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Ethanopharmacological and Ethanomedicine properties of Vetiveria Zizanioides

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ABSTRACT

The objective of the study was to provide an insight to the researchers about the various therapeutic potentially of the plant *Vetiveria zizanioides* which is used in Traditional System of Medicine to treat various ailments and shows positive effects. Moreover, this paper emphasized on the study of various models related to nootropic and antidepressants. As its well known that Indian System of Medicine generally rely on natural resources for its treatment and repair process for the betterment of human race so the exploitation in these field becomes an almost concern to the researchers. The natural sources are used widely because of their lesser side effects and high tolerability.The plant used for the study *Vetiveria zizanioides* (Linn.) Nash, a member of the family Poaceae commonly known as the Khas-Khas, Khas or Khus grass in India, is a perennial grass with thick fibrous adventitious roots which are aromatic and highly valued.widely used in Traditional system of medicine, particularly in respect to Ayurveda system. The herb possesses many therapeutic activities and is being used in brain tonic, nootropic, cooling, antiemetic, diaphoretic, haemostatic, skin diseases, expectorant, recommended for the treatment of antifungal action, Antihypertension AntiInflammatory diuretic, stimulant, insomnia, , antispasmodic, kidney problems, gall stones, antioxidants.and many more. The extract of the herb showed significant activity against anti-microbial, antifungal, anti-oxidant, anti-inflammatory etc. This is due to the presence of bio-active components of alkaloids, flavonoids, tannins, phenols, Vetiverol, Vetivone, terpenoids and saponins. This review article will provide an insight about the various active chemical isoflavonoids and their mechanism involved in therapeutic potential of physiological nature in healing process with concern to Central Nervous System.

Keywords: *Vetiveria zizanioides*, Khas khas, Vetiver oil, Urinary problems.

INTRODUCTION

In today's era the need of herbal medicine plays a vital role in the treatment profile of mankind. Taking this in to consideration herbs are exploited to its maximum because of their various pharmacological properties with respect to its active constituents. Thus the herb *Vetiveria*

zizanioides was taken up to explore its potentiality.itbelongs to the grass family, vetiver is perrineally growing grass that is indigenous to India. It is also known as khas in north and south india[1]. This grass has tall stem, while the leaves are elongated, slender and somewhat firm.Vetiver produces brownish purple hued flowers, the roots of vetiver grow downwards upto 2 meters 4 meters in depth.Presently countries like India, Haiti, and Reunion are the largest producer of vetiver worldwide Vetiver grass is also cultivated for the production of a commercially important essential oil used in perfumery and aromatherapy [2]. This tufted grass grows throughout the plains of India ascending up to an elevation of 1200 m. Indian Ushera or *Vetiveria zizanioides* Linn. (Poaceae) is an important medicinal plant of the Indian traditional system of medicine that is Ayurveda and is mentioned in the Ayurvedic Pharmacopoeia of India under the name of Ushera.It is used in traditional medicine as aanti oxident agent and as an aphrodisiac, cooling, antiemetic, diaphoretic, haemostatic, and skin diseases. It has exhibited anti-hyperglycemic, anti-fungal and anti-depressant, hepatoprotective and anti-inflammatory activities[3]. It is a constituent of various formulations used as diuretic, expectorants and for the management of rheumatism, fever and bronchitis[4]. *Vetiveria zizanioides* Herbs are rich in chemical constituents like flavonoids, tannins, phenols Vetiverol, Vetivone, Khusimone, Khusimol, Vetivene, Khositone, Terpenes[5,6]. which strengthens the immune system and thereby increase the fertility of human mankind. Hence, the major objective of this review was to provide an update on its pharmacological properties and the chemical constituent present in the herb which will prove its authenticity in scientifically manner with respect to its traditional uses.

