ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

A Perspective Overview On Topical Herbal Gels.

S Vanitha Sagar, Katta Manogna*, and B Jyothi.

St. Pauls College of Pharmacy, Turkayamjal, Sagar Road, R.R. Dist, Telangana, India.

ABSTRACT

Herbal formulations have been used to alleviate many chronic diseases since antiquity, ascribing to their diverse pharmacological activity shown by various parts of plants. These days there are many herbal dosage forms available in the form of tablets, capsules, ointments, syrups, gels, creams, etc.,. Numerous semisolid dosage forms are also used for various dermatological problems like burns, acne, warts, psoriasis and some bacterial and fungal infections. Topical herbal gels are transparent or translucent semisolid dosage forms which consist of one or more herbs in defined quantities to produce specific therapeutic effect. These gels are applied to skin, rectus, vagina etc., In this modern century, herbal products are gaining huge popularity by leaps and bounds worldwide as synthetic drugs have constraint of adverse effects. There by, it is pre requisite to develop more herbal formulations with enhanced product quality and shelf life to congregate the necessity and demand globally. Hence, this review is centered to elucidate about detailed characteristics, preparation methodologies and evaluation parameters of herbal gels which might enlighten researchers to utilize this knowledge for developing herbal gel dosage forms.

Keywords: Herbal products, Topical herbal gel, Shelf life, Dermatological problems.

https://doi.org/10.33887/rjpbcs/2020.11.6.14

Corresponding author

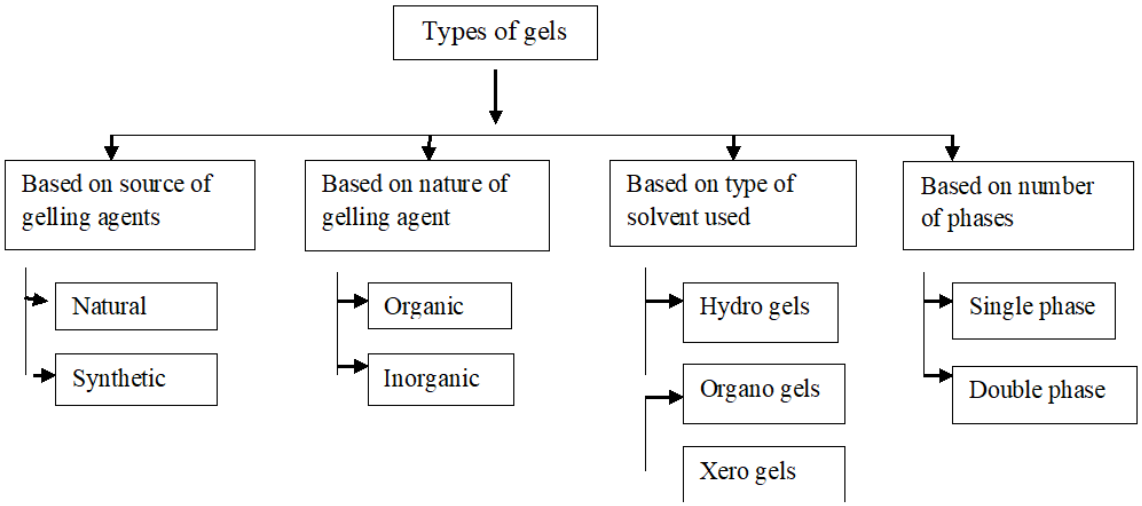
ISSN: 0975-8585

INTRODUCTION

Herbal medicines are even now the backbone of developing countries about 75-80% of the world's population, for primary health care because of better compatibility with human body and lesser side effects. Herbal plants are which comprises medicinal properties in its part to treat injuries, disease or illnesses and ailments or to promote health. It is a drug or preparation made from a plant or plants and used for any to such purpose. Herbal medicines are the oldest form of health care. (1). Topical drug administration is a localized drug delivery system anywhere in the body through ophthalmic, rectal, vaginal and skin as topical routes. Skin is one of the most readily accessible organs on human body for topical administration and is main route of topical drug delivery system (2). Topically applied dermal and transdermal delivery systems could replace needles required to administer many of the new biologics-based drugs and vaccines, in addition to other significant advantages such as avoiding first-pass hepatic metabolism, gastric degradation and frequent dosing. The topical drug delivery system is generally used where the others system of drug administration fails or it is mainly used in pain management, contraception, and urinary incontinence. Over the last decades the treatment of illness has been accomplished by administrating drugs to human body via various routes namely oral, sublingual, rectal, parental, topical, inhalation etc.(3)

