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Case Report

# A Brief Review on Aloe Vera & Aloe Vera Gel

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**Abstract:**

Aloe vera has a storied history of use. Mesopotamian clay tablets dated 1750 BC indicate that Aloe vera was being used for medicinal purposes. Egyptian records from 550 BC also mentioned aloe for infections of the skin. The ancient Greeks were also aware of aloe's medicinal effects as both Pliny (23-79 AD) and Dioscorides (1st century AD) wrote of aloe's ability to treat wounds and heal infections of the skin. Aloe vera is still widely used in many traditional systems of medicine.

**Key words:** aloe vera; heal infection; greek

## Introduction

There are more than 300 species of aloe plants, but the most popular medicinal variety is currently Aloe vera. Aloe vera is a perennial succulent with yellow flowers and tough fleshy triangular or spear-like leaves arising in a rosette configuration.

**Scientific Name:** Aloe vera Tourn (L.) Webb.

**Family:** Liliaceae

**Arabic Name:** صبار

**English Name:** Aloe

**Synonyms:** Aloe vera Tourn. Ex. L. and A. vera (L.) Webb ford.

**Historical:** Native to Arabia and Africa.

**Habitat & Cultivation:** Found all over the tropical and subtropical plains. Often cultivated as a garden or hedge plant. Aloe vera is abandoned at Dhadnah, East Coast, UAE.

### History and Folk Use:

Aloe vera has a storied history of use. Mesopotamian clay tablets dated 1750 BC indicate that Aloe vera was being used for medicinal purposes. Egyptian records from 550 BC also mentioned aloe for infections of the skin. The ancient Greeks were also aware of aloe's medicinal effects as both Pliny (23-79 AD) and Dioscorides (1st century AD) wrote of aloe's ability to treat wounds and heal infections of the skin. Aloe vera is still widely used in many traditional systems of medicine. In addition to external applications, aloe (whole leaves, the exudate, and the fresh gel) is used as a cathartic, stomachic, and anthelmintic. Aloe vera has been adopted into the Materia Medica by many cultures of the world [1]. In the United States, the history of aloe can be traced as far back as the United States Pharmacopoeia of 1820, where a number of aloe preparations were described. In 1920, aloe began being cultivated for pharmaceutical use [2].

### Aloe vera Leaves

**Description:** It is a dwarf and fleshy-leaved bush. Leaves are long and spiny-toothed at the margin. Red-colored flowers in a bunch appear. This plant grows well in sandy soil. In or close to the mountain only, where it was planted in graveyards. Also, an ornamental in towns.

**Parts Used:** Leaf or juice

**Traditional Use:** Externally, it is used for burns and sprains. Internally, it is used for jaundice, habitual constipation, loss of appetite, gas formation in the stomach, and leucorrhoea (foul-smelling discharge from the genital tract) taste, a pinch of salt should be added to it. For children, the juice should be given by adding an equal quantity of honey or a small quantity of sugar.

### Medicinal uses:

The mucilaginous gel has been used from early times for the treatment of numerous conditions but in recent years its use in the herbal and cosmetic industries has become very big business in the USA, Europe, and elsewhere. Aloe gel is perhaps the most widely recognized herbal remedy in the United States today, used to relieve thermal burn and sunburn, promote wound healing and moisturize and soften skin. In addition, recent research suggests that aloe gel can help stimulate the body's immune system.

**However, the way aloe works is not yet fully understood. Among some of the recent findings:**

i. Researchers at Tokyo Women's Medical College in Japan and also in the Netherlands have shown that certain lectins (a type of protein) in aloe gel may stimulate the immune system to increase the production of killer cells, or naturally occurring lymphocytes that kill bacteria and tumor cells [4]. Acemanan

(acetylated mannose), a constituent of Aloe vera is a potent immunostimulant [5].

ii. A review of the medical literature by a group at the University of Texas in Galveston conducted that aloe gel clearly promotes wound healing & prevents progressive skin damage caused by burns and frostbite. It works by penetrating injured tissues, relieving pain, reducing inflammation, and dilating capillaries to increase blood flow to the injury.

