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FORMULATION AND EVALUATION OF ANTI-ACNE GEL

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Abstract:-

Thai traditional medicine has relied on the herbal ball to treat a variety of ailments, including acne. However, using the herbal ball in actual practice is difficult and time-consuming. The goal of this research was to create a gel using a herbal ball extract in order to improve the effectiveness of the herbal ball as an acne therapy.

The Benzalokawichian cure and powdered stem bark were combined to create a herbal ball. To get the extract, the herbal ball was heated and squeezed. Based on a carbomer gel, gel formulations containing the herbal ball extract at strengths of 0.1, 1 and 5% w/w were created. The herbal ball extract had minimal bactericidal concentration, antioxidant, and antiactivity. With an inhibitory zone value of 5, the 5% w/w gel formulation demonstrated antibacterial efficacy against *P. acnes*.

This suggests that the gel formulation that was produced may be useful for treating acne. The use of herbal ball extract in the form of gel ought to be easier to use than the conventional way of using herbal balls.

Keyword:-

Gel, Topical, Antiacne, Herbal, Cosmetic use.

Introduction:-

Acne vulgaris, also known as acne, is a persistent condition that affects many people and is brought on by abnormal sebum production in skin follicles. The condition frequently has an impact on confidence. The pathological aspect of acne first appears when the sebaceous glands become abnormally overactive. Cosmetic products used to treat acne often have several adverse effects, including skin irritation and bacterial resistance issues. Recent studies have shown that natural active substances with low toxicity for humans, such as proteins or peptides produced from plants and animals, have anti-acne capabilities.

In order to utilise these chemicals in the context of supplemental cosmetic goods, several efforts have been done. Southeast Asia and other tropical regions are particularly rich in biodiversity thanks to their abundance of therapeutic plant and animal extracts. Crocodile blood, a rich source of active proteins or peptides that exhibit a variety of biological capabilities, is one animal medicine derivative. Previous studies have demonstrated that crocodile blood components, such as the American alligator's serum, have antibacterial and antiviral properties against *Escherichia coli*. Additionally, our studies show that Siamese crocodile blood, particularly crocodile leukocytes, showed antimicrobial properties. Leukocyte extracts from Siamese crocodiles have yielded peptides that have been found to have broad-spectrum antibacterial action. Additionally, crude crocodile leukocyte extract has a number of biological qualities, including anti-inflammatory and antioxidant activities.

It is thought that crocodile leukocyte extract is a source of physiologically active peptides, making it possible to create a cosmetics product with crocodile leukocytes as an anti-acne gel. Thus, the viability of creating anti-acne skin-care gel products with crocodile leukocyte extract was evaluated in this study

Preparation of Gel :-

Propyl paraben was added when the water had slightly cooled after the weighed amount of methyl paraben had been dissolved in 5ml of hot water.

After adding 50 ml of distilled water to this beaker, carbopol 934 was continuously stirred for 20 minutes to dissolve it. This mixture was retained for soaking the next day.

The necessary amounts of polyethylene glycol (PEG 400) and propylene glycol were added to another beaker.

This combination was stirred into the carbopol beaker along with the concentration of the aqueous extract that corresponded to its MIC.

Distilled water was used to make up the volume, and it was forcefully stirred. The gel's pH was adjusted to 6.8 before triethanolamine was added.

Antibacterial study of

For the purpose of determining the antibacterial activity against *S. aureus* and *P. acnes*, all gel formulations were dissolved in methanol.

Following the procedure outlined in, the agar well diffusion method was used to assess the antibacterial efficacy of the gel formulations against *S. aureus*.

The gel base and methanol served as the negative controls, and a synthetic commercial antiacne gel served as the positive control.

Then, using the broth microdilution method in microtitre plates, the MIC of these formulations was calculated as reported in

The assay was carried out three times. Under anaerobic conditions, the agar well diffusion test was used to assess the antibacterial activity against *P. acnes*.

were made using a sterilised cork borer on blood agar plates that had been contaminated with *P. acnes* clinical isolates from the Medical Research Institute, Sri Lanka.

Each of the test formulations was poured into the wells, and the agar plates were incubated at 37°C for 48 hours in an anaerobic jar before the zones of inhibition were determined. The gel base and methanol were utilised as the negative controls, and a commercial antiacne gel served as the positive control. Three duplicates of the experiment were carried out

Stability

At day 30 following the formulation of the gels (storage conditions: temperature 30 ± 2°C and relative humidity 75 ± 5%), the stability of the physical parameters (colour, odour, homogeneity, washability, consistency, and pH) of all three formulations was assessed.

In order to ascertain if the gel formulations are capable of maintaining their antibacterial capability over time while being stored, the antibacterial activity against *S. aureus* was also assessed at day 30.

Plan of work:-

1. Literature review.
2. Choosing and acquiring herbal materials.
3. Excipient selection and acquisition.
4. Supplies, tools, and equipment.
5. Gel evaluation:-
6. pH measurement.
7. Content drug.
8. Viscosity Research .
9. Spreading capacity.
10. Study of extrudability
11. Study on Skin Irritation .

Herbal Medicine :-

The World Health Organisation defines traditional herbal medicines as homemade drugs or compounds derived from plants.

The oldest healthcare system in the world is likely India's herbal medication industry. The use of herbs for healing dates back to ancient times, the vedas, and even early religious writings. It is most likely the oldest healthcare system in existence.

