

Formulation and Evaluation of Herbal Anti-Acne Gel Containing Bitter Cumin Extract

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Abstract- Acne vulgaris is a long-term inflammatory disorder of the pilosebaceous unit that leads to the formation of inflammatory lesions, seborrhea, comedones, etc. Propionibacterium acnes and Staphylococcus epidermidis have been recognized as pus-forming bacteria triggering inflammation in acne. Staphylococcus aureus support to cause inflammation in acne. Natural remedies are more acceptable in the belief that they are suffering from fewer side effects than the synthetic ones. Herbal formulations have a growing demand in the global market. This present research work aims to formulate and evaluate herbal antiacne gel containing ethanolic extract of Bitter Cumin (*Centrathium anthelminticum*). The herbal antiacne gel was optimized by preparing 3 formulations (F1, F2, F3) using an extract of bitter cumin. The formulation was evaluated for various parameters like Physical appearance, pH, Drug content, Spreadability, Extrudability, was successfully studied. Amongst all the formulation studied, batch F3 was found optimum for all the parameters. Ethanolic extract of *Centrathium anthelminticum* show potential effect against Acne vulgaris and also exert a synergistic effect on the bacteria.

Keywords: Bitter Cumin, Herbal Gel, Anti-Acne, *Centrathium Anthelminticum*, Ayurvedic Formulations.

INTRODUCTION

The word acne comes from the word acme meaning "the highest point", which is derived from the Greek word Akme meaning "point" or "spot". It was originally misspelt, with an 'n' rather than an 'm' in 1835. Acne, medically known as Acne vulgaris, is a skin disease that involves the oil glands at the base of hair follicles. It commonly occurs during puberty when the sebaceous (oil) glands come to life and are stimulated by male hormones produced by the adrenal glands of both males and females. (1)

Acne vulgaris or simply known as acne is a human skin disease characterized by skin with scaly red skin (seborrhea), blackheads and whiteheads (comedones), pinheads (papules), large papules (nodules), pimples and scarring (2). Acne affects skin having dense sebaceous follicles in areas including face, chest and back (3). Acne may be of inflammatory or non-inflammatory forms (4). Due to changes in pilosebaceous unit lesions are caused by androgen stimulation. Acne occurs commonly during adolescence, affecting about 80–90% of teenagers in the Western world and lower rate are reported in rural societies (5–8). Acne is usually caused by increase in androgens level like testosterone mainly during puberty in both male and female (9).



Figure 1: Acne on the Back



Figure 2: Acne on the Chest



Figure 3: Acne on the Face.

The word acne refers to the presence of papules, scars, comedones and pustules. The common form of acne is known as acne vulgaris. Many teenagers suffer from this type of acne. Acne vulgaris shows the presence of comedones.

Acne rosacea is synonym for rosacea and some persons not have acne comedones associated with their rosacea, hence prefer the term rosacea. Chloracne occurs due to exposure to polyhalogenated compounds. (10)

Histopathology of acne: - Acne is a disease of sebaceous hair follicles that comprises multilobulated large sebaceous acini, tiny vellus hairs, and dilated follicular channels. Sebaceous follicles are located in the face, chest, and upper back. The sebaceous gland is atrophic in acne lesions. meaning that sebum has already been discharged into follicular channels because of undifferentiated sebocytes becoming mature and differentiated. Cunliffe proposed cyclical comedo growth and explained the natural resolution of comedones. (11)

Bitter Cumin [*Centratherum anthelminticum* (L.) Kuntze] is used in the indigenous system of medicine for the treatment of various ailments. The seeds are used various in skin disease, leucoderma; also used as emetic, purgative, for asthma, kidney trouble, as a blood purifier, for hiccoughs and in inflammatory swelling, good for sores and itching of the eyes and as depilatory. The seeds are also credited with tonic, stomachic and diuretic properties *Centratherum anthelminticum* (L) Kuntze and may exhibit anti-inflammatory activity. Analgesic and antipyretic activities. (12)

Bitter cumin [*Centratherum anthelminticum* (L.) Kuntze], is a medicinally important plant. Earlier, we have reported phenolic compounds, antioxidant, and anti-hyperglycaemic, antimicrobial activity of bitter cumin. (13)

MATERIALS & METHODS

A) MATERIALS -

Bitter Cumin -

Synonym – *Vernonia anthelmintica* and *Conyza anthelmintica* are scientific synonyms of this plant.