Scientific Classification

Kingdom- Plantae,
Division – Magnoliophyta(flowering plant),
Class – Liliopsida (monocotyledon),
Family – Poaceae (grass family),
Genus – Vetiveriabory (vetiver grass),
Species – *Vetiveria zizanoides* (L.) Nas

Vernacular Name

Hindi and Bengali Khas, Khas-Khas, Khus-Khus, Khus
Gujarati Valo
Ayurvedic Name Ushira [7]

Fig.1: Dried Roots of *Vetiveria Zizanioides*

Fig.2: Whole Plant of *Vetiveria Zizanioides*

Plant Description

Vetiveria Zizanoides belongs to the grass family, vetiver is perrineally growing grass that is indigenous to India. It is also known as khas in north and south india. This grass has tall stem, while the leaves are elongated, slender and somewhat firm. Vetiver produces brownish purple hued flowers, the roots of vetiver grow downwards upto 2 meters – 4 meters in depth. Presently countries like India, Haiti, and Reunion are the largest producer of vetiver worldwide.

Chemical Constituents

The chemical constituents present in the plant are Vetiverol, Vetivone[8], Khusimone, Khusimol, Vetivene, Khositone, Terpenes, Benzoic acid,Tripene-4-ol, ß-Humulene, Epizizianal, vetivenylvetivenate, isokhusimol, Vetiver oils, vetivazulene[9]. Zizaene, prezizaene, bvetispirene,[10] Among these, the major active constituents identified are khusimol, vetivone, eudesmol, khusimone, zizaene, and prezizaene[11] which are considered to be the fingerprint of the oil .

The essential oil of vetiver, *Vetiveria zizanioides* (L.) Nash is one of the most important raw materials in perfumery both ass a fixative and in its own right as a fragrance ingredient. Vetiver oil possesses sedative property and has been traditionally used in aromatherapy for relieving stress, anxiety, nervous tension and insomnia for a long time,Vetiver oil consists of a complex mixture of more than 150 sesquiterpenoid constituents[12,13]. The composition and odor quality of the oil is dependent upon its origin. Among the 60 components identified to date, the sesquiterpene alpha-vetivone, beta-vetivone[14], and khusimol always occur in the oil in amounts up to 35%. As a result, they are considered to be fingerprints of the oil even though they do not possess the typical odor characteristics associated with vetiver.

MULTIPLE USES OF KHAS GRASS

Medicinal Use

Various tribes use the different parts of the grass for many of their ailments such as mouth ulcer, fever, boil, epilepsy, burn, snakebite, scorpion sting, rheumatism, fever, headache, etc. Apart from the medicinal uses, the culms along with the panicles form a good broom for sweeping[15].Widely used in aromatherapy and perfume, Khas-Khas is a cooling agent, tonic and blood purifier. It is used to treat many skin disorders and is known to have a calming effect on the nervous system. Other medicinal uses of Khas-Khas include ringworm treatment, indigestion and loss of appetite. [16]

Traditional medicine

Khas grass plays an important role in the socioeconomic life of rural India. In Madhya Pradesh and Maharashtra, the plant is used as anthelmintic for children. The plant is used as a tonic for weakness; the Lodhas of West Bengal use the root paste for headache, rheumatism and sprain, and a stem decoction for urinary tract infection; the Mandla and Bastar tribes of Madhya Pradesh use the leaf juice as anthelmintic; the tribes of the Varanasi district inhale the root vapour for malarial fever. The root ash is given to patients for acidity by the Oraon tribe. Likewise, there are very many different applications of the plant for different ailments among different ethnic tribes[17,18] Roots for preparing Sharbat (sherbet) or soft drink during

summer, Khas-Khas is used to treat gastrointestinal disorders like flatulence and indigestion. It is a natural cleanser that is used in soaps, shampoos and perfumes. Khas-Khas gives a cooling effect to the skin.the plant is used as an anthelmintic for children The Oil is reported to be used as a carminative in flatulence, colic and obstinate vomiting. It is regarded as a stimulant, refrigerant and antibacterial and when applied externally, it removes excess heat from the body and gives a cooling effect [19].

