Phytochemical Aspects of Indian Valerian 'Tagara' (*Valeriana Wallichii*) from Uttarakhand, Western Himalaya

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Abstract-*Valeriana Wallichii* is also known as Tagara found in temperate regions of Himalayas. It is used as herb and well documented in Ayurvedic system as well as modern medicinal system. In the present study investigation on different phytochemical constituents screening was carried out from medicinal plant, *V. Wallichii*. Preliminary phytochemical screening reveals the presence of different bioactive compounds such as alkaloids, flavonoids, terpenes, saponin, tannin, phytosterol, gylcosides, steroids and phenolics. GC-MS and FTIR analysis showed that important phytochemical compounds, bond and important functional groups are present in *Valeriana wallichii.* There is need to study on the comprehensive phytochemical composition and pharmacological characteristics of *V. wallichii* along with analysis of the biomedical researches on this multipurpose herbaceous species in near future.

Key Words: GC-MS, FTIR, Phytochemical, *Valeriana Wallichii*

Introduction

Indian Himalaya occupies a unique location with remarkable storehouse of biological resources in its diverse habitats and ecosystems that has made it one of the most biodiversity rich regions of India. It is the place of more than 8000 inhabited species of vascular plants, out of which 1748 are identified for their medicinal properties. WHO reports claimed that world's 80% of population totally depend on traditional system of medicine (Igoli et al., 2003). *Valeriana Wallichi* also known as Tagara in Ayurvedic medicinal system as Indian valerian belongs to valerianaceae family, is wild medicinal herb distributed at higher altitudinal region (upto 3000 m asl) of Himalayan regions of China, India, Nepal and Pakistan (Sahu et al., 2016). This plant is a perennial herb whose under part consists of a rhizome bearing many rootlets and flowers which are small and white or pink in color, the fruits are oblong-ovate, single seeded achienes.

Medicinal uses of this plant are used for patients suffering from restlessness (Balderer & Borbely, 1982), for nervous disorders, it reduces a high blood pressure and stress is used as an antidote for snake poisoning, cure disease of the blood liver and eye. It is used in neurological, psychological, and digestive

disorder in small dosage, it calms the mind, strengthens nerves (Singhal et al, 2013). Modern uses are in the treatment of disturbed sleep (insomnia), and paralysis. It has anti-inflammatory actions (subham et al, 2007), that is why, it is used to treat rheumatoid arthritis, it helps to treat abdominal pain, gas, abdominal heaviness and improves the strength of the muscle, heart and reduces blood pressure.

Material and Methods

Roots of *Valeriana Wallichii* were collected from local market of Dehradun. They were cleaned first and crushed in mortar & pestle. Extraction of essential oil carried out by hydro distillation unit. The fresh leaves were washed with tap water and then rinsed with distilled water. It was then air dried, cut into pieces and pulverized into fine powder using a grinder. The dried powdered plant extracts were extracted in methanol in soxhlet apparatus for 4 hours. The extract was concentrated by using hot plate for 1 hour for the reduced to get crude extract.

Preparation of plant extracts

Leaves samples of Valeriana Wallichii were dried under shade and ground in powdered form. The powdered form was stored in a container for use .

Method of extraction

Continous hot percolation (successive solvent extractions) was done by applying Soxhlet apparatus, methanol is used with dried coarse powder of *V. Wallichii* .

Extraction procedure for *valeriana wallichii*

Extracts of dried leaves of *Valeriana Wallichii* were obtained with methanol by using Soxhlet extraction. 10 grams of coarse powder of dried leaf w*as* sequentially extracted in a Soxhlet extractor using 100ml of methanol for four hours. The extracts were evaporated using rotary evaporator and 2ml were stored at 4^{o}c. After that, it was filtered through the filter paper and concentrated by rotary evaporator.

Test for saponins

Leaves extract (About 10ml) was used to mix with 5ml of distilled water and shaken vigorously for a stable foam soap frothing which was mixed with olive oil and shaken, then observed for emulsion formation.

Test for tannin

2ml of the leaves extract was mixed with 3ml of 5% of solutions of $FeCL_3$ presence of black coloration indicated presence of tannin.