Drug aloe (prepared from the bitter yellow juice of the leaf) and its derivatives are used extensively today as active ingredients in commercial laxative preparations, most often in combination with other botanical laxatives such as Senna leaves or pods. Commercial aloin is a refined form of drug aloe that contains a high concentration of barbaloin, aloe's main laxative constituent. In Germany, concentrated extracts of dried aloe leaves are used as laxatives preceding rectal surgery and as a hemorrhoid treatment. Some studies show that aloe lowers blood glucose levels by an unknown mechanism [6]. A more recent and larger study (49 men and 23 women) now provides more support for the efficacy of aloe in combination with glibenclamide in diabetes. While there was no response to glibenclamide alone, the combination was very effective [4]. The patients were provided with 1 tablespoon of aloe gel and 5 mg of glibenclamide twice a day, with 5 mg twice a day of glibenclamide serving as the control.

In continuation of my earlier work [3], the following scientific activities have also been carried out,

### Phytochemical analysis:

Aloe vera extract (gel) is a translucent liquid with a yellowish tint. The gel is acidic in nature (pH 3.87). It gives an ultraviolet absorbance at 260nm 2 2.475 (absorbance) in an aqueous medium.

### Thin layer chromatographic fingerprinting:

Thin-layer chromatography was carried out in different solvent systems: Toluene: Ethyl acetate (93:7)

Ethyl acetate: MeOH Water (100:13.5:10)

### The chemical constituents identified in Aloe vera gel are:

- Aloin (barbaloin)
- Aloecin
- -sitosterol
- -carotene
- Citric acid
- Vitamin C
- Amino acids
- Anthraquinone

### The chemical constituents identified in Aloe vera gel through GCMS are:

- Sorbic acid
- Sorbitol
- Benzoic acid
- Hexa decanoic acid
- Octadecanoic acid
- 1-mon arachidic

Anthroquinones (Up to 30 %, mainly C-glucosides). Collectively known as aloin, the mixture contains barbaloin. Isobarbaloin, and emodin (glycosides), and free anthraquinones (e.g., aloe-emodin). Other constituents include resins, alosin, and its aglycone aloes one (a chromene) Side effects and toxicity:

Aloe is a potent purgative. It should not be used in pregnancy.

### Pharmacological action:

Gel preparations have been reported to be effective against radiation burns, skin ulcers and peptic ulcers. Anti-inflammatory activity has been observed in rats and mouse models. Anti-tumor activity in animals; hypoglycemic activity in mice and rats: Purgative action has been reported in human studies.

**Mode of Administration & Doses:** In burns, the juice or the pulp of the fleshy parts of the leaf is applied externally. For sprains, the pulp or the juice may be rubbed over the D-affected parts two or three times. The external skin of the leaf should be removed with a knife and the fleshy pulp should be made to paste using a pastel and mortar. Because of its fleshy nature, it is slightly difficult to take out juice from the pulp. The white leaf may be slightly roasted over a fire. Then it becomes easy to take out juice from the pulp by squeezing through a cloth. Both pulp and juice should be given in a dose of one teaspoonful (5 ml) three times per day, preferably on an empty stomach. Since it is bitter in taste, a pinch of salt should be added to it. For children, the juice should be given by adding an equal quantity of honey or a small quantity of sugar.

| Group | Dose (ml/paw, used topically) | Percentage of inhibition of hind paw volume (Mean ± SE) at | | | | | |
|---|---|---|---|---|---|---|---|
| | | BW (g) | 0 h initial | 3rd day | 7th day | 10th day | 14th day |
| Control | 0.25 | 270.00±19.82 | 1.35±0.09 | 178.93±5.71 | 173.40±4.95 | 161.25±5.13 | 153.67±3.06 |
| Aloe vera | 0.25 | 323.75±18.12 | 1.52±0.06 | 162.15±16.59 | 143.60±11.50* | 135.40±9.60* | 136.85±10.29 |
| AR | 0.25 | 266.25±21.29 | 1.31±0.08 | 180.68±5.90 | 182.15±8.02 | 171.48±.72 | 165.06±5.70 |

