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Formulation of Topical gel from betel pepper

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ABSTRACT: *The purpose of writing this review was to compile the recent literature with a special focus on a rational approach to topical formulation and basic components of topical drug delivery systems. Topical applications of drugs have advantages of delivering the drug directly to the site of action and acting for a longer period of time. Skin is one of the most widespread and readily accessible organs on the human body for topical administration and is the main route of topical drug delivery system. Many widely used topical agents like ointments, creams and lotions have numerous disadvantages as they are usually very sticky causing uneasiness to the patient when applied. Moreover, they also have less spreading coefficient and need to apply with rubbing and also exhibit the problem of stability , due to all these factors, within the major group of semisolid preparations; the use of gas has increased both in cosmetics and in pharmaceutical preparations. A gel is colloid that is typically 99% by weight liquid, which is immobilized by surface tension between it and a macromolecular network of fibers built from a small amount of a gelatinous substance present. Topical gels or formulations have many advantages as compared to other conventional dosage form.Topical gels are less toxic and more effective than other dosage form. Topical gels are best choice for treat local Infections and skin problems because of it directly apply on the skin or in the site. Topical gels provide action Direct to the site of action. Topical gels exclude the GI irritation and metabolism of drug by which the Bioavailability of drug is greater. Drug-Drug interaction and Food drug interaction is also not possible in the case Of topical gels. Gels have better penetrating power because gel consists two phase. In this review a detailed study About gel, its preparation, characteristics and evaluation parameter was done.Skin infections occur commonly and often present therapeutic challenges to practitioners due to the growing concerns regarding multidrug-resistant bacterial, viral, and fungal strains. The antibacterial properties of betel pepper are well known and have been investigated for many years.*

Keywords :- *Topical gel, ideal characteristics of gel, evaluation parameter,betel pepper .*

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I. INTRODUCTION:

Topical skin infections commonly occur and often present therapeutic challenges to practitioners, despite the numerous existing antimicrobial agents available today. The necessity for developing new antimicrobial means has increased significantly due to growing concerns regarding multidrug-resistant bacterial, viral, and fungal strains [1–4]. Consequently, attention has been devoted to safe, new, and/or alternative antimicrobial materials in the field of antimicrobial chemotherapy. Gels are defined as semi rigid systems in which the movement of the dispersing meilium is restricted by an interlacing three-dimenSional network of particles or solvated macromolecules of the dispersed phase.The word "gel" is derived from "gelatin," and both "gel" and "jelly" can be drawn back to the Latin gels for "frost" and gel are, meaning "freeze" or "congeal" This origin indicates the essential idea of a liquid setting to a solid-like material that does not flow, but is elastic and retains some liquid characteristics: Use of the term "gel" as a classification originated during the late 1800s as chemists attempted to classify semisolid substances according to their phenomenological characteristics rather than their molecular compositions. At that time." Analytical methods needed to determine chemical structures were lacking The USP defines gels [sometimes called jellies) as semisolid systems containing either suspensions made up of small inorganic par ticles, or large organic molecules interpenetrated by a liquid. Where the gel mass contains a network of small separate particles, the gel is classified as a two-phase system. In a two-phase system, if the particle size of the dispersed phase in relatively large, the gel mass is sometimes called as a magma. Single-phase gels consist of organic macromolecules uniformly circulated throughout a liquid in such a way that no apparent houndaries occur between the dispersed macromolecules and the liquid.In pharmaceutical applications, water and hydroalcoholic solutions are most common. Many polymerels exhibitreversibility between the gel state and sol, which is the fluid phase containing the dispersed or dissolved macromolecule. However, the formation polymer gels is irreversible because their chains Are covalently bonded. The three-dimensional networks formed in two-phase gels and jellies are formed by several inorganic colloidal clays. The formation of these inorganic gels is reversible. Gels are generally considered to be more rigid than jellies because gels contain more covalent crosslinks, a higher density of physical bonds, or simply less liquid. Gel-

forming polymers produce materials that span a range of rigidities, beginning with a sol and increasing in rigidity to a mucilage, jelly, gel, and hydrogel.Some gel systems are as clear as water, and others are turbid because the ingredients may not be completely molecularly dispersed (soluble or insoluble), or they may form aggregates, which disperse light. The concentration of the gelling agents is mostly less than 10%, usually in 0.5% to 2.0% range, with some exceptions.