Table 1: Some traditional uses of *Vetiveria zizanioides* [20]

Plant part	Tribe	Ailment
Root decoction	Santhals	As cooling in high fever, inflammation, sexual diseases, etc
Root paste	Lodhas	Headache, fever, Ayurvedic preparation "Brihat Kasturi", "Bhairava Rasa" for fever, diarrhoea, chronic dysentery
Root ash	Oraons	Acidity
Root juice	Tribe of M.P.	Anthelmintic
Root vapour	Tribe of Varanasi	Malarial fever
Leaf paste	South Indian tribes	Rheumatism and sprain
Vetiver oil	Most tribe	Stimulant, diaphoretic and refrigerant
Root and stem juice	South Indian tribes	Boil, burn, epilepsy, scorpion sting, snakebite, and mouth ulcer

PHARMACOLOGICAL ACTIVITIES

Antibacterial Activity

Razvy *et al*. studied the antibacterial activity is measured by zone of inhibition (mm). Totally four bacterial strains (two gram positive S.aureus, B.subtilis and two gram negative bacteria P. aeurogenosa, E.coli. Ethanolic extract of *Vetiveria Zizanioides* is known to Posses flavonoids, alkaloids, terpenoids, saponins, tannins and phenols which either individually or combination exert antimicrobial activity. The study showed that EEVZ inhibited gram negative bacteria than gram positive bacteria. Flavonoids are found to be effective antimicrobial substance against a wide range of microorganisms, probably due to their ability to complex with extra cellular and soluble proteins and to complex with bacterial cell wall; more lipophilic flavonoids may disrupt microbial membrane. Antibacterial activity of tannins may be related to their ability to inactivate microbial adhesion enzymes and cell envelope transport proteins, they also complex with polysaccharides. The presence of tannins present in the roots of *Vetiveria zizanioides* implied that tannin may be the active compound which may be responsible for in vitro antibacterial activity in this study. Tannin in the plant extract was found to possess antibacterial [21].

Mosquito Repellent Activity

Nuchuchua O *et al.* reported that the nano emulsions composed of citronella oil, hairy basil oil, and vetiver oil with mean droplet sizes ranging from 150 to 220 nm were prepared and investigated both in vitro and in vivo. Larger emulsion droplets (195-220 nm) shifted toward a smaller size (150-160 nm) after high-pressure homogenization and resulted in higher release rate. It was proposed that thin films obtained from the nanoemulsions with smaller droplet size would have higher integrity, thus increasing the vaporization of essential oils and subsequently prolonging the mosquito repellant activity. In the laboratory oviposition deterrent test, the root extract of *Vetiveria zizanioides* at each concnentration greatly reduced the number of eggs deposited by the gravid Anaphelesstephens[22].

Antifungal Activity

Sridhar SR *et al.* Studied The antifungal activity of ethanol and aqueous extracts of *Vetiveria zizanioides*. Ethanol and aqueous extracts of *Vetiveria Zizanioides* were prepared. Standard cultures of Asperigulls Nigar, Asperigulls Clavatus and Candida Albicanus were used for the study. The antifungal tests were conducted by using agar well plate method nystatin and Griseofulvin were used as standard[23]

Antitubercular Activity

Chaudhary GD *et al.* studied the *Vetiveria Zizanioides* L. Nash (Family: Poaceae) root (intact and spent) extracts and fractions were evaluated for Anti mycobacterial activity against Mycobacterium tuberculosis H(37)Rv and H(37)Ra strains using radiometric BACTEC 460 TB system.The ethanolic extract of intact as well as spent root was showed potent Antituberculosis activity at a minimum concentration of 500µg/ml. The hexane fraction also showed antibacterial action by recording continuous decline in growth index (GI) of Mycobacterium tuberculosis at 50µg/ml. It was further more observed that root extract and hexane fraction showed activity even after the extraction of essential oil by hydro distillation[24].

