



FORMULATION, OPTIMIZATION AND ESTIMATION OF ALOE VERA JELLY BAR AS A ORAL LAXATIVE

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ABSTRACT

The edibility of *Aloe vera* as a medicinal product for ailment of hyperacidity, oxidative stress has been proven. The popularity of artificial jellies in confectionaries and as medicated vehicles is enhancing. These dual needs are synchronized in this experimental study. Natural gel from *Aloe vera* leaves, family Xanthorrhoeaceae formulated and stabilized with excipients to form medicated and flavored confectionaries which will pioneer the path leading the natural digestive, fibrous jelly toffees with low synthetic excipients. Moreover an herbivorous jelling is constituted with fleshy leaves of *Aloe vera* which also have rich soothing property. The antioxidant activity of *Aloe vera* gel can assure to protect various sensitive medicaments. *Aloe vera* leaf gel along with gelatin and glycerin constituted as a jelly base with vanilla flavor, appropriate coloring agent and sodium benzoate was used as edible preservative. Present study deals with formulation of a fleshy natural jelly bar with all natural excipients and evaluation of this formulation by analytical and in vivo technique.

Keywords: *Aloe vera*, Laxative, Jelly bar, *In vivo* Intestinal motility, Analytical estimation.

INTRODUCTION

There are different species of aloe like *peglerae*, *dichotoma*, but *Aloe vera* is the most common. 'Vera' means 'true'. It is native to Africa. *Aloe vera* is a stem less or very short-stemmed succulent plant growing to 60–100 cm tall spreading by offsets. The leaves are thick and fleshy, green to grey-green, with some varieties showing white flakes on the upper and lower stem surfaces. The margin of the leaf is serrated and has small white thorns. Common names are *Aloe vera*, aloe, burn plant, Chinese aloe, Indian aloe.^{1,2}

Kingdom:	Plantae
Clade:	Angiosperms
Order:	Asparagales
Family:	Xanthorrhoeaceae
Subfamily:	Asphodeloideae
Genus:	<i>Aloe</i>
Species:	<i>Vera</i>

The chief contents of *Aloe vera* are: aloe emodin (strong laxative), amino acids (those amino acids which are not synthesized in our body), minerals, vitamins, lignin, mono & polysaccharide, enzymes, anthraquinones, saponin, sterol etc.

This study involves the analytical techniques of UV analysis that confirms qualitatively the various naturally occurring contents that confer the proposed use of formulation. The *in vivo* trials conducted creates the assurance of use of formulation and involves the calculation of intestinal traveling of intestinal contents with dose dependent and time profile of dosage form.

Aloe vera enjoys the various uses in human life. *Aloe vera* used to heal skin wounds, burns and blisters. It helps in speeding recovery time after surgery. *Aloe vera* Plants are also helpful in healing insect bites. *Aloe vera* plants are

also helpful in healing rashes and in healing herpes and also helpful in healing urticaria. Aloe gels are applied on dry skins to give them glowing effect. Helps in reducing acne and sunburn. Wrinkles from aging are reduced by applying *Aloe vera*. *Aloe vera* used to reduce eczema.

However depending upon the excess or ample of specific content, the use of that formulation is dependent and hence the analytical study is undertaken in this experiment.³⁻⁹

MATERIALS AND METHODS

Materials

Natural gel from *Aloe vera* leaves, family Xanthorrhoeaceae formulated and stabilized with natural, digestive, fibrous, less synthetic excipient, forms medicated and flavored confectionaries. The fresh fleshy leaves from following species of aloe was procured from the botanical garden of P.D.V.V.P.F's college of pharmacy, the leaf was excised early in the morning and taken immediately for incision so as to avoid loss by natural degradation due to sunlight and get maximum ingredient concentration.

Method

Before beginning with the *Aloe vera* jelly formation process, it is important to know about the layers of *Aloe vera* leaf. The first part is the outer layer which is green and has the function of protecting the leaf. Next comes the aloin or the yellow sap, followed by the mucilage and gel which are two of the most important parts of the aloe plant as it is here that most of its nutrients rest. A thing to be remembered while preparing aloe gel is that one must completely avoid the yellow sap. This is because aloin is actually latex and can cause several health problems.



Step 1: The first step of making *Aloe vera* gel is to get a fresh, matured *Aloe vera* leaf. A mature leaf is one that is found on the outermost area of the plant. Take off the spikes of the leaf and start peeling the green part of the leaf very thinly.

Step 2: The sliced *Aloe vera* plant is placed in a container in an upright position. This is important to get rid of the yellow sap from the plant. The leaf is placed in the same position for at least 10-15 minutes or till you think that the entire yellow sap has drained.

Step 3: Then next step is to take out the mucilage and gel. However, if you have touched the yellow sap with your bare hands, remember to wash your hands well before touching the gel. To remove the gel, you will need a spoon. With a spoon, you can easily scoop out the inner gel. But, do not add too much pressure while doing this as you may also take out the leftover yellow sap accidentally.

