International Journal of Pharmaceutical Development & Technology

www.ijpdt.com

e ISSN - 2248 - 910X

Print ISSN - 2248 - 9096

FORMULATION OF TOOTH GEL FROM ALOE VERA AND ITS EVALUATION

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ABSTRACT

The aim of current research to formulate tooth gel utilizing leaf extract of Aloe Vera.The magical properties of Aloe Vera have been known to worldwide since time immemorial .It has inherent properties which help in enhancing health and wellbeing of an individual in most natural way possible .Its medicinal properties like antiviral ,antibacterial and wound healing capacity has led to curiosity of using Aloe Vera in treatment of various dental problems .Tooth gel from the Aloe Vera leaf extract in various concentrations are prepared (0%,5%,7.5%,10%,15%).The formulated Aloe Vera tooth gel evaluated by several physical parameters. From the evaluation ,the tooth gel of appropriate concentration of Aloe Vera leaf extract are identified .The outcome from this research evidently signified that the natural plant Aloe Vera using to formulate tooth gel may be a new approach to formulate tooth gel economically and minimum side effect.

Keywords: Tooth Gel; Aloe Vera; Foamability; Homogeneity; Spreadability.

INTRODUCTION

Aloe Vera is known as a miracle plant .It is used in Ayurveda, Homeopathic, Allopathic streams of medicine. The true Aloe Vera is derived from word 'alloeh' meaning 'shinning bitter substance' in Arabic, while Vera means 'true' in Latin. The plant is native to southern and eastern Africa .The plant is commercially cultivated in Aruba, Bonarie, Haiti, India, South Africa [1, 2].

It is an evergreen perennial succulent having plant fleshy sword-shaped leaves growing up to 1m in height. Leaves are green, tightly packed ,thorny edges, and are radially arranged in 2 or 3 circles .Bright yellow tubular flowers appear in a spike .The oldest and largest leaves are at the base, with the leaves in the center of the rosette formation being younger and smaller . Mature leaves can be 2 to 2.5cm thick and 6 to 10cm wide at the base, gradually tapering to a point at the apex. Aloe Vera leaf is formed by thick epidermis covered with cuticle surrounding the mesophyll, which can be differentiated into chlorenchyma cells and thinner walled cells forming the parenchyma. Parenchyma cells contain a transparent mucilaginous jelly which is referred as agel [4, 5].

Gels are semisolid preparation intended for application on skin or accessible mucus membrane like oral cavity. Gels are composed of 2 interpenetrating system where colloidal particles, also known as gelater or gellant are uniformly distributed throughout a dispersion medium or solvent forming a 3D matrix known as gel. Gela are prepared by adding a gelling agent which would be natural synthetic or semisynthetic polymer or LMV small molecules, into organic or inorganic or aqueous solvent or solvent system. Polymer in gel acts as backbone of gel matrix. It primarily consist of water and polysaccharide (pectins, cellulose, hemi cellulose and acetylated galactoglumannan called acemannan) Acemannan is main functional component of gel[6, 7].

Dental disease is to be a major health problem throughout the world .It may be acute or chronic and treatment is long term required. The efficient use of anti-bacterial agents for the treatment of various dental problems requires a sufficient drug concentration at the site of action without unwanted effect. There are various advantages. It may include, directly at sites of periodontal surgery, Used on traumatized gum tissues. Trauma may be due to toothbrush abrasion, sharp foods, and dental floss or tooth pick injuries. Prevent bad breath. Aloe Vera naturally possesses antifungal, antibacterial properties. It not only

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protects sensitive tissue of mouth but also kills bacteria &fights tooth decay. The synthetic antibacterial agent shows problem of drug resistance and other side effect. In pharmaceutical world gel is the most convenient and patient friendly dosage form [8-12].

The gel is formulated by drug incorporating in semi rigid structure of polymer and gel are sticky, easily spreadable with good esthetic value. The objective of this research is to formulate the tooth gel from *Aloe Vera* leaf extract of different concentration and identify the ideal concentration by various evaluation methods. The objective is to extract the gel from *Aloe vera*leaf. And also to formulate the tooth gel of different concentration of *Aloe vera* gel. Another objective is to identify the most appropriate concentration of *Aloe vera* gel for the tooth gel preparations by various evaluationmethods and to overcome the problem of synthetic tooth gel by replacing with natural ingredients.

