PHYTOCHEMICAL INVESTIGATION AND USES OF SOME OF THE MEDICINAL PLANTS OF KASHMIR HIMALAYA - A REVIEW

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ABSTRACT

The valley of Kashmir, also called the bio-mass state of India is very rich in aromatic and medicinal plants. More than 50% of plant species described in the British pharmacopoeia are reported to grow in Kashmir valley and it is established that nearly 570 plant species are of medicinal importance. Natural products utilized in the correct form and dosages are less harmful than synthetic products. The use of these herbal remedies is not only cost effective but also safe and almost free from serious side effects. Modern pharmacotherapy has included a range of drugs of plant origin, known by ancient civilizations and used throughout the millennia. The increasing consumer preference for natural products over their synthetic counterparts is quite evident, so there is a growing demand for analysing unsurveyed plant species. This review article is an attempt to shade a small beam of light on the profiles of some medicinal plants which emphasizes on the need of extensive study for reporting the additional information on the medicinal importance of other unattended species of Kashmir Himalaya.

Keywords: Herbal medicine, GC analysis, Pharmacognosy, Kashmir Himalaya.

INTRODUCTION

Kashmir Himalaya is bestowed with diverse habitats which support a rich floristic wealth that has been used as a resource-base by its people since times immemorial and has also attracted people of different fields from distant places. The application of plants as medicines dates back to prehistoric period. In India the references to the curative properties of some herbs in the Rig-Veda seems to be the earliest records of the use of plants in medicines. Plants are more potent healers because they promote the repair mechanisms in the natural way (Chitra et al., 2009). Plants provide the predominant ingredients of medicines in most medical
Plant based therapy accelerate the healing process (Galal et al., 1965). These plant products are used as first aid, as antiseptic coagulants and in wound wash (Kumar et al., 2007). More than 13,000 plants have been studied during the last five year period (Biswa et al., 2003). There are no reliable figures for the total number of medicinal plants on earth, and the number and percentages of countries and regions vary greatly (Schippmann et al., 2002). Estimates for the number of the species used medicinally include 35000-70,000 worldwide (Schippmann et al., 2002) and 7500 species in India (Shiva 1996).

Thus medicinal and aromatic plants are valued for their biological activities which can be justified by the fact that about 80% of the local population still depend on these plants for primary health care. The formation and accumulation of essential oil in plants have been reviewed by many workers (Guenther, 1972; Corteau, 1986; Fischer, 1991). The compounds from the plant based essential oil are useful as an alternative therapy, either directly or as models for new synthetic products (Houghton, 2000). In India, the collection and processing of medicinal plants and plant products contributes a major part each year to the national economy (Holley et al., 1998). Phytochemical constitution and pharmacological uses of some of the medicinal plants of Kashmir Himalaya are highlighted here:

1. *Origanum vulgare* (L.) (Lamiaceae)

*Origanum vulgare* (L.) is a medicinal, perennial plant, locally known as Jungli Tulsi or Oregano or Himalayan marjoram. This is the only species of genus *Origanum* which is found in India. It is found in the temperate Himalayas from Kashmir to Sikkim at an altitude of 1500-3600m AMSL. Vokou et al., 1993; Kokkini et al., 1997; D’antuonu et al., 2000; Skoula, 2002, reported carvacrol and thymol as dominant components of its essential oil. Andreas et al., 2013 found carvacrol as the dominant component in the essential oil of *O. vulgare* ssp. hirtum. Lagouri et al., 1993; Aeschbach et al., 1994; Yanishlieva et al., 1999, have revealed that the antioxidant effect of this plant is because of carvacrol and thymol. Mastelic et al., 2008 reported its antimicrobial and antioxidant properties and in addition revealed carvacrol's antiproliferative activity on tumor cells of Hela. Essential oil of this plant possesses a variety of biological activities viz. antiradical
抗真菌 (Farag et al., 1989; Sahin et al., 2004; Cleff et al., 2010), 抗hyperglycaemic (Lemhadri et al., 2004), 抗菌 (Dorman and Deans, 2000; Harpaz et al., 2003; Burt and Reinders, 2003; Burt, 2004), 抗凝血 (Goun et al., 2002). 抗氧化 (Lagoun and Boskou, 1996; Nakatani, 2000; Vichi et al., 2001; Stashenko et al., 2002) 功能，这种物种可能会成为治疗癌症、心脏病和高血压的有用药物。Cervato et al., 2000 报告说，抗氧化剂的活性可以抑制所有的脂质过氧化反应过程。