Biological source – *Centratherum anthelminticum* (L) Kuntze is an ethnomedicinal plant commonly grown in India and Southeast Asia belonging to family Asteraceae family.



Figure 4: *Centratherum anthelminticum* seeds

Chemical Constituents - *Centratherum anthelminticum* has been investigated for its bioactive compounds since the early 1960. To date, more than 120 compounds were identified, ranging from fatty acid, sterols, sesquiterpene lactones, carbohydrates and flavonoids. The chemical compounds were mostly identified from the seeds of *Centratherum anthelminticum*, followed by leaves and aerial parts. Some of these identified compounds were isolated using chromatographic techniques and the structures were elucidated through spectroscopic techniques. A number of these compounds exhibited significant biological activities, which serve as the scientific evidence for the traditional usage of *Centratherum anthelminticum*. (14)

Uses –

- Anthelmintic
- Digestive
- Diuretic

- Tonic
- Anti-asthmatic
- Cough
- Diarrhoea
- Fevers. (14)

B) METHOD -

Procurement of plant material-

The fresh seeds of Bitter cumin (*Centratherum anthelminticum*) were purchased from the local market of Amravati.

Extraction Procedure: - (15)

- Weigh accurately the quantity of Bitter cumin seeds.
- Place the seeds in the separate chamber of the soxhlet apparatus.
- This soxhlet extractor placed into RBF containing the extraction solvent i.e. Alcohol in the ratio 1:10 where 1gm seeds in 10ml alcohol
- Take the extraction solvent and pass at least the three cycles from thimble containing the drug.
- Place the reflux condenser on top of the soxhlet apparatus which closed with cotton plug from the top and allow to pass water from top to the bottom of the condenser.
- Then switch ON the assembly and pass the 5-6 cycles into the apparatus.
- After complete, the extraction removes the soxhlet apparatus and collect the extract from RBF.
- After collecting the extract. It allows to evaporate on the water bath to get the concentrated extract.

Formulation of Gel- (16)

The gel was prepared by using a 1% concentration of the extracts. In a separate beaker, Carbopol 940 was dispersed uniformly in distilled water with continuous stirring, avoiding air entrapment and allowed to soak overnight. In another beaker, methylparaben was dissolved in the remaining amount of distilled water by gently heating. To this solution, the herbal extracts were added and triturated well. The above mixture was then added to the HPMC mixture and stirred well. Finally, propylene glycol and triethanolamine were added and the pH was adjusted to 6.8-7. The prepared formulation was filled in a suitable container and label. Various formulation batches were prepared; the composition of formulations was shown in Table 1.

Table no. 1: Formulation chart for herbal gel

Sr. no.	Ingredient Name	Formulation Code			Role of Ingredients
		F1	F2	F3	
1.	Ethanollic extract of Bitter Cumin Seeds	1%	1%	1%	Heals acne scars, Coolant, Soothing, Moistening
2.	HPMC	1%	1.5%	2%	Gelling agent
3.	PEG 400	2%	2%	2%	Humectant, Solvent
4.	Methyl paraben	0.1%	0.1%	0.1%	Preservative
5.	Triethanolamine	2%	2%	2%	Stabilizer or Neutralizer
6.	Distilled water	Qs.	Qs.	Qs.	Vehicle

