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Evaluation of general behavioral activities of *aloe vera* (L) burm.f

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Abstract

Anxiety is the natural human response to motivate to solve the problems. Under pressure, person is facing a stressful situation in anxiety. Although it is a normal human emotion but symptoms escalate into anxiety attack, it may be anxiety disorder. *Aloe vera* was evaluated for general behavioral activities in mice, different behavioral activities for anxiety. *Aloe vera* was administered orally in both sexes of mice found to cause significant depression in general as well as behavioral profiles. The results revealed that *Aloe vera* showed significant reduction (<0.01) in awareness, alertness, mood, locomotor, touch response, motor coordination, and passivity and spontaneous activity with highly significant decrease (<0.001) in pain response with significant increase (<0.01) in sedation. The result suggests that *Aloe vera* can possesses anxiolytics and CNS depressive potential with sedation at long-term use and required further investigation.

INTRODUCTION

Anxiety can create fear feelings and uneasiness require to early treatment, otherwise it becomes a generalized anxiety disorder which identified by excessive fearfulness and anxious thoughts [1] It is difficult to control resulting serious mental problems disturbing the normal daily life and functioning[2]. Ethno-medicine provides the resources for newly designed modern pharmaceuticals and in developing countries has a beneficial role in drug discovery [3]. Toxic and unwanted constituents are present in most of the herbal drugs but before manufacturing all these constituents removed or decrease from herbal drugs [4]. Regular monitoring is required to increase the quality and content of the herbal preparations and protect from the contamination [5].

Aloe vera is a succulent plant [6] with 360 species [7] and few have medicinal values [8]. Inner portion of *Aloe vera* leaf has transparent, tasteless, and thin mucilage or gel, contained various biologically active substances [9].

Aloe vera's thick fleshy leaf provides storage for carbohydrate [10]. A constituent of *Aloe vera* acemannan acts as an antiviral [11]. Polymannans [12] take part in the growth and repairing of skin tissues. Plant leaf has 12 Anthraquinones. Anthrones [13] of *Aloe vera* is responsible for evacuation of bowel or acts as a laxative and purgative agent [14]. *Aloe vera* mucilage contains 20 - 22 amino acids in which eight are essential amino acids found in *Aloe vera* gel [15]. Campesterol act as anti-inflammatory agents [16]. For anti-inflammatory effect, carboxypeptidase responsible to inactivate the bradykinin also present in *Aloe vera* [17]. Antioxidant vitamins found in *Aloe vera* including vitamin A, B_2, B_{12}, C and E [18]. *Aloe vera* mucilage consists of nine different minerals. It contains 3% saponins [19]. Depressive CNS activities may be attributed the *Aloe vera* constituent saponins [20]. Aloes resin found in outer membrane of *Aloe* leaf [21] take part in the reduction of necrosis [22]. Plant antioxidative property [23] revealed different pathways for mechanism of action such as Aloe-emodin showed the highest inhibitory activity against peroxidation of linoleic acid which is catalyzed by soybean 15-lipoxygenase. Furthermore, *Aloe vera* is useful in convulsion, sedation, and cough suppression [24].

MATERIALS AND METHOD

Animals Selection

Long-term dosing of *Aloe vera* carried out on albino mice weighing from 25±5 gm randomly selected with equal sex distribution. Animals divided into two groups, each consists of ten animals. First group received saline as control animals group, while other group served as treated group.

Housing

Albino mice were maintained in 21-23 °C room temperature with 12/12 hours light - dark cycle i.e. light on from 08.00 a.m to 08.00 p.m at the Department of Pharmacology, University of Karachi and had access to water and food *ad labitum. They were housed two per cage in under standard environmental conditions and kept at least 6-7 days for acclimatization.* All procedures and protocols were follow in accordance with guiding principles in the care and use of animals, Helsinki declaration, 1964 [25].

Dosing Protocol

Aloe vera and was purchase from the market in the form of capsule and administered to the treated animal group at 500 mg orally according to the body weight of animal for a period of 30 days daily. The control group received 0.1ml of saline (0.9% NaCl) by the same route as the treated group. The behavioral activities were observed at 7th, 15th, and 30th day of dosing and number of animals death were also noted during these intervals of time.

General Behavioral Activities

Awareness and Alertness test

Albino mice control and treated groups were place in a wide mouth glass jars separately for at least 30 minutes and observed the awareness, alertness and stereotype at 7th, 15th, and 30th day of dosing of *Aloe vera* [25].