Types of Gels

Classification of gels based on various parameters.



i) Based on source of gelling agents:

a. Natural: These are gelling agents which are obtained from natural sources and employed for the preparation of gels. Ex: Starch, Pectin, Gelatin and Tragacanth etc,.(5,6)
b. Synthetic: These are obtained from synthetic sources. Ex: Methyl cellulose, Hypromellose (HPMC) and Carbomer etc.,

ii) Based on nature of gelling agents:

a. Organic: The gels with gelling agents which are organic in nature for example –polyvinyl alcohols.
b. Inorganic: It includes gelling agents which are inorganic in nature such as – Bentonite, Veegum (magnesium aluminium silicate).

iii) Based on solvents used:

a. Organogels: These gels are prepared by incorporating organic solvents as their continuous phase. Ex- Metallic stearate dispersion in oils and olag aerosol gel.
b. Hydrogels: These are the gels which utilizes water as continuous liquid phase in preparation. Ex- Poloxamer gel, gelatin, Mennonite magma, cellulose derivatives.(7)
c. Xero gels: These gels contain solvent in low concentration and are prepared by freeze drying or solvent evaporation. They can be subjected to reconstitution by swelling on addition of fresh fluid. Ex- Dry cellulose, Tragacanth ribbons and acacia.

iv) Based on number of phases:

a. Single phase: The twisted synthetic polymers with large organic molecules of the gel formers and which are generally bounded by vander waals forces or entangle with one another their random motion.(8)
b. Double phase: These upon standing are thixotropic forming semisolids and which upon agitation turns to liquid. Hence, named as double phased or two phase system. It exhibits three dimensional structures all through the gel and is comprised of smaller particles in the gel structure and is not stable always.(9)

Depending upon application gels are categorized as described below.

- Lubricating gels
- Medicated gels
- Miscellaneous gels

Lubricating gels: These are the gel preparations intended for lubrication of diagnostic equipment namely Cytoscopes, Rectal thermometers, surgical gloves, catheters and fingerstalls etc. It is mandatory to maintain sterility of these gels as they are also used for insertion into sterile region of body like urinary bladder etc. They are usually water soluble, thin and transparent. (10,11)

Medicated gels: These are primarily used on skin and mucus membrane due to its local anesthetic, antiseptic and spermicidal. For example phenyl mercuric nitrate gel is employed as spermicidal contraceptive.

Miscellaneous gels: These gels mainly serve the following purposes –

a. Patch testing: To detect sensitivity these gels as vehicles for allergens are usually applied on the skin.
b. Electro-cardiography: These gels are generally made up of sodium chloride, pumice powder and glycerin and are primarily meant for application on the electrode in a way to diminish the electric resistance between electrode and patient's skin.(12-14)

Characteristics of Gels

The gels should withhold the following characteristics:

✓ The gelling agents used in formulations that should be inert, safe and should not interact with active ingredient and other excipients.
✓ The gels reserves appropriate anti-microbial activity towards microbial infections.(15)
✓ Gelling agents are one of the ingredient for formulation of gels, when introduce shear forces to squeeze or for topical application it will generate solid like nature during shored condition that can be easily breakable.
✓ The topical gels should not be viscid.
✓ The gels administered for ophthalmic that should be sterile.(16)

Ageing

Colloidal systems traditionally produce slow vigorous aggregation. This phenomenon is known as ageing. In the formulation of gels, ageing emerge the continuous generation of denser network of gelling agents.

Syneresis

Numerous/Innumerable gels are with stand and emit, when they are frequently contract spontaneously with some fluid medium. This is referred as syneresis. The degree of syneresis increases as the concentration of gelling agent is decreases. The phenomenon of syneresis indicates that the original gel was thermodynamically unstable.(17)

Swelling

Gelling agents when they subjected to liquid media by utilizing the adequate extent of solvates they swell or raise the volume. This activity is called as swelling and this approach is happen by getting solvent into matrix. The gel-gel interactions are converted into gel-solvent interactions. The rate of swelling is directly proportional to number of linkages between individual molecules and strength of these linkages of gelling agent.(18)

Rheology

The gelling agents as solutions disperses as of flocculated solid are pseudo plastic that is possess Non Newtonian flow behavior, characterized with decrease in viscosity and increase in shear rate.(19)

Structure

The rigid structures of gels emerge from the inertness of network generated by interlinking gelling agent particles.(20)

Preparation Methodology: (5,9,27,15)

Gels are generally in large scale industrial formulation is carried out under room temperature. However, some of polymers required special procedure before processing. The preparation methods are described below.(21)

1. Flocculation
2. Thermal changes
3. Chemical reaction

Flocculation

In this method gelation is fabricated by adding adequate quantity of salt to produce precipitate that will give gel state but insufficient to produce complete precipitation. To overcome local high concentration of precipitation it's require to assure the rapid mixing.