2. Artemisia annua (L.) (Asteraceae)

Artemisia annua (L.), also known as annual or sweet wormwood, or sweet Annie, is an annual herb native to Asia. It has been used for the treatment of fever and malaria since ancient times (Chaturvedi et al., 2010). The main active constituent in Artemisia annua is a sesquiterpenoid known as artemisinic acid which is very effective against Plasmodium falciparum, Plasmodium vivax and also drug resistant parasites. Meshnick, 2002 reported that Artemisinin has no toxicity if taken in recommended doses for short periods in the treatment of malaria. A. annua leaves (Zheng and Wang, 2001) and crude extracts have been reported to be a good source of antioxidants (Cai et al., 2004). It is among the four medicinal plants with the highest ORAC (oxygen radical absorbance capacity) level (Zheng and Wang, 2001). This high antioxidant capacity is probably due to the high content (Bilia et al., 2006) and diversity of its leaf flavonoids, including the newly-reported C-glycosyl flavonoids as a possible component of the antioxidant and antiviral activity (Han et al., 2008). Recently, there was also report about anti-Hepatitis B Virus activity of artemisinin (Koo et al., 2000). Scopoletin, a coumarin isolated from A. annua has been reported to possess anti-inflammatory activity (Huang et al., 1993). Jutea et al., 2002 has found that its essential oil contains camphor, germacrene D, transpinocarveol, beta selinene and beta caryophyllene. In addition
artemisia ketone (3%) and other twenty substances of which the content is less than 1% have also been reported by them. Many secondary metabolites of terpene peroxides have also been isolated from Artemisia annua L. such as artemisia ketone, artemisinic alcohol, arteannuin B and myrcene hydroperoxide (Bertea et al., 2005; Ma et al., 2007). An ointment made with Artemisia oil is most effective to cure experimental ringworm infections of guinea pigs within 7 to 12 days (Kishore et al., 1993).

3. Lavendula officinalis Chaix syn. Lavendula angustifolia Mill. (Lamiaceae)

Lavendula officinalis is commonly known as lavender or English lavender and is native to the mountainous zones of the Mediterranean. Lavender growing in the highlands of Kashmir is cherished and keenly sought for perfumery, skincare and hair care. The plant was introduced in Kashmir in 1983 and its cultivation and processing of essential oil and dried flowers was quite successful (Tajjudin et al., 1983). Lavender is popular for its colourful flowers and its fragrance. Essential oils and plant extracts derived from the genus Lavendula have been used therapeutically for centuries and there are some reports on the biological activities of its essential oil (Cavanagh et al., 2002; Moon et al. 2006). It promotes calmness, reduces inflammation, fights infection and promotes skin healing. Since ancient times lavender oil is traditionally believed to be antibacterial, antifungal, antimicrobial, antidepressive, carminative and an excellent remedy for insect bites and burns (Grieve, 1931; Gattefosse, 1937). Lavender oil helps in wound healing, reduces pain and supports healthy tissue growth and is used in the relief of headaches especially migraine, fainting and dizziness. Linalool and linalylacetate are the two major important constituents of the essential oil of Lavendula officinalis (Barazandeh, 2002). The U.S. National Institute of Health (NIH) states that lavender is considered safe in carefully regulated doses for both food and medicinal purposes. Lavender oil distilled from the flowering spikes is used in high grade perfumes and cosmetics. Lavender oil is famous
for creating perfumes for men (Shawl and Kumar, 2000). The continuing popularity and commercial value of lavender was recently confirmed when it was named ‘Herb of the year’ 1999 by the Herb Growing and Marketing Network in USA (Anonymous, 1999). During the World War I, the essential oil of lavender was used as disinfectant in hospitals.

4. *Viola odorata* (L.) (Violaceae)