Mood Test

Albino mice control and treated groups were place in home cage separately for at least 30 minutes and observed the vocalization, restlessness, aggression at 7th, 15th, and 30th day of

dosing of *Aloe vera* [26].

View - Jar Test

Albino mice control and treated groups were place in a view - jars separately for at least 01 minute and observed the spontaneous activity, twitches and tremors at 7th, 15th, and 30th day of dosing of *Aloe vera* [27].

Viewing cage Test

Albino mice control and treated groups were place in a viewing transparent cage separately for at least 30 minutes and observed the fearfulness, corneal reflex, light reflex, and no. of deaths at 7th, 15th, and 30th day of dosing of *Aloe vera* [28].

Test for Touch Response

Albino mice control and treated groups were place in a home cage separately and observed the touch response and body movement after touching the pencil at various portions of body especially tail at 7th, 15th, and 30th day of dosing of *Aloe vera* [27].

Test for Pain Response

Albino mice control and treated groups were place in a home cage separately and observed the pain response and sedation at 7th, 15th, and 30th day of dosing of *Aloe vera* [25].

Wire Hanging Test

Stainless steel bars were use for this purpose in which, hang the mice (control and treated groups) separately with the help of fore limb or hind limb and observed the grip strength, body tone and limb tone to evaluate the motor or muscular function of the animal at 7th, 15th, and 30th day of dosing of *Aloe vera* [29].

Righting Reflex Test

Albino mice control and treated groups were place on the surface on its back, if animal remains in the same condition so the loss of righting reflex occurs [30] and observed the tonic-clonic and myoclonic seizures as well by chemical-induced convulsions using pentylenetetrazole [31] at 7th, 15th, and 30th day of dosing of *Aloe vera*.

Home Cage Activity

Albino mice control and treated groups were place in a home cage separately for at least 30 minutes and observed the passivity, irritability, piloerection, staggering gait and startle response at 7th, 15th, and 30th day of dosing of *Aloe vera*.

Statistical Analysis

The data obtained from present study was analyze for P-value < 0.01 was considered significant and P-value < 0.001 was considered highly significant, following the one way ANOVA [32-33].

RESULTS

General Behavioral Activities

General behavioral activities test were observe in different animal groups during the total period of experiment. No gross toxicity and no death were observed in any group of animals.

Awareness and Alertness test

In View - Jar Test animals showed significant reduction in awareness and alertness and no significant change in stereotype after administration of *Aloe vera* at 7, 15 and 30 days interval (Table 1)

Mood Test

In View - Jar Test animals showed highly significant reduction in mood and no significant change in vocalization, aggression after administration of *Aloe vera* at 7, 15 and 30 days interval (Table 2).

View - Jar Test

In View - Jar Test animals showed significant reduction in spontaneous activity and no significant change in twitches and tremors after administration of *Aloe vera* at 7, 15 and 30 days interval (Table 3).

Viewing cage Test

In Viewing cage Test animals showed significant reduction in fearfulness and no significant change in corneal reflex and light reflex at 7, 15 and 30 days interval after long-term administration of *Aloe vera* (Table 4).

Test for Touch Response

In general behavioral activities animals showed significant reduction in touch response with and body movement the administration of *Aloe vera* at 7, 15 and 30 days interval (Table 5).

Test for Pain Response

In general behavioral activities animals showed highly significant reduction in pain response with significant increase in sedation after administration of *Aloe vera* at 7, 15 and 30 days interval (Table 6).

Wire Hanging Test

In general behavioral activities animals showed significant reduction in grip strength with no significant change in body tone and limb tone after administration of *Aloe vera* at 7, 15 and 30 days interval (Table 7).

Righting Reflex Test

In Righting Reflex Test, animals showed no significant change in righting reflex, tonic-clonic and myoclonic seizures after administration of *Aloe vera* at 7, 15 and 30 days interval (Table 8).

Home Cage Activity

In home cage activity, animals showed no significant irritability, piloerection, and gait, startle response, and showed significant increase in passivity (Table 9).

DISCUSSION

Currently available drugs all they have side and toxic effects even new designed drugs also possesses side effects as well as they are expensive . In addition, herbal drugs are potent, effective, inexpensive, and possessing lesser side effects [20].

Aloe vera (*Aloe barbadensis Miller*) is widely recognized effective herbal medicine used as an analgesic, anti-inflammatory, antioxidant, anti-pruritic, antiseptic and antibacterial effects, stimulates skin growth and repair, inhibit viral replication and helps in digestion. Its antioxidative property exhibits various pathways of action by inhibition of linoleic acid peroxidation and has a high inhibitory free radical scavenging activity.