1.2 Uses Of Gels :

1.As delivery systems for orally administered drugs.
2. For topical drugs applied directly to the skin, mucous membrane or the eye
3. As long acting forms of drug injected intramuscularly or implanted into the body.
4. As hinders in tablet granulation, protective colloids in suspensions, thickeners in oral liquid and suppository hases.
5. In cosmetics like shampoos, fragrance products, dentifrices and skin and hair care preparations.
6. Lubricant for catheters
7. Bases for patch testing
8.NaCl gel for electrocardiography.
9.Sodium fluoride & Phosphoric acid gel for dental care prophylactic

II. Literature review:

1. Mohsin J. Jamadar*, RajmahammadHusenShaikh.et.al.preparation and evaluation of herbal gel formulation concluded that The present work aimed to increase stability of gel and to increase anti inflammatory Activity of gel formulation with Carbopol 934, HPMC K 100 M and Xanthan gum as well As to compare natural gelling agent to synthetic gelling agent. The prepared formulations Were characterized for physical appearance, pH, spreadability, viscosity, in-vitro antiInflammatory study and in-vitro skin irritation study.

2. M Mahfuzul Hoque1*, Shemona Rattila1, M AsaduzzamanShishir, M L Bari, Y Inatsu, and S Kawamoto .et. al;Antibacterial Activity of Ethanol Extract of Betel Leaf (Piper betle L.) Against Some Food Borne Pathogens concluded that betel leaf extract possessCompounds containing antibacterial properties that can be useful To control food borne pathogens. Antibacterial properties of Ethanol extract obtained from betel leaf would be fruitfully utilized In food or food products to extend their shelf-life.

3. Patil P, Datir S, Saudagar R. et.al;A Review on Topical Gels as Drug Delivery System concluded that The clinical evidence indicates that topical gel is a safe and most effective treatment option for use in the management of skin related disease and used for local action to reduce the side effects associated with other conventional dosage form.

4. Mei X. Chen, Kenneth S. Alexander, and Gabriella Baki.et.al;Formulation and Evaluation of Antibacterial Creams and Gels Containing Metal Ions for Topical Application concluded that This study evaluated and confirmed the synergistic in vitro antibacterial effect of copper sulfate and zinc sulfate in a cream and two gels.

5. RodiahRahmawatyLubis, Marlisa, and Dian DwiWahyuni.et.al;Antibacterial activity of betle leaf (Piper betle l.) extract on inhibiting Staphylococcus aureus in conjunctivitis patient The aim of this study is to determine the antibacterial activity of Piper betle L. leaf extract on inhibiting Staphylococcus aureus in conjunctivitis patient. This study follows a post-test only group experimental design.

6. Ni Made Dwi Mara WidyaniNayaka, Maria MalidaVernandesSasadara, […], and Rika Hartati. et.al ;Piperbetle (L): Recent Review of Antibacterial and Antifungal Properties, Safety Profiles, and Commercial Applications This current review showed that betel leaves extract, essential oil, preparations, and isolates could inhibit microbial growth and kill various Gram-negative and Gram-positive bacteria as well as fungal species, including those that are multidrug-resistant and cause serious infectious diseases.

7. R. Bhramaramba*1¸ I. SudheerBabu, Ch. Divya Naga Deepth.et.al;Formulation and Evaluation of Herbal Gel Containing TerminaliachebulaRetz.,leaves extract The studies revealed that The developed single herbal formulation consisting 1% Terminaliachebula Retz., leaves extract comparatively Better than later other formulation but all the Formulations were non irritant and did not show any Skin toxicity when applied daily for 7 days in rats. Its Antibacterial and antifungal property was not under Taken for any scientific study with herbal gel.

