



## Formulation and evaluation of *Aloe vera* gels

Rashmi Tambe\*, Maushumi Kulkarni<sup>1</sup>, Aney Joice<sup>1</sup>, Imran Gilani<sup>1</sup>

\*Department of Pharmacognosy,<sup>1</sup>Department of Pharmaceutics, M.C.E Society's Allana College of Pharmacy, Azam Campus, Camp, Pune 1.M.H. India

Received on: 26-05-2009; Accepted on: 17-08-2009

### ABSTRACT

The *Aloe vera* plant is popular and well known for its medicinal uses across the world. The most popularly known species of *Aloe vera* which is grown world wide is *Aloe barbadensis* Miller. Gel derived from *Aloe vera* is mucilaginous exudate obtained from centre (parenchyma) of the plant leaf. The *Aloe vera* extract is used for many years as a natural herbal and safe remedy in various skin problems. Several marketed preparations in the form of gels and lotions containing *Aloe vera* are available. The present study is an attempt to formulate gel formulations of *Aloe vera* using synthetic polymers like Carbopol 934NF, HPMC and PVP36000. These formulations were prepared in concentrations of 1, 2 and 3% of respective polymers. These gels were further subjected to evaluation of properties like colour, clarity, pH, consistency, and viscosity measurements. Comparison of the results was done in an attempt to find an optimized *Aloe vera* gel formulation.

**Keywords:** *Aloe vera* gel, polymers, formulation, evaluation.

### INTRODUCTION

*Aloe vera* is known as a miracle plant which is the derivative of nature and contains excellent therapeutic value and more than nutritional element. The most popularly known species of *Aloe vera* which is grown world wide is *Aloe barbadensis* Miller (1). *Aloe vera* gel is derived from inside of aloe leaf. It is the mucilaginous gel produced from centre (parenchyma) of the plant leaf. It is the preparation which is called pure "*Aloe vera* gel" in commerce (2). Many countries such as India, China, Rome, Greece, Egypt are using *Aloe vera* extract from many years as a natural herbal and safe remedy for various purposes like to treat skin problems, for beautify regimes, to heal internal and external ailments and to heal wounds. Aloe gel is reported to contain glycoproteins, polysaccharides and other constituents (enzymes etc) and are essentially used for the treatment of various skin conditions (burns, abrasions, bruises, cuts, psoriasis, herpes simplex). Therefore it is incorporated in ointments and lotions and other preparations for external preparations.

Lotions and gels made from *Aloe vera* have become very popular in the market and used as ayurvedic medicines and cosmetics. The gel of *Aloe vera* contains about 75 nutrients and to be proved a good remedy (3).

Polymers are large class of materials consisting of many small molecules can be linked together to form long chains. Humans have taken advantage of versatility of polymers in the form of gums, oils, resins, tar etc. Polymers like Carbopol, HPMC, PVP etc. can be

used to produce thick formulations such as medium to high viscosity gels, emulsions, suspensions. They have excellent properties like film forming, water keeping ability, membranous ability, felting ability and stabilizing property(8). The aim of present study is the formulation of *Aloe vera* gel with different ratio of polymers and their evaluation for different parameters like colour, clarity, consistency, spreadability, and viscosity

### MATERIALS AND METHODS:

*Aloe vera* leaves were collected from Pharmacognosy garden of Allana College of Pharmacy, Azam campus, Pune. The gel is prepared by peeling the outer portion of skin and pericarp. Carbopol 934NF, HPMC k15, PVP36000 purchased from Loba Chemie, Mumbai. Formulation of *Aloe vera* gel:

The formulation of *Aloe vera* gel with different concentrations (1%, 2%, and 3%) of Carbopol 934NF, HPMCK15, PVP36000 were prepared. The volume of plain *Aloe vera* juice was kept 25 ml. in each formulation. Mechanical stirrer was used for the formulation of gel with different polymers. Evaluation: All formulations were evaluated physically for colour, odour, consistency, clarity, pH, spreadability and viscosity. Table 1-7 represent observations for different parameters. Colour, odour, consistency, and clarity were visually observed. pH was measured using a pH meter. Viscosity was determined by Brookfield Viscometer (Model CAP 2000+2). Graph and histogram were plotted between % concentration of polymers and viscosity in poise.