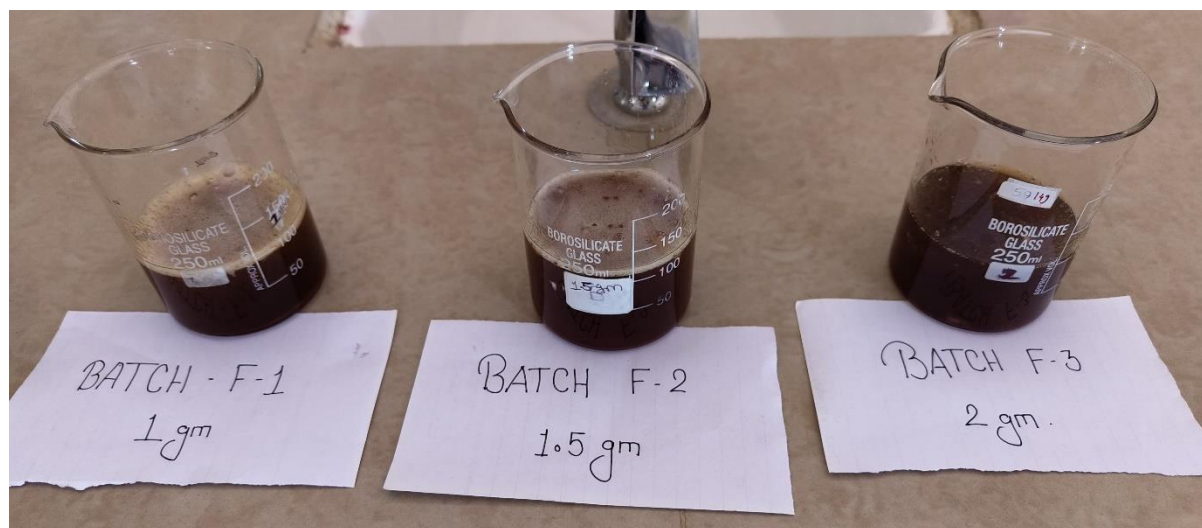


Figure 5: Formulation F1, F2 &F3

Evaluation of Gel-

1) Physical appearance:

Physical parameters such as Colour, odour, and consistency were checked visually.

2) Washability:

Formulations were applied on the skin and then easy and the extent of washing with water was checked manually.

3) pH:

the pH of 1% aqueous solution of the formulation was measured by using a calibrated digital pH meter at a constant temperature.

4) Spreadability:

It indicates the extent of the area to which gel readily spreads on application to the skin or affected part. The therapeutic potency also depends upon spreading value. The time in sec taken by two slides to slip off from gel which is placed in between the slides under the direction of a certain load is expressed as spreadability. Lesser the time is taken for the separation of two slides, better the spreadability. The following formula is used to calculate the Spreadability:

Spreadability (S) = $M \times L / T$ Where, M = weight tied to upper slide

L = length of glass slides, T = time taken to separate the slides.

5) Extrudability:

It is a usual empirical test to measure the force required to extrude the material from the tube. The method applied for the determination of applied shear in the region of the rheogram corresponding to a shear rate exceeding the yield value and exhibiting consequent plug flow. In the present study, the method adopted for evaluating gel formulation for extrudability was based upon the quantity of gel extruded from a lacquered aluminium collapsible tube on the application of weight in grams required to extrude ribbon of study gel in 10 seconds. The measurement of the extrudability of each formulation was in triplicate and the average values were presented.

RESULTS AND DISCUSSION -

The results of the evaluation are shown in Table no.2. The gels were Slight yellowish to brownish with a specific odour. All formulations were found homogenous easily washable. All the formulation has slightly alkaline pH. Amongst all the formulation F3 showed very optimum Spreadability. The Formulations F1, F2 shows good Extrudability whereas formulation F3 shows excellent Extrudability. Formulation F3 shows better drug content than F1&F2. The results showed that all developed gel formulation had an inhibitory effect on the www.ijppr.humanjournals.com Citation: Rahul R. Borse et al. Ijppr. Human, 2020; Vol. 17: 84-94. 93 S. aureus, but the combination of extracts (F3) showed more zone of inhibition as compared to individual extracts (F1&F2).

Table No. 2: Evaluation of Gels

Formulation Batch	Colour	Consistency	pH	Spreadability gm.cm/sec	Extrudability	Drug content
F1	Brownish	Semisolid	6.89	11.85	Good	97.01%
F2	Brownish	Semisolid	6.74	11.60	Good	96.56%
F3	Brownish	Semisolid	6.97	12.95	Excellent	98.48%

CONCLUSION -

Natural remedies are boon to any disease. In the world market, herbal formulations are in great demand. Herbal medicines are believed to be safer than allopathic medicines. All the formulations were optimized based on evaluation parameters such as Physical appearance, Washability, pH, Spreadability, Extrudability, Drug Content, Antiacne activity. After evaluation, this study concludes that formulation batch F3 i.e. the gel which contains a combination of both extracts was comparatively better than other formulations F1 and F2.

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