Aim :

The Present Study Was Plan To Evaluate Extract Of Betel Pepper Leaf For Treatment of topical anti bacterial&anti inflammatory activity.

Objectives :

1. Betel leaf also an amazing anti-fungal, antiseptic & antibacterial remedy .
2. Topical antibacterials are commonly used for superficial pyodermas such as impetigo and treatment or prevention of infections such asminor cuts, abrasions,burns, and surgical wounds.

3. Betel leaf is good for oral health as they not only fight bad breath but also help with protecting you from bacterial infections.
4. Betel leaf helps to prevent the growth of bacteria also used as mouth freshener.

III. DRUG& POLYMER PROFILE

3.1Plant Profile :

Fig 1. Betel Pepper (Peper betel)

Kingdom: Plantae
Division: Magnoliophyte
Class: Magnolipsida
Family: Piperaceae
Genus: Piper
Species: Betel

IV. MATERIALS&METHODS

4.1Chemicals

Chemicalssuch as triethanolamine ,Carbapol 934 ,Methyl Paraben& Peppermint Oil are collected From laboratory of NutanArts,Science and Commerce College,Rajapur.

4.2Preformulation study:

Preformulation studies are needed to ensure the development of a stable as well as effective and safe dosage form. It is a stage of development during which the pharmacist characterizes the physicochemical properties of the drug substances and its interaction with various formulation components. Goals of Preformulation study:

• To determine the necessary physicochemical parameter of a new drug substance.
• To establish its incompatibility with excipients of formulation.

A. Collection and Authentication:(Collection of Betel P.)

The fresh leaves of Betel Pepper (Betel L.)Were collected from the Farmer Garden Rajapur, Maharashtra.

B. Organoleptic Characterization:

Colour, odour, shape, test of Betel pepper were observed.

C. Physicochemical Characters:

After botanical evaluation, the shade-dried plant material were subjected to size Reduction to get coarse powder and then passed through sieve no. 80 to get uniform powder. Then,16 the uniform powder was subjected to standardization with different parameters as per Literature.

4.3Preparation of Topical Gel

Different combinations of Betel Pepper leaves aqueous extract (1% & 2%) were tried with different types of polymers (Carbopol 934) using various formulae[15]. The following few combination with Carbopol 934 resulted in the best gel formulation, which was smooth and stable. Control sample also was stable.

4.4 Method for Preparation of Gel Containing Extract

Method for Preparation of Gel Containing Extract 1 g of Carbopol 934 was dispersed in 50 ml of distilled water kept the beaker aside to swell the carbopol 934 for half an hour and then stirring should be done to mix the carbopol 934 to form gel. Take 5 ml of distilled water and required quantity of methyl paraben were dissolved by heating on water bath. Solution was cooled Further required quantity of betel pepper leaves extract was mixed to. The above mixture and volume made up to 100 ml by adding remaining distilled water. Finally full mixed ingredients were mixed properly to the Carbopol 934 gel with continuous stirring and triethanolamine was added drop wise to the formulation for adjustment of required skin pH (6.8-7) and to obtain the gel at required consistency. The same method was followed for preparation of control sample without adding any betel leaves extract.

Table 1..Formulation prepared with this ingredients along with Quantity

17 8.6.1 Preparation of inoculums For evaluation of antibacterial activity, 24 hours fresh culture of fungi and bacteria were suspended in sterile water to obtain a uniform suspension of microorganism.

Sr. no	Ingredients	F1	F2	F3
1.	Carbapol 934	2gm	2gm	2gm
2.	Triethanolamine(q.s)	1ml	1ml	1ml
3.	Methyl Paraben	0.01gm	0.01gm	0.01gm
4.	Peppermint Oil	0.7ml	0.7ml	0.7ml
5.	Distilled Water	50ml	50ml	50ml
6.	Betel L.Extract	1ml	1.5ml	2ml

V. Formulation

As per method described above the formulae were tabulated in Table 1. Along with control sample gel were prepared with addition of betel pepper leaves extract to prepared betel pepper gel by given concentration respectively.

