

Review of Pharmacological Activities of *Vetiveria zizanioides* (Linn) Nash

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Abstract: *Vetiveria zizanioides* (Linn) Nash is a perennial magical grass of family poaceae commonly known as Khas which is highly valued grass due to its adventitious root system. It is widely distributed in the Pakistan. It is cultivated in all provinces of Pakistan due to its great economic importance. This grass grows plain ascending up to 1200m. Mostly roots stem and leaves were used for treatment of different diseases by ancestors. Adventitious roots contain essential oil which used for multipurpose such as perfumery and in pharmacological industry. *Vetiver* oil contains approximately 150 compounds, including sesquiterpenoids, hydrocarbons. Phytochemical analysis of leaves shows the presence of flavonoids, saponins, tannins and phenols. Various tribes of India used this tuft grass for commercial purposes. Khas serve as broom, for cooling, roof of huts and as medicine for different diseases such as sunstroke, ulcer, fever, epilepsy and in skin diseases. In this study we summarize the magical pharmacological activities of *Vetiveria zizanioides* such as anti-inflammatory, antibacterial, antifungal, and anti-malarial, anti-tubercular, anti-hyperglycemic, anti-hepatoprotective and antioxidant activity.

Keywords: Pharmacological activities, Khas, perfume, traditional medicine, biodiversity.

1. INTRODUCTION

Vetiveria zizanioides is magical and worldly use grass. It is native to India and belongs to family Poaceae. The word "vetiver" is Tamil word meaning "root that is dug up" and commonly known as Khas [1]. It cultivated in plains, river bank, marshy and lower hills with height of 1200m [2]. It is widely distributed in tropical and sub-tropical areas and especially in India. It grows on every type of soil but well-drained soil is best for its healthy growth. It is observed that the Annual growth rate is best in rainy areas as well as the temperature is in between 22°C to 43°C. Monsoon is best time for cultivation however it is also cultivated in early January. Its various parts are used for medicine especially the roots. Oil of *Vetiveria* used for all type of inflammation and infections. It commercially use as perfumery and aromatherapy [3]. Some of its name, Taxonomy, appearance, chemical composition and uses describe below:

1.1. Some Informal Names

Some common names of tufted grass in all tribes of India are given in table:

1.2. Taxonomical Place of *Vetiver Zizanioides*

The taxonomical place of *Vetiver Zizanioides* is as follows [4]:

Table 1: Name of *Vetiveria zizanioides* in Different Language

Language	Common name
English Tamil	Vetiver
Hindi	Khas
Bangali	Khaskhas, Venaghas
Gujarati	Valo
Malayalam	Ramacham
Telugu	Vattivellu

Table 2: Taxonomy of *Vetiver Zizanioides*

Kingdom	Plantae
Subkingdom	Tracheobionta(vascular plant)
Superdivision	Spermatophyte(seed plant)
Division	Magnoliophyta(flowering plant)
Class	Liliopsida(monocotyledon)
Subclass	Commelinidae
Order	Cyperales
Family	Poaceae(grass family)
Genus	<i>Vetiveria bory</i> (vetiver grass)
Species	<i>Vetiveria Zizanioides</i> (L.) Nash

1.3. Plant Description

Vetiveria zizanioides is dense and valuable grass. Its height is 2m. It has advantageous mat-like root

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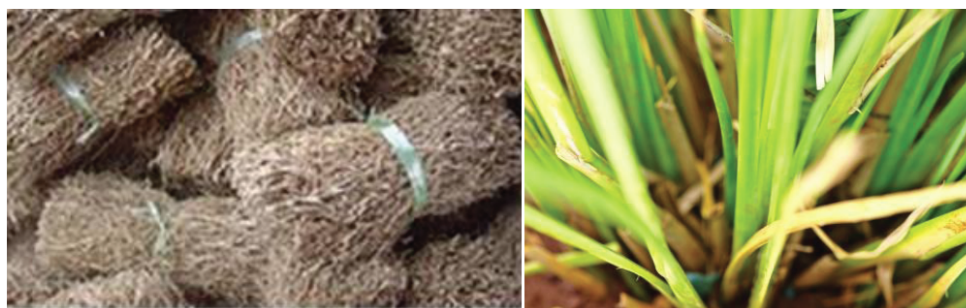


Figure 1: *Vetiveria zizanioides*.

system. Roots are branched spongy and due to its branched structure it prevent the soil erosion [5]. Roots are merged 20-30 cm in soil. The stem is long and leaves are elongated, narrow with scab rid margins. Inflorescence is a panicle, 15-45cm racemes in whorl having central axis. It has 2 spikelets which is 4-6cm long and the color of spikelet is gray to purplish. Upper spikelet is sessile bisexual flower while the lower is pedicelate, staminate and reduce to lamina [6].