**Table 1:** The anti-arthritis effect of Aloe vera on rats (n=8).

*p <0.05 significantly different from the control

**Animals:** Wistar rats, both males and females were used.

**Extract:** Aloe vera: 5g+gel 10g, A.R oil: Teucrium 1g + Alhagi 1g + olive oil 2.5 ml + fish oil 2.5 ml +gel 7g.

**Dosage regime:** 0.25ml/paw was applied topically.

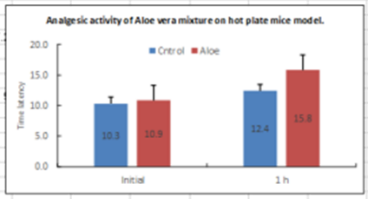
**Protocol:** 0.10ml of Freund's complete adjuvant (BDH, England) was injected into the supplanter a neurosis of the right hind paw. The hind paw edema was measured with a plethysmometer before and 3rd, 7th, 10th to 14th day after the adjuvant was given. 5 inhibition of hind paw volume was calculated using the formula [Percentage inhibition = reading/initial x 100] of rats before and after the administration of Freund's complete adjuvant respectively in the test group and control group.

**Result:** there is an anti-arthritis effect to paw edema induced by Freund's complete adjuvant when 0.25 ml/paw of Aloe vera (water extract) was applied topically, but there is no effect in the AR oil group.

Analgesic activity for Aloe vera mixture

| Control | | | Aloe mixture | |
|---|---|---|---|---|
| Initial | 1 h | | Initial | 1 h |
| 11.1 | 10.9 | | 9 | 12.1 |
| 6.9 | 15.3 | | 9.5 | 21 |
| 8.2 | 9.5 | | 12.7 | 17.3 |
| 11.4 | 13.4 | | 15.4 | 14.7 |
| 11.1 | 12.8 | | 8.5 | 12 |
| 10.1 | 14.5 | | 8 | 17.4 |
| 16.9 | 2.3 | | 8.7 | |
| 6.8 | 13.5 | | 9.9 | 9.3 |
| 9 | 10.3 | | 12.9 | 20.5 |
| 9.2 | 12.5 | | 7.4 | 11 |
| 11.3 | 15.1 | | 11.7 | 18.1 |
| 10 | 14.1 | | 9.1 | |
| 10.3 | 15.8 | | 14.2 | 18.2 |
| 11.9 | 13.8 | | 12.6 | 21.2 |
| | 12.2 | | 10.8 | 12.5 |
| | | | 13.2 | |
| 14 | 15 | | 16 | 13 |
| 10.3 | 12.4 | | 10.85 | 15.79230769 |
| 2.493992783 | 3.338305815 | | 2.425420926 | 4.079105608 |
| 0.666547608 | 0.892199758 | | 0.606355231 | 1.019776402 |
| | | | 0.546670633 | 0.025599661 |

| | Initial | 1 h |
|---|---|---|
| Cntrol | 10.3 | 12.4 |
| Aloe | 10.9 | 15.8 |




## Safety Evaluation and Efficacy Studies on Aloe Vera Gel

### Experimental Protocol

### 1. Acute toxicity study

An acute toxicity study was carried out in mice. Both, male and female mice were used for this study. The details of the experimental protocol are as follows:

**Animals:** Albino mice, MF 1 strain Body weight: 20-25 g

**Doses studied:** 90 ml/kg., p.o.

Two groups of 10 animals each were taken. Aloe vera gel was given as such without any further processing, orally to one group at the dose of 30 ml/kg, body weight, three times at the interval of 3 hours, and the other group was given the same volume of distilled water, which served as control. Both treated and control groups of animals were observed for gross behavioral signs and symptoms using a battery of test. Body weights, before and at 24 h and on the seventh day after administration of a drug, were recorded. Signs and symptoms of toxicity and mortality, if any, were recorded during seven days period after the administration of the drug.