*Viola odorata* (L.) is a species of the genus *Viola* native to Europe and Asia, but has also been introduced to North Africa. It is distributed in Kashmir and western Himalayan regions at an altitude of 1500-1800 m AMSL. It is commonly known as sweet violet, English violet, common violet, or garden violet. The essential oil of *V. odorata* L. flowers contains high percentages of monoterepenes and sesquiterpene. The dominant constituents are 1-phenyl butanone, linalool, benzyl alcohol, α-cadinol, globulol and viridiflorol. Pulegone, epi-α-cadinol, terpinen-4-ol, germacrene A and paramethyl anisole were also found to be minor components of the *V. odorata* L. flower oil (Ines et al., 2011). *Viola odorata* contains alkaloids, glycosides, saponins, methyl salicylate, mucilage and vitamin C (Stuart, 1989). The syrup made from the leaves and flowers of *Viola* is used as an alternative medicine mainly for respiratory ailments associated with congestion, coughing and sore throat (Singh et al., 1983). The sweet scent of this flower has proved popular throughout the generations and has consequently been used in the production of many cosmetic fragrances and perfumes (Perfume and Flavor Materials of Natural Origin, 1961). A decoction made from the root (dry herb) is used as a laxative. The plant has been reported to possess antioxidant (Ebrahimzadeh et al., 2010) and diuretic (Vishal et al., 2009) properties as well. Tea made from the entire plant is used to treat digestive disorders and new research has detected the presence of a glycoside of salicylic acid (natural aspirin) which substantiates its use for centuries as a medicinal remedy for headache, body pains, as a sedative and in migraine (Phillips, Natural herbs). It is used for treatment of whooping cough. Its drug is also anti-inflammatory,
diaphoretic, diuretic, emollient, expectorant, antipyretic and laxative (Chatterjee and Pakrash, 1991; Kaul, 1997). The roots of the plant yield an alkaloid violin which is used as an expectorant.

5. **Allium cepa (L.) (Liliaceae)**

*Allium cepa* (L.) is a member of the Liliaceae family which consists of over 250 genera and 3700 species. It is commonly known as the bulb onion or common onion and is commercially cultivated worldwide, mainly as a food ingredient. *A. cepa*, a potent antioxidant, is one of the richest source of flavonoids and organosulphur compounds (Dorsch et al., 1991; Patil et al., 1995; Goldman et al., 1996) and is proved to have anti diabetic (Dahanukar et al., 2000), antioxidant, anti hypertensive, anti thrombosis, hypoglycemic and hyper lipidemia activities (Galal et al., 1965). Phytochemical screening of *Allium cepa* L. revealed the presence of tannins, flavonoids, alkaloids, proteins and other important constituents. These include quercetin (Slimestand et al., 2007) and its glycosides like quercetin 3, 4'-diglucoside and quercetin-4' glucoside (Williamson et al., 1997; Olsson et al., 2007). It also contains kampferol, β-sitosterol, ferulic acid, myритic acid and prostaglandins (Dhanprakash et al., 2007). These constituents of the bulb extract are shown to have ecobolic effect in rats (Chatterjee 1997). These flavonoids are believed to be one of the most potent sources for wound healing. The pungent juice of onions has been used as a moth repellent and can be rubbed on the skin to prevent insect bites. It is also used to polish glass and copperware and to prevent rust on iron. Pharmacological studies by Brewster 1994, Griffiths et al. 2002 have shown that *A. cepa* L. has antimicrobial and antifungal properties, and may also be of benefit in preventing or treating heart diseases, atherosclerosis, diabetes, cancer and possibly asthma. The liquor obtained from pouring boiling water over chopped onions can be sprayed onto plants to increase their resistance against pests and insects. Onion skins are also used to produce a yellow-brown dye.

6. **Nymphaea alba** (L.) (Nymphaeaceae)

*Nymphaea alba* (L.) commonly known as white water lily is an
aquatic herb with perennial rhizomes or rootstocks anchored within the mud. It is globally distributed in Europe, North Africa, Southwest Asia, India, China and Russia. It is found in the lakes of Kashmir, at altitudes below 1800 m. It is rich in tannic acid, gallic acid, alkaloids, sterols, flavonoids, glycosides, hydrolyzable tannins and high molecular weight polyphenolic compounds (Eliana et al., 2008). All the parts of the plant have medicinal uses in traditional system of medicine. The dried root and rhizome of the white water lily is used orally to treat gastrointestinal, genital, and bronchial diseases (Naghma and Sarwat, 2005). The leaves and roots have also been used externally, as infusions to treat lesions and inflammations associated with mucous membranes and in treatment of a variety of dermatological conditions (Robin, 2001). Tea made from the plant is used to combat kidney and bladder problems (Vergeera and Vander, 1997). Further, it also produces calming and sedative effects upon the nervous system and is useful in the treatment of insomnia, anxiety and similar disorders (Robin, 2001; James, 2008). An infusion of the flower and fruit is given in diarrhoea and as a diuretic (Kang et al., 2006). Its anti carcinogenic action and inhibition of renal oxidative stress and hyper proliferative responses are also reported (Naghma et al., 2005; Naghma et al., 2005). Rhizomes contain starch, crude fiber, crude proteins and ash. An alkaloid nymphaeine is present in all parts of the plant except the seeds, glycosides and tannins are also present. Seeds contain starch, fatty oil of seeds contain di, tri and tetraenoic acid (Wehmer, 1949). Alcoholic extract of rhizome containing alkaloids has a mild sedative and spasmolytic action and do not significantly depress the heart in large doses but are reported to have a paralyzing action on medulla (Irvine et al., 1945). The leaves of this plant contain a flavone glycoside, myricitin. A glycoside nymphalin with digitalis like action has been identified in the flowers. Various parts of the plants contain ascorbic acid (Hoppe, 1943).

