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FORMULATION AND EVALUATION OF HERBAL HYDRO GEL FROM *TECOMA STANS*

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ABSTRACT
Novel drug delivery systems generally approach with the formulations, techniques, technologies and related systems for transporting the specific active ingredients to the systemic circulation. In this context a technique was employed for the formulation of herbal gel by using *Tecoma-stans* is a species of flowering perennial shrub in the trumpet vine family, Bignoniaceae that is native to the Americas. It is also called as Common yellow elder. It mainly contains active constituents like steroids, flavonoids, tannins, reducing sugar, mucilages, riboflavin, niacin and ascorbic acid. It is mainly used as antifertility, abortifacient, antiestrogenic, analgesic, anti-inflammatory, diuretics, vermifuge, tonic and hepatoprotective. Various formulations were prepared with different concentrations of the plant extract and it was evaluated for physical parameters, viscosity, skin irritation and spreadibility. Out of the three formulations the 20% was found to be better in all aspects. Thus it can be used as an alternative for the treatments and drug delivery systems.

KEYWORDS: Plant extract, Formulation, Evaluation.

INTRODUCTION
Transdermal drug delivery system is an electro-osmotic delivery system which helps in passing a drug from the systemic circulation to various part of body. It includes a semi-dry drug patch containing a water solute with the drug and selected level of current delivered to the semi dry patch. A multi-laminate transdemal drug delivery system contains only drug in the drug reservoir which comprises a backing layer, reservoir layer which is dissolved completely (Ansel et al 2011). It is a device which provides an alternative route of administering the medication which allows pharmaceuticals to be delivered across the barriers (Vennat et al 1995). They are classified as Membrane permeation-controlled system, adhesive dispersion type and micro reservoir dissolution controlled systems. Transdermal formulations are liquid preparation, Gels, Powder, ointment, creams, pastes, aerosols (Chein et al 2009). Thus the most convenient type was taken up for the research which can provide better results in terms of experiments. Gel is a solid, jelly like material that posses the properties ranging from soft and weak to hard and tough. Gel is defined as a substantially dilute cross linked system which exhibits no flow when in steady state. There are various type of gel which are classified as Hydro gel are also known as aqua gel (Jain et al 2011). It forms a network of polymer chains which are hydrophilic, and sometimes forms as a colloidal in which water is used as dispersion medium. It posses various uses like: acts as scaffolds in tissue engineering to repair tissue and also as a sustain release drug delivery system. The major advantages of using hydro gels is that they are used as simple encapsulation of cells or drugs in homogenous material. It has been observed that hydro gels are more complex, smart polymers with different types of ligands and cross linked which allows for higher regulation of structure and which reacts different to the bio responsive functionalities. They also help in the preparation of DNA vaccines which can treat the genetic disorders. Organo gels they are noncrystalline, non-glassy thermo-reversible (thermoplastic) solid material composed of a liquid organic phase entrapped in a 3-D cross network. The liquid can be in any form as organic solvent, material oil or vegetable oil. These are used in pharmaceutical products, cosmetic preparations, art conservation and in health food additives. The major advantages of organo gels are they form semisolid on standing of the preparations and also posses molecular electronics. But they also follow disadvantages like recovery is difficult which leads to improper purification of proteins. The next type is Xero gels (Olney et al 1990). They are solid preparations which are generally dried or unhindered shrinkage. They usually retain high porosity (25 %) and enormous surface (150-900 m^2/g) along with very small pore size (1-10nm). Thus a novel approach was undertaken for the making of hydro gel

understanding its advantages with herbal drug. The plant taken up for the research was Tecoma-stans. Out of 160 species, about 40 occur in India (Baljinder et al 2010).

MATERIALS AND METHOD

Preparation of Tecoma-stans extract: The plant was collected from the wild sources of Greater Noida. It was dried, powdered and extracted with solvents as per their polarity. For experimental work, hydro alcoholic extracts were prepared by maceration method. 500 g of the drug were weighed and separately it was mixed with water and alcohol in the ratio of 50:50. The whole process was kept in dark conditions for seven days with frequent shaking every 2 hours. After seven days the extract was filtered and the filtrate was concentrated by distilling of the solvent till one third. After that the extract was concentrated over water bath at a temperature not exceeding 60^{o}C. The extract was further dried over desicator for overnight and was used further for the experiments. The Hydroalcoholic extract (170 gm) were weighed respectively.

Table 1: Formulation for gel preparation

Ingredients	Quantity Specified
Carbopol-934	1gm
Methyl Paraben (0.5%)	Quantity Sufficient
Propyl Paraben (0.2%)	Quantity Sufficient
Propylene glycol-400	Quantity Sufficient
Triethanolamine (Quantity Sufficient)	1.2ml
Distilled water	Make up the volume to 100ml

Preparation of Gel

1 g of carbopol-934 was dispersed in 50 ml of distilled water with continuous stirring. 2 ml of distilled water was mixed with methyl paraben and propyl paraben. They were dissolved on a water bath with continuous stirring. The solution was cooled and propylene glycol 400 was added gradually to form a homogenous mass. Further hydro-alcoholic extract of *Tecoma-stans* (100 mg) was mixed to the above mixture and volume was made up to 100 ml by adding remaining part of distilled water. All the ingredients were mixed properly with carbopol 934 to form a smooth gel. Finally triethanolamine was added drop wise to the formulation for the adjustment of required pH of about 6.8-7, to form a gel of required consistency. Further different formulations were prepared with various percentages (10, 20 and 30%) of herbal extract.

