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RESEARCH ARTICLE

Analgesic effect of methanolic extract of *Vetiveria zizanoides* in wistar rats

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ABSTRACT

Introduction: *Vetiveria zizanoides* is used as a traditional medicine for a number of conditions, but there is lack of scientific data regarding its analgesic action. **Aim:** to study the analgesic action of methanolic extract of *Vetiveria zizanoides* (VZ) on animal models of analgesia. **Methods:** The animals were divided in to four groups (n=6). The groups received gum acacia, tramadol, VZ 300mg/kg and VZ 500 mg/kg orally. The analgesic effect of the plant extract was tested using hot plate and tail flick models. **Results:** VZ500 mg/kg produced a significant analgesic action in both the models of analgesia which was comparable to that of tramadol. VZ 300mg/kg produced significant analgesic action only hot plate model. **Conclusion**: The present study suggests the central analgesic action of methanolic extract of *Vetiveria zizanoides*. Further studies are required to confirm its analgesic action.

Key words: *Vetiveria zizanoides*, methanolic extract, analgesia

INTRODUCTION:

Vetiveria zizanioides is an aromatic medicinal plant which belongs to the family of Poaceae and is popularly known as khus. Though it originates in India, vetiver is widely cultivated in the tropical regions of the world. Different parts of *Vetiver zizanioides* have been used for a number of conditions in traditional medicine. It has been used in epilepsy, headache, fever, rheumatism lumbago etc. It also has anthelminthic and diaphoretic properties.[1] The vetiveria oil is applied externally as antifungal and antibacterial.[2,3] As an aromatic plant it is used in cosmetics, perfumes and soaps. The root extracts have been used as a water purifying agent. Studies have shown it larvicidal action against malarial vector, *Anopheles stephensi*.[4] However, there is paucity of scientific data regarding its central analgesic effect. Hence the present study was undertaken to study the analgesic effect of *Vetiveria zizanoides* in wistar rats.

MATERIAL AND METHODS:

The whole plant of Vetiveria zizanioides was collected from Udupi district of Karnataka and identified in the department of Pharmacognosy, Manipal college of Pharmaceutical Sciences, Manipal.

Extract preparation:

The root and stem of Vetiveria zizanioides was dried and powdered. The powder was loaded into the soxhlet apparatus in 8 batches of 200g each and was subjected to extraction for 30-40 hours with 95% methanol. After that the solvent was distilled and the extract was concentrated under a reduced pressure on a water bath at a temperature below 50^0C to a syrupy consistency then the extract was dried in a desiccator. The extract was used in the dose of 300 and 500mg /kg /day. The doses have been selected based on a previous study.[5]

Animals:

Adult male Wistar rats weighing between 150-250g bred locally were chosen for the study. They were housed in clean polypropylene cages and fed with rat chow and water *ad libitum*. The animals were maintained under standard laboratory conditions; temperature (22±2C), relative humidity (55±5%). The study was approved by the Institutional Animal Ethics Committee and the study was conducted in accordance with the regulations of the Committee for the purpose of control and supervision of experiments on animals (CPCSEA).

Experimental procedure:

The animals were divided into four groups (n=6).The groups 1 & 2 received 1ml of 2% gum acacia orally and 10 mg/kg of tramadol (standard) respectively. The groups 3 and 4 received 300 and 500 mg/kg day of VZ extract orally. Analgesic activity was assessed using hot plate method and tail flick method at baseline and at 20, 60 and 90 minutes after the administration of the drugs.

Hot plate method[6]: The hot plate which is commercially available consists of an electrically heated surface as

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described by Eddy's and Leimbach. Each rat was placed on the Eddy's hot plate which was kept at $55^0C \pm 1^0C$, and the withdrawal latency was noted by observing eitherthe licking of the hind paws, jumping or the rotation movements. The latency was recorded before and after 20, 60 and 90 minutes following drug administration. Withdrawal latency in seconds was measured and an increase in time interval was indicative of analgesia. A cut off time of twenty seconds was used to avoid tissue injury Tail flick method[6]: Analgesic response was determined by measuring the latency of the tail-flick response. Rats were gently held while the tail put on analgesiometer. The tail-flick response at baseline (before administering test drug), and at 20.60 and 90 minutes after drug administration was elicited by applying the radiation heat from a heated nichrome wire to the dorsal surface at 1-1.15cm from the tip of the tail. Time between placing the tail of the rat on the radiant heat source and sharp withdrawal of the tail was recorded as reaction time. Cut off time was set at ten seconds to rule out thermal injury.