Antioxidant Activity

Kim H *et al.* Reported that the Free radicals induce numerous diseases by lipid peroxidation and DNA damage. It has been reported that some of the extracts from plants possess antioxidant properties capable of scavenging free radicals in vivo. *Vetiveria zizanioides* is a densely tufted grass which is widely used as a traditional plant for aromatherapy, to relieve stress, anxiety, nervous tension and insomnia. In this regard, the roots of *Vetivera zizanioides* was extracted with ethanol and used for the evaluation of various in vitro antioxidant activities such as reducing power ability, superoxide anion radical scavenging activity, deoxyribose degradation assay, total antioxidant capacity, total Phenolics and total flavonoid composition [25].

Hepatoprotective Activity

Hassan *et al.* studied the Methanolic extract of *Vetiveria zizanioides* Linn shows hepato protective at the dose 300-500mg/kg p o damage induced by ethanol 20% at the dose of 3.76gm/kg p o [26].

Antidepressant Activity

The ethanolic extract of *Vetiveria zizanioides* posses antidepressant activity and the combination of Fluxetine and ethanolic extract of *Vetiveria zizanioides* is effective against tail suspension test and force swim test induced depressive behaviour [27].

Antihyperglycaemic Activity

Karan Sk *et al.* Reported that The effect of root extract of *Vetiveria zizanioides* in normal fasted rats after multiple doses showed significant antidiabetic activity at 2nd and 4th hour after administration compared to diabetic control, result were comparable with standard glibenclamide. The study indicates the ethanolic extract of *Vetiveria zizanioides* roots posses better antihyperglyceamic activity than any other extract, in both normal and allaxon induced diabetic rats [28].

Acute oral toxicity study

Swiss albino mice were taken for the experiment. The animals were made into a group of 3 each, dose of extracts was given according to the body weight (mg/kg), starting dose of 5-5000 mg /kg was given to the first individual animal, no death was occurred, and higher doses were given to next group of animals. The observation shows the various extracts of root of *Vetiveria zizanioides* was screened for acutetoxicity study for determining the LD50. The results showed that LD50 was found to be 5000mg/kg. 1/10th of LD50 is called as ED50. Therefore its ED50 was found to be 500mg/kg[29].

NOOTROPHIC ACTIVITY

Elizabeth *et al.* Studied the Elevated plus Maze in scopolamine induced memory and learning impairment Transfer latency (TL) of first day reflected learning behavior of animals whereas, TL of second day reflected retention of information or memory. *Vetiveria zizanioides* extracts like, ethanolic extract of vetivera zizanioids (EEVZ) and aquous extract of vetivera zizanioids (AEVZ) (500 mg/kg) and Piracetam (200 mg/kg) administration for 28 successive days orally and intra-peritoneal respectively, significantly ($p<0.001$) decreased TL on first day as well as second days in scopolamine induced memory and learning impairment, indicating significant improvement of learning and memory. The EEVZ & AEVZ (500 mg/kg) administered orally for 28 days highly significant ($p< 0.001$) and equal to Piracetam effect in protected the animals from scopolamine induced impairment in learning and memory compared to other group[30].

Analgesic / Anti-Inflammatory Activity

Elizabeth *et al.* Reported that anethanolic extract of *Vetiveria zizainoides* in Wistar rats and Swiss albino mice showed analgesic and anti-inflammatory activity possible mediated through central and peripheral mechanisms[31].

Anti-Diabetic Activity

Rajeswari *et al.* reported that the Vetiver zizanioides roots extracts in STZ-induced diabetic Wistar rats. Results showed significant improved glycemic control, antioxidant and hypo lipidemic properties, together with protective effect against hepatic and renal injury Associated with diabetes [32].

CONCLUSION

Thus from this review it is very clear that the herb can be used in Traditional System of Medicine to treat the various ailments and their isolates will play a major role in curing them. This is because of the presence of active constituents present in the herb which makes it more potent. Thus this herb can be explored to treat the various diseases pertaining to Central Nervous System disorder which affect the human race maximum after silent killers like diabetes, hypertension etc to its best possible physiological activity for mankind.

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