Example: The solutions of polystyrene and ethyl cellulose with benzene will be gelled by hasty mixing along with appropriate quantity of non solvent like petroleum ether. The gels are produced by this method are in thixotropic behaviour. (22)

Thermal changes

The gelling effect will be formed by introducing solvated polymers to thermal changes. Most of the hydrogen forming polymers is highly soluble in hot than the cold water. If the temperature is decreases the hydration of polymers also decreases and finally gelation occurs. (23, 24) (Cooling of a concentrated hot solution of polymer will produce the gel).

Example: Agar sodium oleate, cellulose derivatives, guar gum and gelatin etc.

Chemical reaction

Chemical reaction is formulated by chemical interaction between solvent and solute.(20,6)

Example: Gel of Aluminium hydroxide can be produced by interaction between aqueous solutions of aluminium salt and sodium carbonate, the greater concentration of reactants will develop a gel structure.

Evaluation of Herbal Gels: (5,7,11,27,21,17)

Physical Appearance

The formulated gel contains consistency, phase separation, color and homogeneity.

Measurement of pH

The various preparations of gels pH was determined by using of digital pH meter. The prepared solution of 100ml of distilled water contains 1 gm gel was set aside for 2 hrs. The average values of triplets should be calculated for each sample by measuring the pH.(25)

Drug content

Drug content of various dilutions of gel preparations are produced from the stock solution of 1gm prepared gel in desired solvent. Then the different dilutions of samples were filtered and measured the absorbance.

Homogeneity

For all prepared gels were examine the homogeneity by visual inspection. The gels are tested for their appearance and presence of any aggregates.(26)

Extrudability study

The Extrudability of gel preparations was determined by weighed quantity of gel is filled in collapsible container and the required quantity to expel 0.5 cm ribbon of gel in 10 sec.

Viscosity measurement

The viscosity measurement for gel preparation was performed by brook field viscometer. The gels were rotated at various speeds like 0.3, 0.6 and 1.5 per minute, and note the coinciding dial readings. The viscosity of prepared gels was determined by multiplication of the dial reading with brook field viscometer content.(27)

Grittiness

All the gel preparations should fulfill the required freedom from particular matter and from grittiness as desired for topical preparations. Gel formulations were evaluated microscopically to examine the particulate matter which was seen under light microscope.(17)

Skin irritation test

The skin irritation test for gel was done with animal skin especially either sex of guinea pig (400-500 gm). Before applied the gel to the surface 4cm square of animal the hair was rimmed on back of animal. The gel was applied twice a day for 7 days to the skin of guinea pig. The site was observed for any sensitivity and the reaction, and it was graded as 0, 1, 2, 3 for no reaction, slight patchy erythema, slight but confluent or moderate but patchy erythema and severe erythema without or with edema, respectively.(14)

Stability study

The stability studies for gel formulations were performed by freeze thaw cycling method.

In this method the characteristics of syneresis was observed by subjecting the formulated gel to a temperature of 4°C for 1 month, then at 25°C for 1 month, then at 40°C for 1 month. After this process the gel is exposed to ambient room temperature and liquid exudates, separating is noted. (11)

CONCLUSION

The therapeutic outcome of the drug is significantly impacted by the route of administration. The objective of any drug delivery system is to deliver desired concentrations of drug and maintain the therapeutic drug levels at the proper site of action in the body. For topical drug delivery system skin is considered as most readily approachable organs on human body and main route of administration for skin injuries and arthritis and various skin problems namely psoriasis, eczema etc., Herbal remedies are more preferred over synthetic drugs in the belief that natural drugs offer more safety with fewer or no side effects. Hereforth, it can be concluded that preparation of topical herbal gels helps us fulfill all these objectives and hence immense research should be carried out to develop topical herbal gels using natural drugs and their combinations.

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