Test for steroids

1ml of the leaves extract was mixed with chloroform (2ml) then concentrated H_2SO_4 was added, Presence of red color in lower chloroform layer indicated presence of steroids.

Test for phytosterol

Leaves extracts were mixed with chloroform and then filtered. The filtrates were treated with few drops of concentrated H_2SO_4 shaken and allowed to stand. Appearance of golden yellow color indicates the presence of phytosterol.

Tests for flavonoids

Flavonoid content was determined by adding concentrated sulphuric acid. Few drops of 1% $Alcl_3$ solution were added to a portion of each fraction. Yellow coloration indicated the presence of flavonoids, which disappered on standing.

Test for glycoside

The Leaves extract was hydrolised with diluted HCl and extract was treated with ferric chloride solution and immersed in boiling H_2O for 5minute. The mixture was then cooled and mixed with equal volume of benzene. Benzene layer was separated and treated with ammonia solution. Rose pink color formation in ammonia layer indicated the presence of glycoside.

Test for phenol

Phenol content of plant was found out by Folin-Ciocalteu reagent method. First, test tube was kept in the dark for 2h and the absorbance was quantified by UV- spectrophotometer at wavelength 750nm.

Leaves extract was dissolved in methanol (1ml) and 10% Folin-Ciocalteu reagent was arranged by putting in 10 ml of Folin-Ciocalteu reagent in water (90ml), then 5% Na_2CO_3 (3g) was prepared by putting Na_2CO_3 (3g) in water (50ml). Leave extract (200µL) was kept in the test tube and added 10% Folin-Ciocalteu reagent (1.5ml). Then all the test tubes were kept in a dark place for 5min. Finally 5% Na_2CO_3 (1.5mL) was added to the solution and mixed by hand and again the test is carried out.

GC-MS analysis

Methanolic extract of leaves samples excised from plant by using soxhlet apparatus. The leaves extract was then subjected to GC-MS analysis for identification of different phytocompounds.

FTIR Analysis

The ether and methanol extract of *Valeriana Wallichii* was subsequently subjected to FTIR analysis so as to identify diverse phytocompounds present in the extract.

Results and Discussion

Phytochemicals are chemicals substances having particular physiological functions on human body, which protect it from any of health issues such as diseases, injury etc. These are the reasons for medicinal value of medicinal plants.

1. **Saponin**- It is secondary metabolites and its structure is composed of one or more hydrophilic glyciside . Saponin is stable foam produced when they are shaken in the solution and the soap like foam is indicated the presence of saponin in the methanolic sample of *Valeriana Wallichii*. Toxicity to fish and haemolysis of RBC are two distinct properties of this group. It is found to be antimicrobial and employed as expectorant.
2. **Tannin**- Tannins are an important group of plant polyphenolics which are present in a variety of plants and are utilised as both food and feed due to their potential biological activity. Black coloration in test tube was showed to the presence of tannin in the methanolic sample of *Valeriana Wallichii.* Beside, oxidant properties they also possess myraid physiological properties, for example anti-allergenic, anti-inflammatory, antimicrobial etc. It acts as antioxidant in edible substances specially fats and medical astringents.
3. **Steriods**- Steriods have important biological functions and important components of cell, membrane fluidity**.** All the steriods are manufactured in the cells.

4. **Phytosterol-** Phytosterol is a plant sterols and stanols similar to the cholesterol which occur in plants and vary in carbon side chains and presence or absence of a double bond. They represent physiologically active compounds.
5. **Flavonoids**-Flavonoids serve as an important source of antioxidant found in different medicinal plants. In addition, plant flavonoids which show an antioxidant activity In vitro, also function as antioxidant activity in vivo. It exhibits anti-inflammatory properties also.
6. **Glycoside-** Glycoside play a important role in plants. They are known to have cardiac activity
7. **Phenol**- Phenolics have multiple biological properties including antimicrobial and antioxidant activity, the antioxidant activity is mainly due to their redox properties. They are the best anti oxidants. Methanol extract contain the lowest amount of phenol.