Statistical analyses:

The results were analyzed using SPSS 11.5 version. One way analysis of variance (ANOVA) followed by Tuckey's test was used to analyze the parameters, $p<0.05$ was taken as significant.

RESULTS:

The animals treated with tramadol showed significant ($p<0.01$) increase in latency period and reaction time in hot plate and tail flick model respectively at 60 min. VZ 300 mg/kg prolonged the latency time significantly ($p<0.01$) at 90 min only in hot plate method whereas VZ 500mg/kg prolonged the latency time and reaction time significantly at 60 min ($p<0.05$) and 90 min ($p<0.01$) in both the models of analgesia (table 1 and 2).

Table 1: Effect of drugs on withdrawal latency in Hot plate method

	Withdrawal latency (seconds) Mean ± SEM			
Groups	**0 min**	**20 min**	**60 min**	**90 min**
Control	6.06±0.44	5.85±0.74	4.86±0.39	4.9±0.27
Tramadol	5.37±0.4	7.31±0.6	6.76±0.46**	8.25±0.52**
VZ 300	5.5±0.1	4.81±0.29	6.15±0.2	6.23±0.17**
VZ 500	5.16±0.4	5.23±0.24	7±0.42**	6.5±0.19**

ANOVA: $p=0.004$ at $6o^{th}$ min; $p=0.00$ at 90^{th} min

*p<0.05, **p≤0.01

Table 2: Effect of drugs on reaction time in tail flick method

	Reaction time (seconds) Mean ± SEM			
Groups	**0 min**	**20 min**	**60 min**	**90 min**
Control	7.88±0.84	8.95±0.71	8.93±0.33	8±0.61
Tramadol	8.47±0.7	11.4±0.54	12.41±1.00*	13.79±0.42**
VZ 300	9.08±0.67	10.65±0.11	11.25±0.45	12.25±0.85
VZ 500	9.41±0.29	10.74±0.72	12.9±1.07*	15.9±2.5**

ANOVA : $p=0.009$ at 60^{th} min ; $p=0.001$ at 90^{th} min

*p<0.05, **p≤0.01

DISCUSSION:

Vetiveria, a commonly used ayurvedic medicine and constitutes of Vetiverol, vetivinone, Khusimone, Khusimol, Vetivene, Khusitone, Turpenes, Benzoic acid, Terpene4-ol, β-humulene, Epizizianal, vetivenyl vetivenate, iso Khusimol, β- vetivone, vetivazulene.[7] The central analgesic activity of a compound can be determined by hot plate and tail flick method. In this study these two methods have been employed.

In the present study, tramadol, an opioid analgesic showed significant analgesic activity in hot plate and tail flick models. VZ at a dose of 500mg/kg produced significant analgesic activity which was comparable to that of tramadol. The lower dose of VZ showed analgesic activity only in tail flick method. A recent study also reported analgesic and anti-inflammatory activity of VZ. In this study VZ was administered intraperitoneally and the peripheral analgesic activity was ascertained by

writhing method and hind paw licking method.[8] In the present study, the drug has been administered orally and central analgesic activity has been assessed.

Vetiveria zizanoides has been used traditionally for sprains, rheumatoid arthritis, headache and lumbago. This study provides a scientific validation for the above traditional uses of *Vetiveria zizanoides*. Ability of *Vetiveria zizanoides* to combat oxidative stress has been attributed to the various uses of this plant extract. Another study put forth that *Vetiveria zizanoides* exerts analgesic effect by inhibiting prostaglandin synthesis.[9] Further studies are required to elucidate its exact effect and mechanism of action.

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