information on price of marketable species.

CONCLUSION AND RECOMMENDATIONS

The area also host many endemic and endangered species of medicinal and aromatic plants, many of them containing medicinal and economic importance. The study also revealed that only few species were known while several species of medicinal and aromatic plants were completely unknown to the community as a whole. Therefore, this study suggests that local community should get education about the identification and importance of indigenous medicinal and aromatic plant species. Indigenous knowledge behind the uses, collection and management of medicinal and aromatic plant species is fastly eroding. One reason for this is the lack of awareness among the local community regarding the economic and pharmaceutical importance of medicinal and aromatic plants. Another factor contributing in the declination of medicinal and aromatic plants cover and eroding of indigenous knowledge is the inadequacy of the medicinal and aromatic plants market and lack of government support. This is, therefore, an issue of national policies and must be address. The study recorded highly valuable informations about some MAP species. For instance *R. webbanium* is widely distributed and quite common in the study area.

The Chinese scientists extracting oil that is used to cure cancer and the juice extracted from the fruit is sold and used as tonic. Similarly, the Chinese scientists have developed small-scale enterprise from the species like preparation of Jams and prickles etc. The Chinese are earning an annual profit of 05 million US\$ from this single specie. *R. webbanium* can develop similar scope in their country especially in the remote pocket District Swat. The approach to improve or restore the ill effects of resources misuse and economic degradation should be in multiple

directions, from improving the economic standard to changing the attitudes of the local people should be adopted in future. One important lesson learned from this study is that the establishment of a community based enterprise that depends on local biodiversity can be a strategy to provide more equitable returns to community groups and hence incentives for conserving the resource base. This type of study may help in better understanding of local forest resources and potential medicinal and aromatic plants. Lack of knowledge regarding the local potential at the national level would eventually lead to the genetic erosion of medicinal and aromatic plant species and the related indigenous knowledge system. In order to ensure the management and conservation of medicinal and aromatic plants, documenting of indigenous knowledge system and its constant and consisting support is essential.

ACKNOWLEDGEMENTS

The authors greatly thank the local communities for their willingness to sharing their valuable empirical knowledge and experiences on wild medicinal plants. Thanks are also due to the Forest Department for secondary data of the study area.

REFERENCES

- Arshad M, Akram S (1999). Medicinal plants of university of Arid Agriculture, Rawalpindi, *Hamderd Medicos*, 40(3): 46 - 50.
- Balck MJ (1996). Transforming ethnobotany for the new millennium. *Annals of the Missouri Botanical Garden*, 83: 58-66.
- Census Report of District Swat, (1998). Population census organization, Statistical Division Govt. Pak, Islamabad, 10 - 89.
- FAO (1995). Forest Resource Assessment, 1990, Global Syntesis, FAO. Rome, (3): 124-162.
- Goshi S (1997). Folk medicine: A micro study in and around Sushunia Hills, India. *J. living world W.*, 1: 12 - 10.
- Hussain F, Khaliq A, Durrani MJ (1996). Ethnobotany Studies of Some Plants of Dabargai, Hills, District Swat, Pakistan Proc of Ethnobotany Workshop NARC Islamabad, p. 207-215.
- Hussain F, Sher H, Ibrar M (2004). Ethnomedicinal profile of some plants of district Swat, Pakistan. *Pakistan J. Plant Sci.*, 10(2): 85-104.
- Hussain F, Sher H (2005). Ethnomedicinal uses of plants of district Swat, Pakistan. *Pakistan J. Plant Sci.*, 11(2): 137-158.
- Joshi P (1982). 'An ethnobotanical study of Bhils- A preliminary survey.' *J Econ. Taxonomic Bot.* 3: 257-266.
- Nasir E, Ali SI (1971-95). *Flora of Western Pakistan*, Depart.Bot. University of Karachi, Karachi.
- Olsen CS, Larsen HO (2003). Alpine medicinal plant trade and mountain livelihood strategies, *Geographical J.* 169(3): 243-254.
- Ozcan M (2005). Mineral composition of different parts of *Capparis ovata* Desf. Growing wild in Turkey, *J.Med. Food*, 8: 405-407
- Sher H, Khan ZD, Khan AU, Hussain F (2004). Ethnobotanical study on some plants in village Tigdari, district Swat, Pak. *J. Acta Botanica Yunnanica.*, 10(5): 42-54.
- Sher H, Khan ZD, Khan AU, Hussain F (2005). *In-situ* conservation of some selected medicinal plants of Upper Swat, Pak. *J. Acta Botanica Yunnanica.*, 27: 27-36.
- Sher H, Khan ZD, Khan AU, Hussain F (2004). Ethnobotanical evaluation of some plant resources of Village Tigdari, Swat Pak. *J. Acta Botanica Yunnanica.*, 4: 45-58.
- Sher H, Hussain F (2009). Ethnobotanical evaluation of some plant resources in Northern part of Pak. *Afri. J. Biotechnol.*, 8 (17): 4066-4076.
- Sher H, Al-Yemeni MN, Sher H (2010a). Forest Resource utilization assessment for economic development of rural community, Northern parts of Pakistan. *J. Med. Plants Res.*, 4 (12): 1197-1208, 18 June, 2010
- Sushila R, Permender R, Dharmender R, Deepti R, Vikash K (2010). Phytochemical and pharmacological Potential of Kair (*Capparis Decidua*). *Int. J. Phytomedicine*, 2: 10-17.
- Stewart RR (1972). An annotated catalogue of the vascular plants of West Pakistan and Kashmir, Fakhri press, Karachi 102.
- Yazicioglu A, Tuzlaci E (1996). Folk medicinal plants of Trabazon Turkey *Fitoterapia*, 67(4): 307 - 318.