7. Inula royleana (D.C) (Asteraceae)

Inula royleana (D.C) an ornamental plant of great medicinal value. The genus Inula is cosmopolitan in
distribution, comprising about 90 species. India is represented by 20 species and Pakistan along with Kashmir is represented by 11 species. In Kashmir it is found at an altitude of 2800-3400m AMSL (Khuroo et al., 2007). On extraction of the plants belonging to this genus, major compounds isolated are mainly sesquiterpene lactone e.g. dihydroisoalantolactone, isoalantolactone and alantolactone (Kirt et al., 1953). It is reported that the roots of this plant contain sesquiterpene lactones of eudesmane type (Bohlmann et al., 1978; Qurishi et al., 1980). The above quoted components are reported to have numerous biological activities viz. insecticidal (Jennings et al., 1986), insect repellant (Ulubelen et al., 2001), antimicrobial (Yang et al., 2001), anti-inflammatory (Dirsch et al., 2000) and antiproliferative (Lawrence et al., 2001; Konishi et al., 2002). Some abietanes obtained from Inula royleana have a vasodepressor effect as well (Clark et al., 2001; Ulubelen et al., 2002). The roots of this plant are known to have neuromuscular blocking properties (Manchanda et al., 2000) and are used to cure headaches (Kala, 2006). In Kashmir Himalayas, shoots of I. royleana are used for curing dermatitis (Kaul, 1997) and its dried flowers are used for curing throat sores, wounds and inflammation of the hooves after boiling in water for half an hour and adding few drops of edible oil (Khuroo et al., 2007). The alkaloid of the roots of this plant also helps in lowering hypertension (Haq and Alam, 2010). The chemistry of genus Inula is diverse and represents many important compounds from the chemical world, many of whose activity has been determined. Its roots have been shown to be rich in derivatives of the diterpenoid alkaloid lycoctonine (Talapatra et al., 1958; Khaleque et al., 1959). In addition, the presence of a yellow pigment has been reported (Handa et al., 1958) which consist mainly of a mixture of diterpenoid Quinones called ‘royleanones’. It possesses biological and therapeutic activities including anti-inflammatory, antitumor, antimicrobial, anthelmintic and antifeeding (Picman, 1986).

8. **Mentha arvensis** (L.) (Lamiaceae)
Today, the Lamiaceae family is considered as one of the most important sources for extraction of compounds with antioxidant activity. *Mentha arvensis* (L.) is popularly known as cornmint or pudina and is a common household remedy in India. Mentha is distributed mostly in temperate and sub-temperate regions of the world and plays a pivotal role in Ayurveda for treatment of a number of ailments. Mints have played an important part in human society for a long period. There are 30 species of mint and all species of the genus *Mentha* are aromatic. The essential oil profile of *Mentha arvensis* L. is useful for commercial purpose as it possess a range of aroma chemicals used in perfumery, flavor, pharmaceutical and other allied industries. Phytochemical analysis of the *Mentha arvensis* L. shows the presence of menthol, menthone, isomenthone, limonene, methyl acetate and neomenthol (Verma et al., 2010). *M. arvensis* grown in foothill conditions showed high menthol content along with menthone, iso-menthone, menthyl acetate, neo menthol and limonene as other major constituents (Rao et al., 2000; Singh et al., 2005). The effect of the plant extract on bacteria have been studied worldwide by a large number of researchers such as Farnz Malik et al., (2012) who have evaluated the phytochemical, anti-allergic and anti-inflammatory activity of *Mentha arvensis* on animals. Gupta et al.,2010; Henrique et al., 2010 and Suresh et al., 2012 have also studied the phytotoxic properties of *Mentha arvensis*, where it is highly considered as an antiseptic, antipyretic, antimicrobial and stimulant with anti-ageing properties.