1.4. Chemical Composition

Vetiveria zizanioides (L) Nash oil has 150 sesquiterpenes. 60 components are identified to date. 35% oil contains alpha-vetivone, beta-vetivone and khusimol. These provide characteristic odor of oil [4]. The chemical constituents present in plants are Vetiverol, Vetivone, Khusimone, Khusimol, Khusitone, isokhusimol, terpenes, Benzoic acid, Tripene-4-ol, betaHumulene, Epizizianal, Vetivenyl vetivenate, Zizaene, vetivazulene, prezizaene, b-vetispiorene etc [7].

1.5. Conventional Uses

Khas served as medicine in various tribes of India. Different parts of plant are used for different diseases. Root use for cooling in inflammation and sexual diseases in Santhals. Lodhas used root paste for headache, fever, diarrhea, chronic dysentery and for ayurvedic preparations [8]. Root ash used for acidity in Oraon. Juice of root used for anthelmintic. Varanasi tribe used vapor of root for malarial fever. Vetiver oil, leaf paste, stem juice used as stimulant, diaphoretic, refrigerant, rhenmatism, boil burn, snake bite, epilepsy and mouth ulcer. Leaves and roots of mats also used as bed providing cooling effect. Stem along with panicles form a sweeping broom. In various tribes it also used as walls and roof of huts [9]. These all uses showed the remedial importance of *Vetiveria zizanioides*. These useful effect also applied pharmacologically some of the major application in pharmacological effects describe below.

2. PHARMACOLOGICAL ACTIVITY

2.1. Anti Inflammatory

Anti inflammation is the pain relieve activity. At particular dose these drugs can reduced the inflammation. It is a body's response against injury and irritation. These drugs used for long term pain relives. Essential oil of *V. zizanioides* (L) showed the anti inflammatory effect. It is mostly used as anti inflamers in circulatory system and nervous system. It is also used as good tool for inflammations caused by sun stroke, dehydration and dry winds [2].

2.2. Anti Oxidant Activity

Anti oxidant molecules restrict the other molecules for oxidation. In oxidation process many free radical generated and can damage the cell. These anti oxidant agents terminate the chain reactions. The plant extract of *Vetiveria zizanioides* show antioxidant activity by scavenging free radicals *in vivo*. Free radicals cause various diseases by DNA damage and lipid by pre oxidation. Root of *Vetiveria zizanioides* in ethanolic extract use for different antioxidant activity and reducing the ability of oxidation, superoxide anion radical capturing ability and total antioxidant capacity [10].

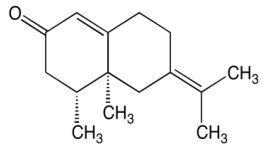
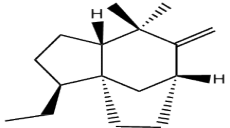
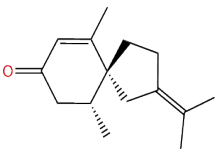
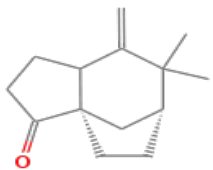
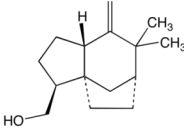
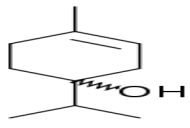
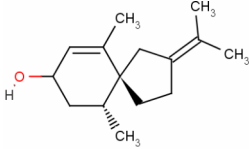
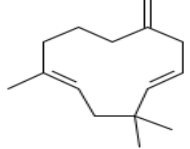
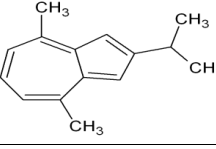
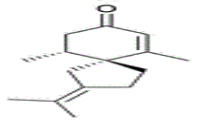
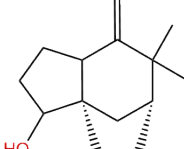
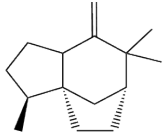
2.3. Antifungal Activity

Antifungal medication is used to treat the infection caused by fungi. Fungal infection is usually not so serious if it is on skin only but it is very serious and life threatening when affects the internal parts of the body. *Vetiveria zizanioides* showed antifungal effect in both aqueous and ethanolic extract against standard culture of *Asperigulls nigra*, *Asperigulls clavatus* and *Candida albicanus*. Nystatin and griseofulvin ager plate method was used as standard [11].