Materials and Methodology

Carbopol-940, sodium carboxy methyl cellulose, poly ethylene glycol-4000, triethanol amine, sodiumsaccharine, sodium benzoate purchased from Himedia Pvt. Ltd., Mumbai.

Collection and extraction

The fresh leaves of *Aloe Vera* were collected from the plant, washed in running tap water for 15 min then it was rinsed with sterile distilled water. Then the leaves were dissected longitudinally and the colourless parenchymatous tissue that is the *Aloe Vera* gel was scraped out using sterile knife ,thick epidermis was selectively remove and gel like pulp separated with spoon ,minced and homogenized in mixer [4-8].

Formulation of *Aloe vera* tooth gel

Carbopol 940 and sodium CMC were dispersed in 50 ml of distilled water with continuous stirring .5 ml of distilled water was mixed with required quantity of sodium benzoate then heated on water bath to dissolve properly. solution was cooled and polyethylene glycol 4000 was added and mixed with first solution .then required quantity of *Aloe Vera* leaves extract was mixed to above mixture and volume was make up using remaining distilled water .then add sodium lauryl sulphate and sodium saccharin to the carbapol 940 gel in proper manner with continuous stirring and tri ethanol amine was added drop wise to the formulation .thus the gel is obtained in required consistency. Duration of formulation trial phase various problems like homogeneity, spreadability and viscosity occurs .to overcome it, the concentration of carbapol and sodium CMC were increased and decreased. Thus various formulations of *Aloe Vera* tooth gel were prepared.it may contain several concentrations of *Aloe Vera* leaves extract that is 0%, 5%, 7.5%, 10%, and 15%.From the above 5 preparation most suitable preparation were identified and selected by evaluation methods [8-13].

Evaluation of formulated toothgel

Physical appearance:

1. Colour: Formulated tooth gel was evaluated for its colour. The visually colour was checked.
2. Odour: Odour was found by smelling the product.
3. Taste: Taste was checked manually by tasting the formulation.
4. Smoothness: The smoothness was tested by rubbing the gel formulation between the fingers [8,9].
5. Determination of sharp and edge abrasive particles

Extrude the content 15-20 cm long on the butter paper. Press with the contents of the entire length with fingertip for the presence of sharp and hard edged abrasive particles.

Foamability

The foam ability of formulated tooth gel evaluated by taking small amount of formulation with water in measuring cylinder initial volume was noted and then shaken for 10 times. Final volume of foam was noted [10-12].

Determination of pH

pH of the formulated gel was determined by using pH meter. In this method, 1g gel was dispersed in 100 ml purified water. The electrode was washed with double distilled water, dried by tissue paper and calibrated before use withstandard buffer solution at 4.0 & 7.0. The pH measurements were done in triplicate and average values were calculated [13-5].

Homogeneity

All developed gel formulations were tested for homogeneity by visual inspection after the gels have been set in to the container. They were tested for their presence and appearance of any aggregates. Homogeneity of gel formulation was reported [16-17].

Spreadability

One of the criteria for a topical formulation to meet the ideal qualities is that it should possess good spreadability. It is the term expressed to denote the extent of area to which formulation readily spreads on application to skin or affected part. The therapeutic efficacy of a formulation also depends upon its spreading value. To determine the spreadability of formulation, 0.5gm of gel was placed within a circle of 1cm diameter pre marked on a glass plate, over which a second glass plate was placed. A weight of 500g was allowed to rest on the upper glass plate for 5min. The increase in the diameter due to gel spreading was noted [18-19].

Antimicrobial activity

The in vitro anti-bacterial study of formulated tooth gel was performed by disc diffusion method. *Staphylococcus aureus* was initially cultured in nutrient

broth and incubated at 37ºC for 24 hr. The formulated tooth gel containing discs were placed over the bacterial plates and incubated at 37 C for 24h, comparing penicillin as the positive control. The diameter of zone of inhibition was measured in millimeters [15-18].