9. *Nepeta govaniana* (Wall. ex Benth.) Benth. (Lamiaceae)

The genus *Nepeta* is a widespread genus of the family Lamiaceae consisting of about 250 species distributed in central and southern parts of Europe, Asia and Middle East. It is commonly known as yellow catmint. In India about 30 species are found, mostly distributed in temperate Himalayas and few on foothills and plains. The literature survey reveals that the *N. govaniana* has been the focus of earlier studies, especially with respect to its
essential oil from the aerial parts. Several species of *Nepeta* are used as laxative to treat dysentery, kidney and liver diseases and tooth troubles (Baser et al., 2000). They are also used as antispasmodic, expectorant, diuretic, antiseptic, antiasthmatic and febrifuge (Zargari, 1990; Rapisarda et al., 2001; Dabiri et al., 2003). Some species are also used to reduce serum lipids and have anti-inflammatory effects (Agarwal et al., 1978; Prokopenko et al., 1985). The leaves have a sweet aromatic fragrance when crushed.

Bisht et al., 2010 have reported the antifungal activity of the essential oil of *N. govaniana* against *Candida albicans* and *Trichophyton rubrum*. The oil from the aerial parts contains a high percentage of sesquiterpene hydrocarbons followed by oxygenated sesquiterpenes (Thappa et al., 2001). Thappa et al., 2001 has reported 4αα, 7α, 7αα-nepetalactone, β-elemene, germacrene D, allo-aromadendrene and α-pinene as the major constituents of essential oil of aerial parts of *N. govaniana*. Some minor components are elemol, germacrene-D-4-ol, α-cadinol and α-eudesmol.

10. *Mimosa pudica* (L.) (Mimosaceae)

It is commonly known as sensitive plant or touch-me-not as it folds itself when touched and spreads its leaves once again after a while. The stimulus can be transmitted to neighboring leaves (seismonastic movement). It is an annual or perennial herb and invites attention of the researchers worldwide for its pharmacological activities. It is used in folklore medicine in arresting bleeding and in skin diseases. *Mimosa pudica* has been reported to contain mimosine a toxic alkaloid (Agharka, 1991; Chauhan et al., 2009). The phytochemical screening of the *M. pudica* leaf extract shows the presence of bioactive components such as terepenoids, flavonoids, glycosides, alkaloids, quinines, phenols, tannins, saponins, coumarins and carbohydrates (Gandhiraja et al., 2009; Kamlendra et al., 2010). The drug is also found to be rich in tannins (Nadkarni, 1927). The root is also stated to have anti-convulsant activity (NgoBum et al., 2000). Successive extracts of the whole plant are reported to have antibacterial activity (Pawaskar et al., 2006). In preliminary screening of *Mimosa pudica* extract it was
found to exhibit anti-venom activity against common sea snake 
(Enhydrina schistosa) poisoning (Prashanth et al., 2007). It was
found that the root of Mimosa pudica has acetylcholine esterase
inhibitory activity. The wound healing studies on the roots of
Mimosa pudica indicate that phenols and tannins play an important role in
the wound healing process (Muthusamy et al., 2008). The
extracts of Mimosa pudica immobilize the filariform
larvae of Strongyloides stercoralis in less than an hour (Robinson et al.,
1990).

11. Parthenium hysterophorus (L.)
(Asteraceae)
Parthenium hysterophorus (L.)
grows wild in different regions of
India including Jammu & Kashmir.
The plant extract is used as a folk
remedy against skin diseases,
ulcerated sores, facial neuralgia
fever & anaemia (Kupchan et al.,
1971). In traditional medicine its
decoction has been used for
treatment of many infectious and
degenerative diseases. All parts of
the plant are reported to be used as a
bitter tonic, febrifuge, antidiysenteric
(Oudhia, 2001). The plant is used in
the treatment of diabetes mellitus
(Patel et al., 2008) and is also
reported to have antibacterial (Pandey, 2007) and
anti tumor activity (Reddy et al.,
2011). The aerial portion of
Parthenium hysterophorus contains
Parthenin as the major component
along with several other
sesquiterpene lactones. These
sesquiterpene lactones contain an
alpha-methylene-gamma lactone
moiety which plays a vital role for
the bioactivity of the compounds
especially for cytotoxicity (Herz et
al., 1967). Besides the above
mentioned compounds hexacosanol
myracylchol, β-sitosterol, β-o-
glucoside of sitosterol, stigmasterol,
compesterol, ursolic acid & saponins
have also been reported (Gupta et
al., 1977) from the leaves of
Parthenium hysterophorus. Five free
amino acids (Arginine, Proline,
methionine, amino caprilic acid &
hystidine) have also been reported
from the pollen of the plant (Ruesh
et al., 1969). It is applied externally
on skin disorders and decoction of
the plant is often taken internally as
a remedy for a wide variety of
ailments (Dominguez and Sierr
1970; Morton 1981). Root
decoction is useful in dysentery (Singh et al., 1996). Mew et al., 1982 has demonstrated that sublethal doses of parthenin exhibits antitumor activity in mice. Parthenium is also reported as a promising remedy against hepatic amoebiasis (Sharma and Bhutani, 1988).