### RESULT AND DISCUSSION:

The gels with different concentrations showed different colour range from light green to dark green. Odour was characteristic with all polymers. Consistency was slightly thick with Carbopol 934

---

#### \*Corresponding author.

Tel.: + 91-09922964713

Telefax: +91-020- 26442074

E-mail: [rashmicloud9@rediffmail.com](mailto:rashmicloud9@rediffmail.com),

[aneyjoice2004@yahoo.com](mailto:aneyjoice2004@yahoo.com)

**Table I: Colour of Aloe vera gel formulations**

Preparation	Concentration		
	1%	2%	3%
Aloe vera (plain)	Greenish	-----	-----
Aloe vera with carbopol 934	Slightly green	Slightly green	Light green
Aloe vera with HPMC	Greenish	Greenish	Greenish
Aloe vera with PVA	Greenish	Greenish	Greenish

**Table II: Odour of Aloe vera gel formulations**

Preparation	Concentration		
	1%	2%	3%
Aloe vera (plain)	characteristic	-----	-----
Aloe vera with carbopol 934	Characteristic	Characteristic	Light
Aloe vera with HPMC	Characteristic	Light	Negligible
Aloe vera with PVA	characteristic	Characteristic	Characteristic

**Table III: Consistency of Aloe vera gel formulations**

Preparation	Concentration		
	1%	2%	3%
Aloe vera (plain)	Thin	-----	-----
Aloe vera with carbopol 934	Slightly thick	Thick	Thickest
Aloe vera with HPMC	Medium	Slightly thick	Thickest
Aloe vera with PVA	Thin	Medium	thick

**Table IV: Clarity of Aloe vera gel formulations**

Preparation	Concentration		
	1%	2%	3%
Aloe vera (plain)	Turbid	-----	-----
Aloe vera with carbopol 934	Turbid	Turbid	Turbid
Aloe vera with HPMC	Turbid	Turbid	Turbid
Aloe vera with PVA	Turbid	Turbid	Turbid

**Table V: Spreadability of Aloe vera gel formulations**

Preparations	Concentration		
	1%	2%	3%
Aloe vera (plain)	Poor	-----	-----
Aloe vera with carbopol 934	Good	Best	Best
Aloe vera with HPMC	Poor	Good	Best
Aloe vera with PVA	Poor	Poor	Poor

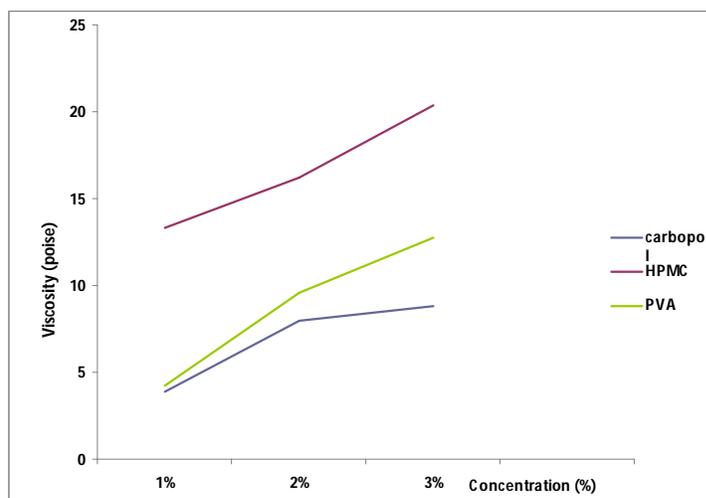
**Table VI: pH of Aloe vera gel formulations**

Preparations	Concentration		
	1%	2%	3%
Aloe vera (plain)	6 - 7	-----	-----
Aloe vera with carbopol 934	3 - 4	3 - 4	3 - 4
Aloe vera with HPMC	6	7	7
Aloe vera with PVA	4 - 5	4 - 5	4 - 5

