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Formulation and Evaluation of Emulgel for the Treatment of Acne Vulgaris

Sana Umar Malik*, Fiza Yunus Mulani. Quazi Majaz, G. J. Khan.
Ali-Allana College of Pharmacy, Akkalkuwa, Dist Nandurbar, MS, India.

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Corresponding Author:
Sana Umar Malik

Email ID:
sanamalik76111@gmail.com

Abstract: Acne affects around 9.4% of the population, It affects over 90% of persons during their adolescent years and occasionally into adulthood. The present study is focused on the use of herbs for treatment of acne. The Emulgel for the Treatment of Acne Vulgaris was formulated from herbal crude extracts and investigated the physico-chemical parameters. The study revealed that reveals that all formulation has passed the evaluation parameter except F5 which does not have homogeneity. F3 Formulation found to be best as compare to others.

Keywords: Emulgel, Acne, Herbal Formulation.

INTRODUCTION

Acne affects around 9.4% of the population, It affects over 90% of persons during their adolescent years and occasionally into adulthood.[1] Moderate and severe instances affect about 20% of the population. Acne is uncommon in rural settings, and it may not exist among Paraguayans and Papua New Guineans who are not Westernized.[2] Females had a higher prevalence of 9.8% compared to men' 9.0%. Approximately 1% of males and 5% of females among over 40-year-old patients experience issues.[1] It affect people of all ethnic groups, and it's unclear if race has an impact on illness rates.[3,4]

Topical drug products cause one or more therapeutic outcomes when they are applied to infected skin, and the onset, duration, and magnitude of these responses are determined by the relative efficiency of three sequential activities: drug release from the dosage form, drug penetration through the skin barrier, and generation of the desired pharmacological effect. [5]

The goal of this study is to develop a stable herbal medicine emulgel for the treatment of Acne vulgaris, which manifests as comedones, papules, pustules, nodules, and/or cysts as a result of the organism *Propionibacterium acnes* obstructing and inflaming pilosebaceous units (hair follicles and their associated sebaceous gland).

Emulgels are biphasic systems having a polar internal phase (emulsion) contained inside an aqueous gel foundation. The emulgel system is a unique drug delivery technique, particularly for hydrophobic pharmaceuticals.[6] Emulgels are emulsions that are either oil-in-water or water-in-oil in nature and are gelled by adding a gelling chemical to them. For hydrophobic or weakly water-soluble medicines, an emulsified gel is a stable and better carrier. In a nutshell, emulgels are a mixture of emulsion and gel.[7] Gels are made by trapping vast volumes of aqueous liquid inside a network of colloidal solid particles, which can include inorganic compounds. Gels contain a larger aqueous component than ointment or cream, allowing for more solubility and migration of the active substances, as well as other benefits such as being thixotropic, greaseless, readily spreadable, easily removable, and emollient.[8,9]

METHODOLOGY

Preparation of Emulgel

The emulsion's aqueous phase was made by dissolving tween 80 in filtered water. Methyl paraben and propyl paraben were dissolved in propylene glycol, while the medication was dissolved in ethanol, and the two solutions were combined with the aqueous phase. Both the oily and aqueous phases were heated to 75°C separately, then the oil phase was added to the aqueous phase and stirred continuously until it reached room temperature. The gel bases were made by dispersing different amounts of polymers in distilled water separately using a mechanical shaker and continual shaking at a reasonable speed. Triethanolamine (TEA) was used to adjust the pH of all formulations to 6 6.5. To make the emulgel, the resulting emulsion was blended with the gel with moderate stirring.[10]

Table 1: Formulation Table for Emulgel

Ingredient	F1	F2	F3	F4	F5
Neem oil	1	1	1	1	1
Eucalyptus oil	1	1	1	1	1
Turmeric	1	1	1	1	1
Aloe	1	1	1	1	1
Carbopol 934	1	2	3	-	1.5
Carbopol 940	2	1	-	3	1.5
Glycerin	10	10	10	10	10
Tween 80	10	10	10	10	10
Cetosteryl alcohol	4	4	4	4	4
Glycerol monsterate	2	2	2	2	2
Methyl paraben	0.1	0.1	0.1	0.1	0.1
Propyl Paraben	0.1	0.1	0.1	0.1	0.1
Triethelene Amine	0.6	0.6	0.6	0.6	0.6

Evaluation Parameters [9-12]

Colour

After the final product was developed, the colour of the formulations was decided by the texture they provided.