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• Application of herbal gel and skin irritation study

0.5 gm of the herbal gel was used as the test substance was applied to an area of approximately 6 cm2 of skin and covered with a gauze patch. The patch was loosely held in contact with the skin by means of a semi-occlusive dressing for the duration of 1 hour and gauze was removed. At the end of the exposure period, i.e., 1 hour, residual test substance was removed, without altering the existing response or integrity of the epidermis. Observations have recorded after removal of the patch. Control animals were prepared in the same manner and 0.5 gm of the gel base i.e., gel formulated using all ingredients except the herbal mixture was applied to the control animals and observations were made as similar to the test animals [20] The gel was applied to the skin once a day for 7 days and observed for any sensivity and the reaction if any was graded[21].

VI. RESULTS & DISCUSSIONS

The herbal gel was prepared and subjected to evaluation of the various parameters. The herbal Gel was light brown in color and translucent in appearance and had a cool and smooth feeling on application. pH also maintained constant throughout the study which was found to be 6.9 to 7.0 and the gel was non-irritant upon application on the skin. Spreadibility were also measured and found to be less variant than the initially prepared gel after performing stability study. Further stability test for three months has been carried out and results revealed gel containing 2% Betel L.Extract showed better stability than 1& 1.5%.The gel was non-irritant upon application on to the skin. The physiochemical property of gel containing 2% carbopol was most appropriate for the formulation of gel. The spreadability of both 0.75% and 1% carbopol was good. Gel can be used as an effective vehicle for topical administration of herbal extracts and essential oils of plants

Table 2 .Physical Evaluation Of Gel

S. N	Parameters	F1	F2	F3
1	Appearance	Light brown	Light brown	Light brown
2	pH	6.5	6.8	6.8
3	Viscosity	3714±0.21	3688±0.69	3671±0.58
4	Homogeneity	Homogeneous	Homogeneous	Homogeneous
5	Spreadability	19.37	21.38	22.16
6	Extrudability	17.06	16.78	17.50

6.1 Optimization of Batch:

After analysis of all batches of formulations for their evaluation parameters like pH, Viscosity, Spreadability, and Extrudability, the formulation batch F2 & F3 from leaves extract Gel showed good results. The batch F2optimized with The good viscosity, Spreadability and Extrudability and F3 shows good spreadability hence, these two batches Were used for further evaluation.

Table 3 .Results Of Herbal Gel

S.No	Parameters	Results
1	Colour	Light brown
2	Odour	Characteristic
3	State	Semisolid
4	pH	6.8
5	Spreadability	22.16±0.3
6	. Non – irritancy Test	Non irritant
7	Viscosity	3671±0.58

Fig 5. Formulation Of Gel

VII. CONCLUSION

The plant betel pepper , was Selected for the study, whose extract was very useful in The treatment of wounds. Literature survey revealed that This plant is used traditionally for various ailments, Especially for its wound healing property. Extensive Scientific studies were not performed on this plant. It is An attempt made to establish the herbal gel containing Betel pepper Leaves extract at various Concentrations (1% and 2%). The studies revealed that The developed single herbal formulation consisting 2% leaves extract comparatively better than later other formulation but all the Formulations were non irritant and did not show any Skin toxicity when applied daily for 7 days in rats. Its Antibacterial property was not under Taken for any scientific study with herbal gel. Hence the present work is performed. The result also suggests that betel leaf extract possess Compounds containing antibacterial properties that can be useful To control food borne pathogens. Antibacterial properties of Ethanol extract obtained from betel leaf would be fruitfully utilized In food or food products to extend their shelf-life. As the main Concern of this study was to search some plants with excellent Antimicrobial activity, the betel leaf may prove to be a beneficial Invention since it is cultivated in a large amount in Bangladesh.The aim of this study is to determine the antibacterial activity of Piper betle L. leaf extract on inhibiting Staphylococcusaureus&Ecoli.

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