12. Nigella sativa (L.) (Ranunculaceae)

*Nigella sativa* (L.) commonly known as Small Fennel or Black Cumin is an economically important umbel lifer growing wild in the dry temperature regions of Jammu & Kashmir, Himachal Pradesh, Afghanistan, Baluchistan and Iran. It is used as a spice in Indian and Middle Eastern cuisine. The dry roasted seeds serve as a flavor in curries, vegetables and pulses. It has been used as a stimulant, diuretic, emmenagogue, lactagogue, anthelmintic, and carminative (Nadkarn, 1976). Black Seed has also been used externally where it is applied directly to abscesses, nasal ulcers, orchitis, eczema, and swollen joints. In the indigenous system of medicines, seeds are regarded as stimulants and carminatives and found to be useful in diarrhea and dyspepsia (Abduganiew, et al., 1997). Its many uses have earned *Nigella* the Arabic approbation 'Habbatul barakah', meaning the seed of blessing (Dwivedi, 1999; Dwivedi et al., 2007). Among the essential oils, thymoquinone was identified as the main component besides p-cymene, pinene, dithymoquinone and thymohydroquinone (Ghosheh et al., 1999; Ali et al., 2003). Terpene derivatives like carvacrol, carvone, limonene, 4-terpineol, citronellol were also found in traces. Furthermore, the essential oil contains significant amounts of fatty acid ethyl esters. The seeds give on steam-distillation a yellowish brown volatile oil with an unpleasant odor. The oil contains carvone, d-limonene, and a carbonyl compound- nigellone (Chopra et al., 1949). *Nigella sativa* exhibits significant hypoglycemic activity and hence suggest the antidiabetic action release from the mast cells, which supports an anti inflammatory role for the plant. *Nigella sativa* has been used for thousands of years in the Middle East for allergies, asthma, and for treating immune disorders. It has analgesic (Abdel - Fateh et al., 2000), postcoital contraceptive (Keshri et al., 1995),
histamine release inhibitor (Chakravarty, 1993), hepatoprotective (Daba et al., 1998), antimicrobial (Sokmen et al., 1999) anticancer and anti-inflammatory activities (Mutabagani et al., 1997).

CONCLUSION

The aim of the present review is to present comprehensive information about the medicinal importance of some valuable plant species growing in the Kashmir Himalayas. Although there are numerous species of medicinal importance growing over here, only a few species have been subjected to chemical profiling and biological analysis as evident from a perusal of the literature. Current studies have shown that the essential oil, as well as their active principles possesses several pharmacological properties. The species studied by various workers indicate that the natural wealth of Kashmir Himalayas is a potent source for isolation of a variety of bioactive molecules like terpenes, phenols, flavonoids, glycosides, alkaloids, quinines, saponins, and coumarins etc there by justifying their use in the indigenous system of medicine. Undoubtedly these plant species have important biological activities against different types of diseases and are being used for culinary and economic uses. The recent scientific data and the rich historical evidence of medicinal plants growing over here could support further research as well as their use as safe herbal medicinal products under carefully regulated doses. The antimicrobial activity, can promote the use of the above mentioned natural products as potent preservative and conservation agents, not only in the food industry after testing the toxic and irritating effects on humans but also in cosmetics and medical preparations.

Though India has rich biodiversity and is one among the twelve mega diversity centers, the growing demand of natural products is putting a heavy strain on the existing resources causing a number of species to be either threatened or under endangered category. It becomes our sole responsibility to highlight such natural medicinal treasures, which would help the herbal practitioners, conservationists and environmentalists to narrow down their cynosures to such indigenous plant species, thereby ensuring safety to the country’s flora from being swept off by threatening catastrophes. A detailed and systematic study is required for identification, cataloging and documentation of these bioresources, which may provide a meaningful way for the promotion of the traditional knowledge of the herbal medicinal plants. The present review is an attempt to set the mind of the researchers to carry out the work for developing its various
formulations on bio prospecting, which can ultimately be beneficial for all.

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