Table Constituents of *V. Wallichii* leaves

S. no.	Constituents	*V. Wallichii* leaves (Methanol extract)
1	Saponin	+
2	Tannin	+
3	Steroids	+
4	Phytosterol	+
5	Flavonoids	+
6	Glycoside	+
7	Phenol	+

GC-MS analysis-

Ether extract of *Valeriana Wallichii* leaves was analyzed with the help of GC-MS analysis and major phytocompounds found to be present were 7-Nitro-1-Tetralone Oxime Acetate; 3-[N-Acetyl-4-Acetylanilino] Propionic acid; Dihydroxanthin; Flutamide; Ethanethioic Acid, S-Pentyl Ester; 1,3-Cyclopentadiene-1,3-Dicarboxylic Acid; 1,5-Dodecadiene; Heptane, 4-Azido. Methanol extract of *Valeriana Wallichii* leaves was analyzed with the help of GC-MS analysis and major phytocompounds found to be present were 1, 3-Dioxin-4-One, 5-Bromo-2, 6-Dimethyl; Flutamide; Acetamide, N-[4-Nitro-2-(Trifluoromethyl); Quinoxaline, 1,4-Diacetyl-1,2,3,4-Tetrah; Ethanethioic Acid, S-Butyl Ester; 2,5-Cyclohexadiene-1,4-Dione, 2,5-Diacet; Glycine, N-Acetyl-, Ethyl Ester; Ethanethioic Acid, S-(2-Methylbutyl), Valeric acid ,pentadecadienoic acid, aristolene, Est. These phytochemicals are responsible for various pharmacological actions such as antimicrobial, anti-inflammatory, antioxidant etc.