Step 4: After an incision the concentrate of *Aloe vera* was removed from the leaf and mixed in mixer for 3 minute. All ingredients were taken according to as stated in table no.1 and then gelatin, glycerin and water was heated together to form a molten mass.

Step 5: Sucrose powder was passed through sieve no: 100# and dissolved in above prepared molten mixture of step 4.

Step 6: *Aloe vera* concentrate was added in above mixture followed by flavoring and coloring agent in sufficient quantity as stated in table no.1. Prepared mixture was poured in mould and it was allowed to cool and solidify. The resultant jelly was cut into small pieces of desired size and shape to get product as shown in fig.1.

Table 1: Formulation of *Aloe Vera* jelly bar

Ingredients	Quantity (%)	Use
Aloe vera gel	15	Laxative
Sucrose	15	Sweetener
Glycerin	29	Humectants
Gelatin	5	Gelling agent
Vanillin	5	Flavor
Colour	q.s.	Colorant
Water	30	Solvent
Sodium Benzoate	0.02	Preservative



Figure 1: Prepared formulation jelly bar.

RESULTS AND DISCUSSION

Evaluation of the formulated jelly

Recent study is undertaken to isolate the phenolic anthraquinones from the ethanolic extract from *Aloe vera* leaf gel. Aloe products have long been used in health foods and for medical and cosmetic purposes. These products range from aloe drink to aloe gels, powders, capsules, creams etc. for both internal and external uses for a wide variety of indications. Aloe has a wide range of medicinal application such as wound healing effect, reduces blood sugar in diabetes, soothes burns, ulcer curative object, stimulates immune response against cancer etc. Anthraquinones derivatives in *Aloe vera* gel play an important role in the treatment of tumors, diabetes, ulcer and cancer.

The present formulation was evaluated by UV spectrophotometry (Jasco) with different polar and nonpolar solvents along with the crude aloe vera sap for comparative analytical estimation of constituents. The absorbance at 204-208, 210, 220-230, 256 and 279 nm found in crude sap and product coincides respectively with malic acid, aloin alantoin and anthraquinone glycosides respectively. The UV plots showing the qualitative aspects are shown in fig.2 & fig.3 below.^{3,4}

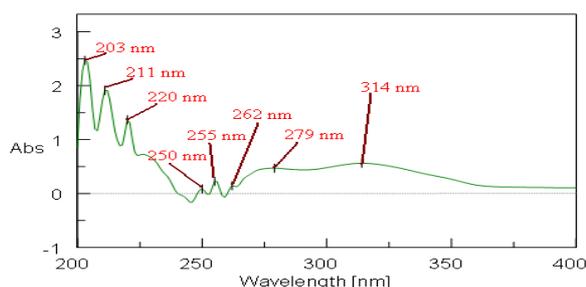


Figure 2: UV spectra of aloe leaf in ethanol

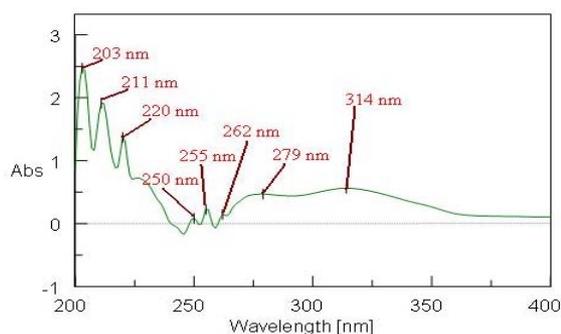


Figure 3: UV spectra of aloe jelly in ethanol

Also the organoleptic characterization is done as follows:

- Appearance: Non gritty, homogenous cake with good consistency.
- Texture: Smooth and shiny delicate mass.
- Colour: Crimson red, orange and yellow as per color added.
- Consistency: Highly viscous rigid gel.
- Taste: Sweet with little bitter taste.
- Weight: 3.5 gm
- Flavor: Vanilla flavor as added.

The laxative effect of prepared formulation is estimated by the gastric motility studies on fasting and feeded healthy rats, the movement of intestinal content is measured along the length of intestine extracted from dissected rats. The dose dependence of formulation is shown in fig.4.

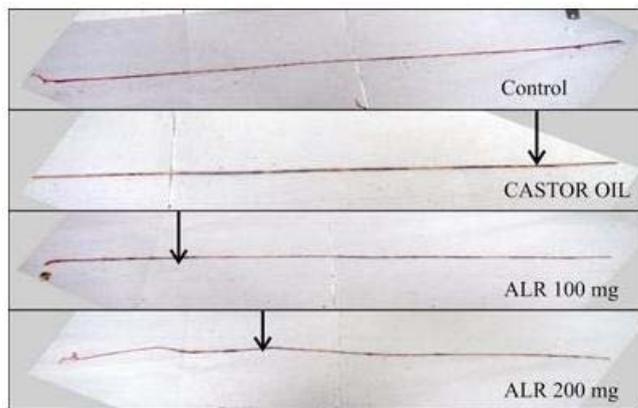


Figure 4: Intestinal motility after formulation ingestion.