Transparency

Approximately 5ml of formulated gel was taken in the 10 ml test tube and its transparency was checked visually [16-19].

RESULTS AND DISCUSSION

The tooth gel of various concentrations of Aloe Vera leaf extract was formulated and named as F1 (0%), F2 (5%), F3 (7.5%), F4 (10%) and F5 (15%). All the formulations were then evaluated. From the evaluated result the best formulation was identified. All the other batches were discarded and makes one final batch.

Table 1. Composition of Aloe Vera tooth gel

Ingredient	Quantity
Carbapol-940(g)	1.5
Sodium CMC(g)	1
Sodium saccharin (g)	0.5
Sodium lauryl sulphate (g)	2
Poly ethylene glycol-400(ml)	2
Sodium benzoate (g)	0.5
Tri ethanol amine(ml)	q.s
Distilled water(ml)	q.s
Aloe vera	q.s

Table 2. Physicalappearanceof Aloe vera tooth gel

Parameters	F1	F2	F3	F4	F5
Colour	White	white	white	white	white
Odour	Characteristic				
Taste	Sweet	sweet	sweet	sweet	sweet
Smoothness	smooth	smooth	smooth	smooth	smooth

Table 3: Determination of sharp and edge abrasiveparticles

Formulations	Result
F1	Absence of sharp particles and goodabrasive
F2	Absence of sharp particles and goodabrasive
F3	Absence of sharp particles and goodabrasive
F4	Absence of sharp particles and goodabrasive
F5	Absence of sharp particles and goodabrasive

Table 4: Characteristic of Aloe vera tooth gel

Formulations	Foamability (ml)	pH	Homogeneity	Spreadability (cm)	Transparency	Zone of Inhibition (cm)
F1	12	6.12	Good	0.7	Translucent	0.2
F2	17	6.10	Good	1.9	Translucent	0.6
F3	25	6.12	Good	2.6	Translucent	1.6
F4	19	6.17	Good	2.1	Translucent	0.8
F5	20	6.14	Good	2.3	Translucent	1.3

Figure 1: Collection and Extraction of Aloe vera gel

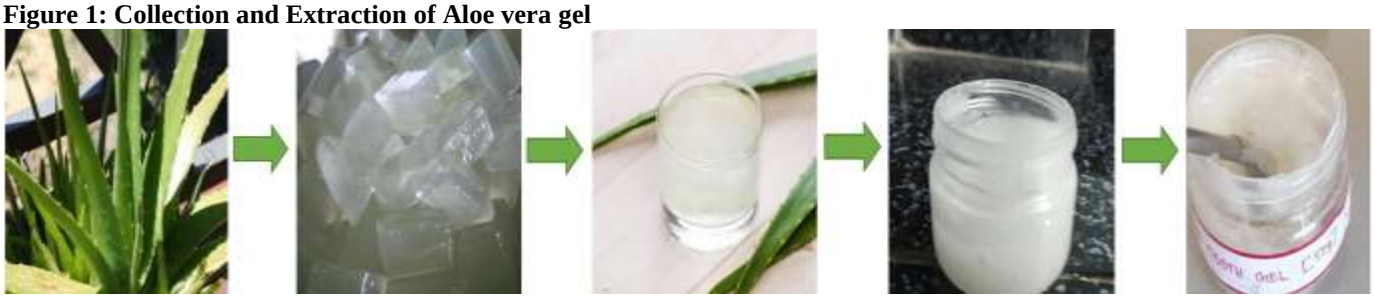

Figure 2: Aloe vera tooth gel (A) Foamability; (B) Variation of foam ability in formulation; (C) Homogeneity; (D & E) Spreadability