2.4. Hepatoprotective Activity

Methanolic and ethanolic extract of *Vetiveria zizanioides* has shown the Hepatoprotection. It is

Table 3: Major Isolated Components of *Vetiveria zizanioides*

Major constituent	Structure	Major constituent	Structure
alpha-vetivone		prezizaene	
beta-vetivone		Khusimone	
khusimol		Tripene-4-ol	
Vetiverol		betaHumulene	
vetivazulene		b-vetispirene	
Khusimol		Zizaene	

observed in methanolic extract of this grass at dosage of 300-500mg/kg is effective. Ethanolic extract showed 20% damage at 3.7 mg/kg dosage [12].

2.5. Antitubercular Activity

Vetiveria zizanioides root extract shows antimycobacterial activity against *Mycobacterium tuberculosis* at dose of 500µg/ml. Antitubercular activity shown in Hexane fraction at very low concentration (50µg/ml). The effect of the dose remains long term even after removal of oil [13].

2.6. Mosquito Repellent Activity

Native of India used the root oil as mosquito repellent. Nano emulsion of oil range from 150-160nm homogenize form thin film and vaporized. This film served as mosquito repellent for long time. Different studies showed that different concentration of root oil of

Vetiveria zizanioides also helpful in reducing the growth of eggs of *Anopheles Stephens* that deposited by gravid [14].

2.7. Antidepressant Activity

Ethanolic extract of vetiver shows antidepressant activity. It combines with fluoxetine provide more good effects. *Vetiveria zizanioides* Served as antidepressant [14].

2.8. Antihyperglycaemic Activity

Antihyperglycaemic activity was performed in ethanolic extract with roots of *Vetiveria zizanioides* (L) Nash. *Vetiveria zizanioides* ethanolic root extract posses Antihyperglycaemic activity. The effect of this extract on rat under control condition shows positive effect [15].

2.9. Antibacterial Activity

Antibacterial activity of ethanolic root extract of *V. zizanioides* Linn is measured by zone of inhibition. Ethanolic root extract of *V. zizanioides* have flavonoids, terpenoids, tannins which show antimicrobial activity. The work is done by four strains of bacteria, two gram positive *S. aureus*, *B. subtilis* and two gram negative bacteria *P. aeruginosa*, *E. coli*. The study shows that flavonoids have antimicrobial activity against the gram negative bacteria. They form complexes with microbial cell membrane and disrupt their activity. Tannins are present in root extract shows antimicrobial activity by default microbial enzyme adhesion, cell transport protein and also complex formation with polysaccharides. So it is concluded that tannin is active component in Ethanolic root extract of *V. zizanioides* that have antibacterial activity *in vitro* [2].

CONCLUSION

Herbal medicines are more in practice now a day's. All the plants have natural ingredients which are helpful in curing of different diseases. In literature almost 500 plants were used by ancients for treatment while about 800 used in indigenous system. WHO provide a guideline for examine the herbal medicine. In few last decays the herbal medicine based researched increased exponentially. It become more famous in developed and under development countries equally to collect from natural origin and have less side effects. One of those herbs is *Vetiveria zizanioides* (Linn) Nash. It is a magical, multifunctional and high potential grass. This perennial grass traditionally uses their roots, stem, leaves commercially as boom, roof of huts or perfumes and its pharmacological uses involve the cooling effect and for treatment of different infection

such as ulcer, sunstroke, epilepsy. This grass proves that it is very value able grass in reference of medicinal uses. It includes anti inflammatory, antibacterial, antifungal, anti malarial, anti tubercular, hyperglycemic, hepatoprotective and antioxidant activities. So, this grass has great economical advantages and natural safeguard against some diseases.

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