Stickiness

After rubbing the formulation between two fingers, the degree of stickiness was assessed.

Odour

The aroma of the formulation was selected once it was smelled. Or The scent was determined once the formulation was sniffed.

Oily Feel

This parameter was obtained after the formulation was rubbed on the skin.

(After a few seconds, all of the formulations had an oily feel to them, but after a few seconds, this transitioned to a non-oily sensation.)

Homogeneity

Visual inspection was used to assess the appearance of the gel and the presence of any aggregates.

pH Analysis

The PH of the produced emulgel was determined by dipping the glass electrode into the emulgel with a digital pH meter. Each formulation's pH was measured three times and the average results were determined.

Spreadibility

Using two equal-length glass slides (14*5 cm), the spreadability of the gel formulation was assessed. 1 gram of gel was put to one glass slide. Weights (125 g) were added to the other slide, and the time it took for the second glass slide to separate from the first glass slide was calculated. Spreadability is better when the interval is shorter. Using the following formula spreadibility was computed. [13]

$$S = M * L/T$$

Where

S denotes spreadibility.

M is the weight attached to the higher slide.

L denotes the length of the glass slides.

T denotes the time necessary to completely separate the slides.

Excudibility

The force required to extrude material from a tube is commonly measured using an empirical test. The method used to determine the amount of applied shear in the rheogram region corresponding to a shear rate greater than the yield value and resulting in plug flow. The method used to evaluate emulgel formulations for extrudability in this study is based on the percentage of emulgel and emulgel extruded from a lacquered aluminium collapsible tube using the weight in grammes required to extrude at least 0.5 cm ribbon of emulgel in 10 seconds. Extrudability improves as the quantity is increased. The extrudability of each formulation is measured three times and the average values are provided. After that, the extrudability is estimated using the formula Extrudability Applied weight to extrude emulgel from tube (in gm)/ Area (in cm2) [14]

RESULTS AND DISCUSSION

Colour

The colour appearance of the Prepared emulgel was tested, and it was discovered that formulations containing varying amounts of carbopol had distinct colours and appearances.

Stickiness

The stickiness of all prepared emulgel has been measured, and a numbering system has been established based on a scale of 1 to 5.

Odour

The odour of all Prepared emulgel was recorded, and it was labelled as + moderate, ++ goob, +++ best.

Homogeneity

The homogeneity of the Prepared emulgel was examined, and it was found that the all formulation have good homogeneity except F5.

Oily Feel

The oily feel of the Prepared emulgel was studied, and it reveals that it offers an oily feel at the beginning after applying all of the formulation, but it does not give an oily feel afterwards.

pH Analysis

All of the prepared emulgel had PH values between 5.8 and 6.8, which is deemed adequate for avoiding skin irritation when applied to the skin.

Spreadibility

The spreadibility results reveal that the prepared emulgel is easily spreadable with a little amount of shear. The F3 spreadability was 5.1 cm/sec, showing that the emulgel containing the herbal ingredients was effective.

Excrudibility

Excusibility tests were done on all formulations as described in the methodology, the results reveals that Formulations F1, F2, and F5 exhibit good excudibility While F3 and F4 formulations have excellent excrudibility.

Table 2: Evaluation parameter of prepared emulgel formulation

Parameter	F1	F2	F3	F4	F5
Colour	Yellow	Sunny Yellow	Dark Yellow	Pale Yellow	Pale Yellow
Stickness	3	0	2	2	0
Odour	+	+++	++	+++	++
Homogenity	Yes	Yes	Yes	Yes	No
Oily Feel	0	0	0	0	0
pH Analysis	6.4	6.8	6.7	5.9	5.8
Spreadibility	4.6	4.5	5.1	4.8	4.3
Excudibility	Good	Good	Excellent	Excellent	Good

CONCLUSION

Topical emulgels containing herbal ingredients were formulated and subjected to organoleptic and physicochemical studies. Total five formulations were prepared by using different concentration of excipients. With the help of results it reveals that all formulation has passed the evaluation parameter except F5 which does not have homogenesity. F3 Formulation found to be best as compare to others. Finally it was concluded that the formulations passes all pharmaceutical evaluation and it may be subjected for pharmacological evaluation (anti acne).

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