In General behavioral activities animals showed no significant righting reflex and animals became passive after long term dosing of *Aloe vera*. It was noted that the plant *Aloe vera* is

Table 1 : Awareness and Alertness test for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Awareness	-	-	-	↓*	↓*	↓*	-	-	-
Alertness	-	-	-	↓*	↓*	↓*	-	-	-
Stereotype	-	-	-	-	-	-	×	×	×

n = 10 , *p<0.01 ↓ = Indicates reduction in behavior
× = Indicates no change in behavior

Table 2 : Mood Test for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Mood	-	-	-	↓**	↓**	↓**	-	-	-
Vocalization,	-	-	-	-	-	-	×	×	×
Aggression	-	-	-	-	-	-	×	×	×

n = 10 , **p<0.001 ↓ = Indicates reduction in behavior
× = Indicates no change in behavior

Table 3 : View - Jar Test for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Tremors	-	-	-	-	-	-	×	×	×
Twitches	-	-	-	-	-	-	×	×	×
Spontaneous activity	-	-	-	↓*	↓*	↓*	-	-	-

n = 10 , *p<0.01 ↓ = Indicates reduction in behavior
× = Indicates no change in behavior

Table 4 : Viewing cage Test for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Fearfulness	-	-	-	↓*	↓*	↓*	-	-	-
Corneal reflex	-	-	-	-	-	-	×	×	×
Light reflex	-	-	-	-	-	-	×	×	×

n = 10 , *p<0.01 ↓ = Indicates reduction in behavior
× = Indicates no change in behavior

Table 5 : Test for Touch Response for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Touch response	-	-	-	↓*	↓*	↓*	-	-	-
Body Movement	-	-	-	↓*	↓*	↓*	-	-	-

n = 10 , *p<0.01 ↓ = Indicates reduction in behavior

Table 6 : Test for Pain Response for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Pain response	-	-	-	↓**	↓**	↓**	-	-	-
Sedation	↑*	↑*	↑*	-	-	-	-	-	-

n= 10, *p<0.01, **p<0.001 ↓ = Indicates reduction in behavior ↑ = Indicates increase in behavior

Table 7 : Righting Reflex Test for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Grip Strength	-	-	-	↓*	↓*	↓*	-	-	-
Body tone	-	-	-	-	-	-	×	×	×
Limb tone	-	-	-	-	-	-	×	×	×

n = 10 , *p<0.01 ↓ = Indicates reduction in behavior
× = Indicates no change in behavior

Table 8 : Wire Hanging Test for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Righting reflex	-	-	-	-	-	-	×	×	×
Tonic clonic seizures	-	-	-	-	-	-	×	×	×
Myoclonic seizures	-	-	-	-	-	-	×	×	×

n = 10 × Indicates no change in behavior

Table 9 : Home Cage Activities for Screening of Aloe vera

Activities	Increase (Days)			Decrease (Days)			No Change (Days)		
	07	15	30	07	15	30	07	15	30
Passivity	↑*	↑*	↑*	-	-	-	-	-	-
Irritability	-	-	-	-	-	-	×	×	×
Piloerection	-	-	-	-	-	-	×	×	×
Staggering Gait	-	-	-	-	-	-	×	×	×
Startle response	-	-	-	-	-	-	×	×	×

n = 10 , *p<0.01 ↑ = Indicates increase in behavior
× = Indicates no change in behavior

affected on pain and touch responses. It significantly reduces ($p<0.01$) the touch response and body movement with significant reduction ($p<0.01$) in awareness, alertness, and locomotion. Depressive effect on CNS resulting the decrease in locomotion [32]. In the wire-hanging test it was noted that drug significantly reduces ($p<0.01$) the grip strength, it could be due to the deficit motor coordination and muscle tone occurred during long term administration of *Aloe vera* .Decrease activities are related to the sedative action of the *Aloe vera* resulting the depression of CNS.

Depressive CNS activities [34] may be attributed by the some

constituents such as saponins [35] , tannins, flavonoids [36] and steroids [19] and all these constituents are found in *Aloe vera* reveals the depression on CNS .Furthermore, mild sedative effect resulting the reduction in anxiety.

CONCLUSION

It concluded that *Aloe vera* can possesses anxiolytics and CNS depressive potential with sedation action at long-term therapy It has no any toxicity or death were observed during experimental work and required further investigation.

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