#### Observation of behavioral signs and symptoms

Both treated and the control group of animals was observed for the following parameters.

a. Somatic response (Preening, Scratching, Writhing)
b. Coat (Alopecia, hair erosion, patches)
c. Postural reflex (Presence or absence of righting reflex, abnormal gait)
d. Respiration (Respiratory rate and depth)
e. Piloerection (Presence or Absence)
f. Diarrhea (Formed, loose, watery)
g. Urination (Frequency and quantity)
h. Salivation (Increased or normal)
i. Movements (Normal or restricted)
j. bizarre reaction (Presence or absence of circling movement and shovel nose)
k. Phonation (increased or normal)
l. Sensitivity to pain (increased or normal)
m. Sensitivity to touch (increased or normal)
n. Sensitivity to sound (increased or normal)
o. Pinnal reflex (Present or absent)
p. Tail (Rigid, Straub tail)
q. Aggression (Towards same species, towards the observer)
r. Muscle tone and in-coordination (Gait, flaccid legs)
s. Tremors/ convulsions (Present or absent)

### 2. Locomotor activity

The animals were administered orally the Aloe vera gel at the dose of 40 ml/kg. Locomotor activity was monitored in treated and control animals using Columbus Activity Meter. One animal each was introduced into the compartment of the equipment and was monitored for 30 minutes.

The 'total', 'ambulatory', and 'vertical' activities were recorded by the in-built system on the compartments. Distance traveled, resting time, ambulatory time, and stereotypic time were computed by the PC connected to the equipment. The data obtained from treated and control animals were compared statistically.

### 3. Biochemical studies

The animals were administered orally the Aloe vera gel at the dose of 40 ml/kg. The blood samples from treated animals and control animals were collected after 2 h of the treatment and the serum was separated. The biochemical parameters viz. ALB, ALT, AST, BUN and Creatinine were analyzed using Biochemical Analyser (Dade Behring, USA).

### 4. Hypoglycemic activity studies

Two groups of normal mice fasted for 4 h. One group was administered with Aloe vera gel and the other group was given distilled water (Control), after 2 h of the start of fasting. Blood samples were collected at the end of the fasting (4 h) and glucose levels were determined in the plasma. Using an ANALOX glucose analyzer.

## Results

#### 1. Acute toxicity & LD 50

Animals treated with Aloe vera gel at the dose of 90 ml/kg orally, did not show any signs of toxicity. No Straub tail or piloerection was observed. The respiration, urination, and stool were found normal. No death was recorded during the one-week observation period.

Since no lethality was found at the dose of 90 ml/kg, which is the maximum possible that could be given orally in mice, we concluded that the LD50 of the Aloe vera gel could be more than 90 ml/kg.

#### 2. Locomotor activity

Locomotor activity was significantly reduced in the animals administered Aloe vera gel, compared to the control animals.

#### 3. Biochemical studies

The serum ALB, BUN, CREA, ALT, AST, showed no significant changes in the treated group as compared to the control.

#### 4. Hypoglycemic activity

Aloe vera gel did not produce significant hypoglycemia or hyperglycemia in normal mice, compared to the control group.

## Conclusion

Aloe vera gel contains Aloin (barbaloin), Aloecin, Beta-sitosterol, Beta-carotene, Citric acid, Vitamin C, Amino acids, Anthraquinone, Sorbic acid, Sorbitol, Benzoic acid, Hexa decanoic acid, Octa decanoic acid & 1-mon arachidin

Acute administration of Aloe vera gel did not produce any noticeable toxic effects in the mice. However, locomotor activity was reduced significantly in treated animals. The gel did not show any hypoglycaemic activity in normal mice.

Precautions and adverse reactions:

Despite their widespread use in commercial preparations, drug aloe, and aloin are considered the least desirable of plant laxatives for home healthcare. Besides being extremely bitter, they produce cramping and irritation in the digestive tract. Overdose or other misuse can cause abdominal pain, gastrointestinal bleeding, or even kidney disorders. Pregnant or nursing women should not take products containing drugs aloe oral in because they stimulate the uterus (which can bring on premature labor) and because they pass readily into the mother's milk, sometimes causing gastrointestinal distress in the nursing infants. Long-term use leads to losses of electrolytes, in particular potassium, and as a result of this to hyperaldosteronism, inhibition of intestinal motility, and enhancement of the effect of cardiotonic steroids. In rare cases, heart arrhythmias, nephropathies, edemas, and accelerated bone deterioration may occur. Long-term use can also lead to albuminuria and hematuria [6].

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