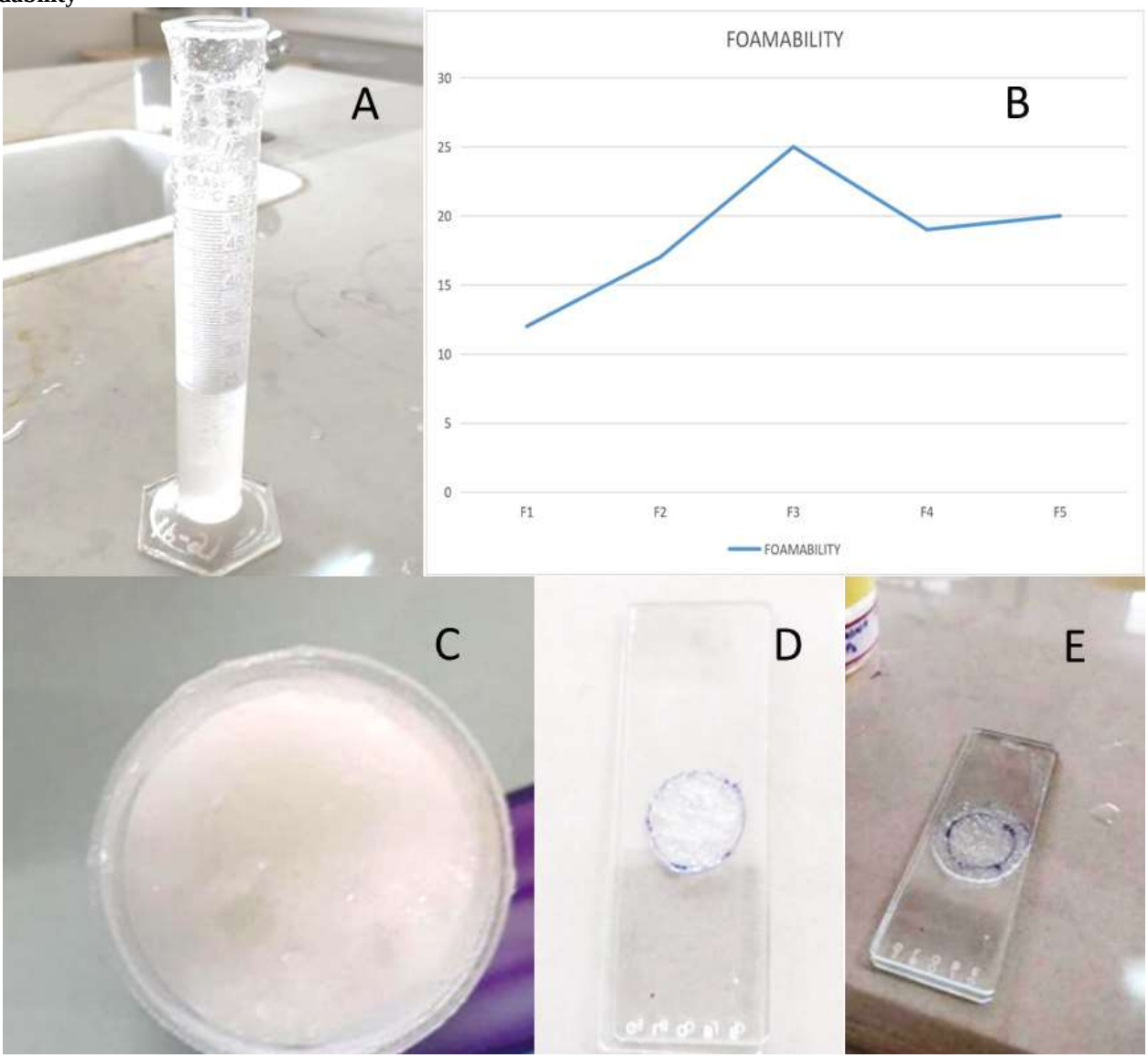

Figure 3: Anti-microbial activity showing Zone of inhibition of Aloevera tooth gel

CONCLUSION

The tooth gel prepared from Aloe Vera leaves extract as natural ingredient and small amount of synthetic agents. At the formulation trial process various concentrations of Aloe Vera leaf extract were taken (0%, 5.0%, 7.5%, 10.0%, and 15.0%) and tooth gel was formulated. All these formulations are evaluated by various parameters and thus appropriate concentration of Aloe Vera leaf extract is identified. The formulated Aloe Vera tooth gel was white in colour with characteristic odour and sweet taste. It is smooth, translucent in appearance also shows goodhomogeneity, abrasiveness, foam ability and also free from microbial growth & lumbs. Thus the best concentration of Aloe Vera leaf extract was found to be 7.5%.

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