Commercial Extraction of Gel from *Aloe vera* (L) Leaves

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Summary: A commercially viable process for preparing a stable and pharmacologically active crystalline substance from the fresh whole leaf meal has been developed. Dermatological testings of the product on experimental animals and volunteers have shown promising wound healing remedy for all kinds of damaged skin conditions.

Introduction:

The historians have recorded many applications of *Aloe* species, both in the medical field as well as in cosmetics.[1-6]. It is used to heal burns, to prevent blisters [7,8], for the treatment of wounds and in various kinds of damaged skin.[9-11] *Aloe* leaves were also used in the treatment of third-degree X-ray burns.[12]. The *Aloe* gel came to the attention of the United States Government when it was learned that the Japanese who were exposed to the "A" bomb and those who applied gel to their wounds were cured more rapidly than the others, many were left without any scars [13,14].

An extensive literature search has failed to locate a single study regarding the extraction of active principles from the indigenous species. In view of the therapeutic and commercial importance, the extraction of stable and medicinally active crystalline compound has been carried out. The process developed is simple and economically feasible.

Results and Discussion:

Aloe vera gel prepared was off-white practically odourless and almost tasteless hydrocolloid. The gel consisted of polysaccharides, together with small amounts of saponins and minerals.

Product specifications:

Consistency.	Powder
Color.	Off-white
Odor.	Odorless
Taste.	tasteless
Solubility	dissolves slowly in water forming a viscous colloidal solution.
	Insoluble in methanol, chloroform, acetone, ether and other organic solvents.
Aloe leaf fibres.	None
P^H (0.5% solution).	6-7.5
Acid insoluble ash.	Max. 0.05%
Water insoluble ash.	Max. 0.05 - 0.1%
Dispersion rate.	Max. 60 mins.

The raw gel extracted from the leaves is vulnerable to degradation. As the decomposition progresses, it becomes watery, yellowish-brown and finally loses protective and healing properties. Therefore, the natural gel for commercial uses must be sufficiently purified and stablised. Thus, the powdered gel obtained is free flowing and stable to microbial degradation. It can be stored for longer period of time without decomposition or co-polymerization. It is also compatible with most cosmetic ingredients at pH between 6-8 [15]. Because of its stability to microbial degradation no preservative is required. However, once it is solubilized in water, it is quite susceptible to microbial attacks and preservative must be added.

The isolation of polysaccharide and other active principles from the different species of *Aloe* was often been carried out with multistage extractions and purification of product by different chromatographic techniques [16-19]. Normally the elution and purification of polysaccharide fraction was carried out by a sepharose 6B and diethylamino ethyl cellulose columns [20]. The extraction procedures are laborious and not feasible economically. The methods, however could not be used for commercial extraction. Whereas, the present method of extraction and purification of gel is

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simple, efficient and economically feasible. The isolated compound has characteristics identical to those reported in the literature [21-23]. The findings of the present wound healing studies of 1% ointment has demonstrated very promising results of the drug. It appears to stimulate a rapid granulation and formation of new tissue, when applied to skin injuries, minor wounds and damaged skin. Therefore, it is concluded that *Aloe* gel appears to relieve pain, burning and itching sensations, to stimulate a rapid granulation and formation of new tissue. The beneficial properties of the product permits its uses in all kinds of cosmetics, creams and lotions. The process developed to isolate the stable compound from indigenous species is simple extraction procedure

Experimental

Experimental cultivation of *Aloe vera* (L) in the farms of Peshawar laboratories has been carried out. Fresh leaves of Aloe vera(L)were collected in April. Standard gel (Reparil) was purchased from the local market. .Infrared spectra were obtained from KBr discs, using a Pye Unicam SP3-100 Spectrophotometer. Melting point was determined using Griffin electrothermal apparatus, which was uncorrected. The animals used were albino rats, bred at the animals house PCSIR, Peshawar. They were kept in cages and pelleted diet was provided to them alongwith free access to water.

Fresh leaves were peeled and pulp (4.3 kg) collected and homogenised by grinding and mixing with small increments of distilled water (4.5 lit) containing 11.1 gm of tannic acid.. The mixture was heated to 30°C for two hours.and the slurry obtained was centrifuged. The supernatant liquid was decanted, filtered and solvent removed under reduced pressure at 50-55°C.The. residue was dried,pulverised and dissolved in 200 ml anhydrous ethanol. The resultant turbid solution was filtered and the clear extract concentrated and dried under reduced.pressure. The dried product was suspended in 35 ml methanol and the solution allowed to stand for crystallising out the product.. The final product was dried at 60-70 °C to yield an off-white powdered compound (7.9 gm).

Pharmacological Studies:

Local/topical applications:

Albino rats of either sex, weighing 180-250 gm were used for dermatological work. Before treatment an area of 2x2 cm over the back of each animal was clipped. The test material(1 g) was dispersed in petrolatum to obtain (1%, w/w) ointment.The animals were divided into three groups, each group consisted of six animals. Minor cuts of approximately equal intensity were applied to the shaved backs of all the animals. Treatment was attempted by an open epicutaneous application and was performed for three days. Test animals were treated with 1% ointment, control group animal received petrolatum and positive control group painted with Reparil gel,. After the termination of the treatment regimen, visual assessment of the exposed skin was made for a period of 10 days.

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