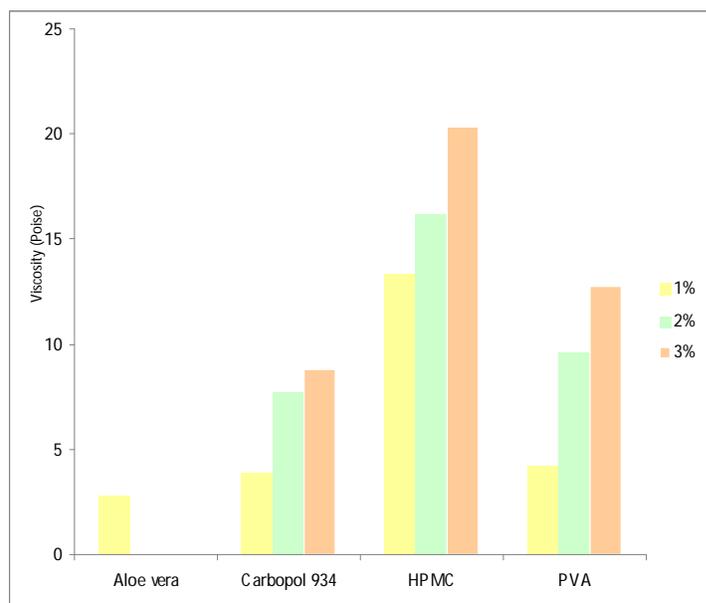
**Table VII: Viscosity of Aloe vera gel formulations**

Preparation	Viscosity (poise)	Speed (rpm)	%FSR	Shear stress	Stress rate	Temp (°C)
Aloe vera (plain)	2.781	60	8.9	2224.77	799.99	25
Aloe vera with carbopol 934 (1%)	3.875	60	12.4	3099.96	799.99	25
Aloe vera with carbopol 934 (2%)	7.968	60	12.3	-----	799.99	25
Aloe vera with carbopol 934 (3%)	8.812	60	28.2	7049.5	799.99	25
Aloe vera with HPMC (1%)	13.343	60	42.7	10674.27	799.99	25
Aloe vera with HPMC (2%)	16.187	60	51.8	12949.44	799.99	25
Aloe vera with HPMC (3%)	20.343	60	65.1	16274.20	-----	-----
Aloe vera with PVA (1%)	4.219	60	7.1	1774.38	799.99	25
Aloe vera with PVA (2%)	9.562	60	30.6	7649.5	799.99	25
Aloe vera with PVA (3%)	12.750	60	40.8	10199.87	799.99	25

**Fig. 1: Viscosity v/s Concentration**



**Fig. 2: Viscosity v/s polymers**



and was thickest with HPMC, while with PVP it was thin and medium. All formulations were turbid. Spreadability was observed best in *Aloe vera* with HPMC 3%, while in others it was good and poor. pH values were obtained as pH6, pH4, pH5 and pH7 for plain aloe vera gel, carbopol, PVP, and HPMC respectively. Study of plotted graph and histogram revealed that gels made with Carbopol 934 in the concentrations of 1%, 2%, and 3% had very low viscosity (Fig.1.). Gels made with PVP in the concentrations of 1%, 2%, 3% had intermediate viscosity (Fig.2.). While the gels made with HPMC were highly viscous formulations. 1%, 2%, and 3% HPMC gels showed mucilaginous consistency and high viscosity amongst all formulated gels which is suitable for application on the skin. Based on the physical evaluations, formulation with HPMC 3% exhibited good physical properties and was found to be best choice for preparing gels of aloe vera among the formulation studied.

#### REFERENCES:

1. "History of *Aloe vera*" "History of Biomedicine-Indigenous Cultures Karolinska Institute. Retrieved re
2. Tyler, Varro, Brady; Pharmacognosy; 9<sup>th</sup> Edition; Philadelphia, Lea and Febiger; 1988; 62-64.
3. Leung AY, Foster S. ; Encyclopaedia of Common Natural Ingredients used in Food, Drugs and Cosmetics; 2<sup>nd</sup> Edition; John Wiley & Sons; 1996; 25-28
4. Bruneton J.; "Pharmacognosy, Phytochemistry of Medicinal Plants"; 2<sup>nd</sup> Edition; Lavoisier Publishing, Paris; 1993; 363-364
5. Lee C, Mo Y, et al. Prevention of Ultraviolet radiation-induced suppression of accessory cell function of Langerhans cells by aloe vera gel components. Immunopharmacology; 1997; 37; 2-3.
6. W.D. Callister; Jr Material Science and Engineering: An Introduction; 5<sup>th</sup> Edition; Wiley; 2000.
7. WHO Monographs on selected medicinal plants, vol I Aids Publishers, India, 46-47, 1<sup>st</sup> ed, 2005.
8. Udupa S.I., Udupa A.L., Kulakrni D.R. Anti-inflammatory and wound healing properties of *Aloe vera*, *Fitotherapia*, 1994, 65: 141-145.
9. Manuchair Ebadi, Pharmacodynamic Basis of Herbal Medicine, Crc press, Washington D.C, 167.

Source of support: Nil, Conflict of interest: None Declared