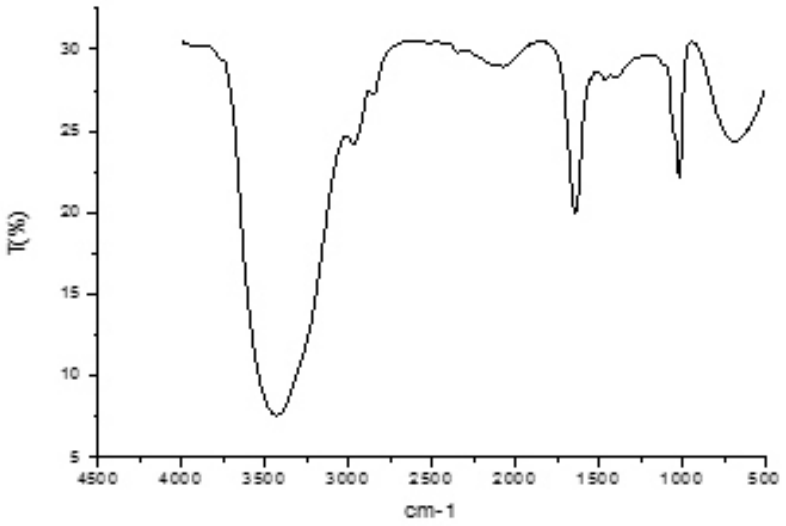

Fig.2 FTIR spectrum of (A) leaf methanol extract of *V. Wallichii*

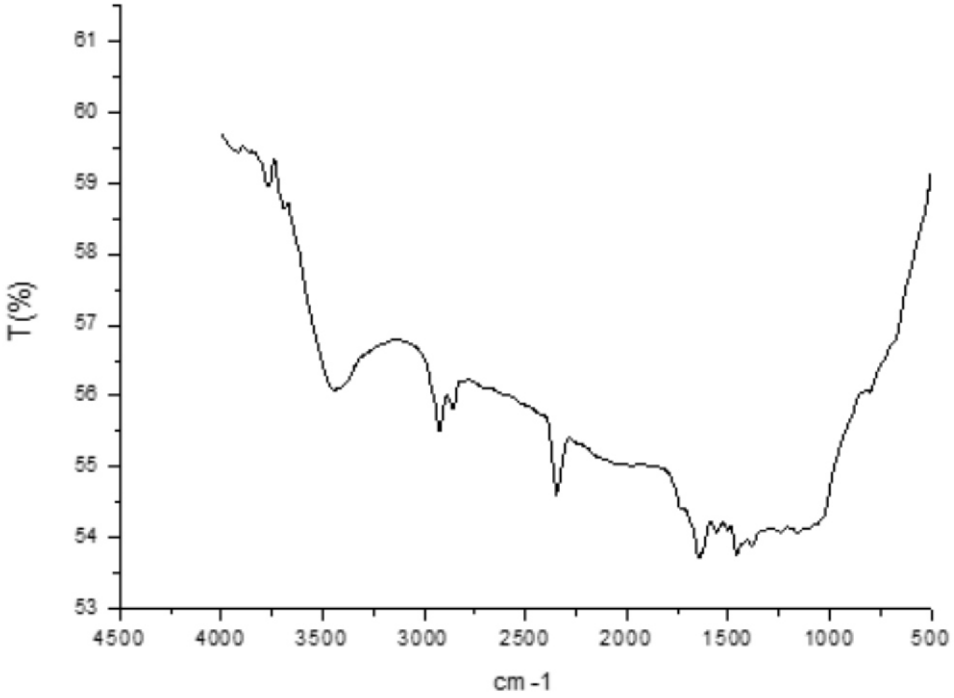

Fig.1 FTIR spectrum of (B) leaf ether extracts of *V. Wallichii*.

Fourier Transform Infrared spectroscopy is related to absorption of light in infrared region by the molecular atom. FTIR is basically used to observe the identification of bond and functional groups present on the surface of organic, inorganic a polymeric substance in frequency range of 4000-500cm-1. The broad peaks are obtained by methanolic extract of *V. wallichi* at 3441cm-1, 2077cm-1, 1641cm-1, 1018cm-1 and 648cm-1. These peaks are related to presence of O-H, C=C (alkene), C=O and C=C. The broad peaks are obtained by ether extract of *V. wallichi* at 3450cm^{-1}, 2850cm^{-1}, 2350cm^{-1} and 1643cm^{-1}. These peaks are related to presence of O-H, C-H(alkene). C=O (CO_2), C=O (aldehyde ketonic) etc. *Valeriana wallichii* DC, is an medicinal plant used in Indian traditional system for treatment of central nervous system from many decades.

Valeriana Wallichii is categorized under the family *Caprifoliaeceae* few years ago but in recent years it was categorized under family *Valerianaceae*. It is also be suggested by Ayurvedic medicinal system that *Valeriana Wallichii* having important pharmacological properties including neuroprotective, sedative, anticonvulsant, hypnotic anxiolytic, antispasmodic and anti-inflammatory analgesic properties. The present investigation are in agreement with the previous finding of Devi et al., 2014, who suggest that presence of various phytochemicals constituents within Valeriana Wallichii make it effective medicinal plants against chronic disease such as cancer, AIDS, heart disease and diabetes etc.

Phytochemicals have important role to cure much chronic disease of present scenario. They are categoriesed into two types on the basis of its work on plant growth, metabolism and development. (Wadood et al., 2013). Primary phytochemical include amino acids, carbohydrates, lipids, nucleic acids etc. while secondary phytochemical include alkaloids, saponins, flavonoids, phenolics, terpenes and steroids etc. The presence of different phytochemical constituents gives to plant additional characteristics. Presence of flavonoids give rise to plant antioxidant, antibacterial, antifungal, anti-inflammatory, anticancer, antiallergic and diuretic characteristics (Yadav et al., 2014; Chic et al., 2014).

Conclusion

The present study concluded that due to various phytochemicals present in *Valeriana Wallichii,* it posseses effective medicinal values. Besides, its antioxidant, antimicrobial, anti-inflammatory, antileishmanial activity, sedative and hypnotic properties are also reported Studies on *Valeriana Wallichii* should further be carried out to develop new potential compound to modern drug. In addition, studies should be made to reveal the mode of action produced by *Valeriana Wallichii* which may be helpful in understanding its possible roles in modern medicines.

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