Gastrointestinal motility tests

The method of Mascolo *et al.*, was used. Rats were divided into different groups of five rats each and fasted for 18 hours before the experiment. Three of the groups were then treated orally with three increasing doses (100, 200 and 400 mg/kg) of the extracts serving as the test groups. One group served as blank or negative control treated with saline (5 mL/kg, p.o.) and the last group was administered castor oil (2 mL/rat), a laxative agent, as the positive control. After 30 min, the animals were given 1 mL of freshly prepared charcoal meal (distilled water suspension containing 10% gum acacia, 10% vegetable charcoal). Following 30 min of charcoal administration, the rats were sacrificed by cervical dislocation and the abdomen immediately cut open, to excise the whole small intestine (pylorus region to caecum). The length of the small intestine and the distance between the pylorus region and the front of the charcoal meal was measured for obtaining the charcoal transport ration or percentage, the results depicted in table no.2.

Laxative activity

The method of Capasso *et al.*, was followed for this activity. Rats fasted for 12 h before the experiment were placed individually in cages lined with clean filter paper. Rats were divided in five groups with the first group acting as the control and administered saline (5 mL/kg, p. o.) that acted as the negative control. The second group received sodium picosulfate (5 mg/kg, p.o), this served as the positive control. The third, fourth and fifth groups received 100, 200 and 400 mg/kg per of the aloe aqueous extract. The faeces production (total number of normal as well as wet faeces) in all five groups was monitored for 16h. The results concluding its laxative efficacy of formulation as shown in table no.3. Similarly the formulation jelly was estimated for its laxative activity

and showed effects as depicted in table no.4 and fig.no.4.¹⁰⁻¹²

Table 2: Effect of *Aloe-vera* extract on gastrointestinal motility in rats

Treatment	Dose	Percentage of distance (%)
Control	5mL/kg	46.48±0.22
Castor oil	2 mL/rat	96.13±0.17**
<i>Aloe-vera</i>	100mg/kg	54.46±0.16**
<i>Aloe-vera</i>	200mg/kg	73.46±0.18**
<i>Aloe-vera</i>	400mg/kg	72.36±0.18**

Values are expressed as mean ± S.E.M (n=6); **p<0.01 compared to control group

Table 3: Laxative activity of *Aloe-vera* extract in rats

Treatment	Dose	Faces output in gm. (2- 16 hrs.)
Control	5mL/kg	5.10 ± 0.10
Sodium Picosulfate	5 mg/kg	18.79 ± 0.14**
<i>Aloe-vera</i>	100mg/kg	5.09 ± 0.08
<i>Aloe-vera</i>	200mg/kg	19.24 ± 0.32**
<i>Aloe-vera</i>	400mg/kg	14.52 ± 0.30**

Values are expressed as mean ± S.E.M (n=6); **p<0.01 compared to control group

Table 4: Laxative activity of *Aloe-vera* jelly formulation in rats

Treatment	Dose	Faces output in gm. (2- 16 hrs.)
Control	5mL/kg	6.75 ± 0.63
Sodium Picosulfate	5 mg/kg	19.24 ± 0.46**
<i>Aloe Vera Jelly Formulation</i>	200mg/kg	17.25 ± 1.08**

Values are expressed as mean ± S.E.M (n=6); **p<0.01 compared to control group

Phytochemical screening

The dried alcoholic extract of jelly bar was chemically estimated by Bornstragers test for anthroquinone glycosides which confirmed that the jelly bar was rich in the anthroquinone glycosides by the presence of strong pink coloration in ammonical layer.

CONCLUSION

This formulation prepared in experiment is rich in aloin, malic acid and alantoin and hence serves as a laxative ingredient in over-the-counter drug products. This aloin chemically contains 1) nataloins, which yield picric and oxalic acids with nitric acid, and (2) barbaloins, which yield aloetic acid (C₇H₂N₃O₅), chrysammic acid (C₇H₂N₂O₆), picric and oxalic acids with nitric acid. Malic acid is added to many foods and candies to give them a more taste also a study published by a group of doctors in the "Journal of Clinical Biochemistry and Nutrition" suggested that malic acid is beneficial in lowering blood pressure (along with other acids, such as various types of vinegar). While more studies are necessary to bring about more conclusive results, it's a promising lead on a blood pressure-lowering supplement. Malic acid is used as a cleansing agent on a tooth before filling a cavity. The malic acid removes any particles of food left behind, and leaves a completely clean surface for the dentist to work on, all while being safe for to swallow in small amounts.

Malic acid is a common ingredient in chemical peels. A chemical peel is applied to the skin to burn away the first layer of dead skin, leaving smooth, fresh skin underneath. The Food and Drug Administration identifies malic acid as being an effective pain reliever for certain conditions, like the pain sustained from an ischemic reperfusion injury. Malic acid can also act as an anti-inflammatory agent, but the FDA warns that malic acid has not yet been approved for such an application.

Thus the present formulation serves the purpose of lubricants, laxatives, a cleansing agent of dentures and as a taste enhancer for various medications. The laxative effect is dose dependent as evident from the intestinal motility study on healthy fasting and fed rats. The result of gastric motility studies are depicted on fig.4.

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