Evaluation of Gel: The prepared gel was evaluated on the basis of following parameters like: Physical evaluation, measurement of pH, spreadibility, viscosity, skin irritation, extrudability etc.

1- **Physical evaluation -** Physical parameters such as color and appearance will be checked.
2- **Measurement of pH** – pH of gel was measured with the help of pH meter.
3- **Spreadibility** – Spreadibility was determined by the apparatus which consist of wooden block, which was provided by the pulley at one end. By this method spreadibility was measured on the basis of slip and gel characteristics of gel. An excess of gel (2 gm) was placed on the on glass slide. The gel was then sandwiched between this glass slide and another glass slide having the dimensions of fixed ground slide and provided with the hook. A 1 gm weighted was placed on the top of the two slides for 5mins to expel air and to provide the uniform film of the gel between two slides. Excess of gel was scrapped off from the edges. The top plate was then subjected to the pull of 80gms. With the help of string attached to the hook and time in seconds required by the top slides to cover a distance of 7.5cm can be noted. A shorter interval indicates better spreadibility.

S = M*L/T

Where,

S= Spreadibility, M= Weight of pen tied to the upper slide, T= Time taken (sec) to separated slides completely from each other.

4- **Viscosity-** Viscosity of gel was measured by using Brookfield viscometer with spindle no. S 64.
5- **Skin irritation test -** Gel formulation prepared was applied to the skin and it was tested for the irritation or allergic reactions.
6- **Extrudabilty-** The gel formulation were filled in standard capped collapsible aluminium tubes and sealed by crimping to the end. The weight of tubes were recorded and the tubes were placed between two glass slides and were clamped. 500gm was placed over the slides and then the cap was removed. The amount of extruded gel was collected and weighed. The percent of extruded gel was calculated as

- When it is greater than 90% then extrudability is excellent.
- When it is greater than 80% then extrudability is good.
- When it is 70% then extrudability is fair.

RESULTS AND DISCUSSION

The physical parameters of formulation were compared on the basis of viscosity, color, appearance, pH, spreadibility, skin irritation and exturdability. These tests were performed and their observations are listed in Table1 and Table2.

Table 2: Evaluation of gel

S.No.	Parameters	Results		
		10%	**20%**	**30%**
1.	Colour	Creamy white	Pale cream	Light green
2.	Appearnce	Clear	Clear and transparent	Turbidity
3.	pH	6.8	7.0	7.1
4.	Spreadibility	Non uniform	Good	Good
5.	Skin irritation	No reaction	Non uniform	Reactant
6.	Extrudability	Good	Excellent	Fair
7.	Viscosity	Excellent	Excellent	Good

Table 3: Viscosity Measurement table of 20% Herbal Gel

RPM	Spindle No.	Viscosity	Torque value (in %)
10	564	46020	72.2
20	564	23880	79.2
30	564	17080	85.4

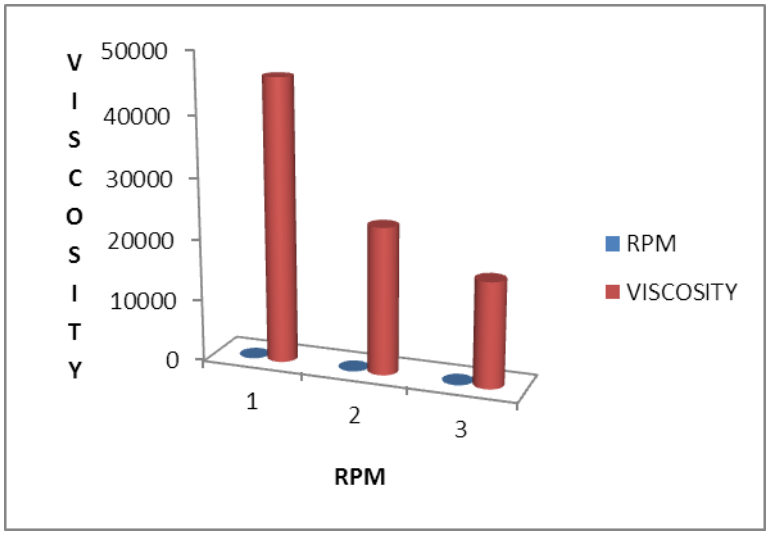

Fig. 1: Viscosity chart of 20% prepared hydrogel of *Tecoma-stans*

CONCLUSION

Out of the three formulations which were prepared, 20% was found to be more effective in terms of physical, viscosity, spreadibility etc. parameters. It was inferred from the results that the formulations which was prepared by gel in co-operation were found to be good in appearance as no sedimentation was observed. It was a clear, transparent preparation with a uniform homogenous mass as no lump formation was observed. The viscosity and spreadibility was found to be as per the limits prescribed by standard pharmacopoeias. Thus these preparations by use of herbal drugs leads to less expensive over the commercial available product. When it was compared with other two formulations (10 and 30%) few parameters like pH, viscosity were not so significant. Thus it can be conferred that there is a growing demand for herbal cosmetics in the world market and they are invaluable gift of nature. Herbal medications are considered safer than allopathic medicines as allopathic medicines are associated with the side effects. One of the method for its survival is preparation of extract and their formulations for better absorption and penetration of the active moiety into the systemic circulation.

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