Herbal products are increasingly widely accepted because of the assumption that they are safe, possess numerous therapeutic capabilities, and have no or few adverse effects when compared to contemporary chemical entities. Herbal healing deals with the use of herbs, herb extracts, or natural products for the improvement of health conditions.

Gel:-

In order to create an infinitely rigid network structure that immobilizes the liquid continuous phase within, a gel is a two-component, cross-linked, three dimensional network made of structural components and a sufficient but disproportionately huge volume of liquid. Organic macromolecules, typically polymers, or inorganic particles can make up the structural components of the gel network. Interactions between chemicals or particles can create cross connections. This results in the distinction between chemical and physical gel systems for gels.

Physical gels are produced by secondary intermolecular forces that are very weak and reversible, such as hydrogen bonding, electrostatic contacts, dipole-dipole interactions, Vander Waals forces, and hydrophobic interactions. Chemical gels are connected with permanent covalent bonding. Gels are two-phase systems in which large organic particles are dissolved in the continuous phase, randomly coiling in the flexible chains, whereas inorganic particles are not dissolved but merely scattered throughout the continuous phase.

Advantage :-

1. Refraining from first-pass metabolism.
2. Practical and simple to use.
3. Enhanced pharmacological and physiological reaction.
4. Increase patient adherence.
5. Make sure it's appropriate for self-medication

Disadvantage :-

Gels Have A Relatively Slower And Longer-Lasting Effect.

Ii) Irritation may be brought on by the additives or gelators.

Iii) The water content may make gels more susceptible to microbial or fungal attack. Iv). Gels May Experience Syneresis (Expulsion Of Solvent From The Gel Matrix) During Storage. V) The Gel may become dry as a result of solvent evaporation from the formulation. Vi). Some gels' covalent bonds may make them irreversible, sealing the medication inside the gel matrix. Vii) In some gels, flocculation might result in an unstable gel. consists of the fresh or dried leaves and seed oil of

Objective:-

The study's goals were to: - Create a topical gel for the treatment of acne vulgaris; and - Restore skin moisture. To lessen aging's telltale signs.

To balance the oil production and minimise skin discoloration.

To encourage the skin's healthy regrowth. To eliminate pigmentation stains. Main chemical components are nimbin, azadirachtin, azadirachtol, azadirachtol, desacetynimbinene, nimbandiol, quercetin, beta-sitosterol, n-hexacosanol, nimbiol and nimocin.

Formulation of 10 ml gel:-

SR.NO.	INGREDIENTS	BATCH A	BATCH B	BATCH C
1	Tea tree oil	1.5 ml	2 ml	3 ml
2	Banana peel	0.1 gm	0.2 gm	0.2 gm
3	Triethanolamine	0.01 ml	0.01 ml	0.01 ml
4	Glycerine	2 ml	3 ml	3 ml
5	Vit.E	0.01 ml	0.01 ml	0.01 ml
6	Xanthan gum	0.3 gm	0.3 gm	0.3 gm
7	Sod.Benzoate	0.01 gm	0.01 gm	0.01 gm
8	Water	6.07 ml	5.95 ml	4.47 ml

Drug profile:-

BANANA PEEL:- Synonym: Banana

Skin

Family: Musaceae

Biological source: It is derived from *Musa acuminata*, *musa balbisiana*.

TEA TREE OIL:**Synonym:** Melaleuca oil**Biological Name:** (Melaleuca alternifolia).**Family:** Myrtaceae**Biological Source:** It grows in the swampy southeast Australian coast**TEA TREE OIL:****Synonym:** Melaleuca oil**Biological Name:** (Melaleuca alternifolia).**Family:** Myrtaceae**Biological Source:** It grows in the swampy southeast Australian coast.**VITAMIN E:****Fig. 9: Vitamin E Capsule****Synonym:** alpha-tocopherol**IUPAC:** (2R)-2, 5, 7, 8-Tetramethyl-2-[(4R,8R)-4,8,12-trimethyltridecyl]-3,4-dihydrochromen-6-ol**XANTHAN GUM:****Synonym:** Gum Xanthan, Rhodigel**Biological Source:** Xanthomonas campestris.**TRIETHANOLAMINE:****Synonym:** Trolamine**IUPAC:** Tris(2-Hydroxyethyl) amine, 2,2,2'-Trihydroxy Triethylamine, TEA**Formula:** C₆H₁₅NO₃**Synonym:** Glycerol**IUPAC:** Propane-1,2,3-triol

It is a colorless, odorless, viscous liquid that is sweet-tasting and non-toxic. The glycerol backbone is found in lipids known as glycerides.

Evaluation Tests:-

Colour: The gel was checked out as having a brownish hue.

- **Odour:** A small amount of gel was diluted with water, and the resulting mixture was sniffed to determine the gel's aroma.
- **Consistency:** Gel was applied to the skin to test the consistency.
- **Greasiness:** By applying it to the skin, the greasiness was evaluated.

2. **pH determination:** The gel's pH was calculated using digital pH after completely dipping the glass electrode in the gel system.

3. **Excrudability:** After the gels were set in the container, the formulation was filled and transferred into collapsible aluminium tubes. It was decided what the excrudability gel was. 4. **Spreadability:** On a glass slide covered by a second glass slide, 0.5 gramme of gel was placed inside a circle with a 1 cm diameter that had been previously delineated.

10 g of weight was placed on the upper glass slide and left there for 5 minutes.

It was observed that the gel spread and caused an increase in diameter.

The circle's diameters were measured in centimetres and used as benchmarks for spreadability.

5. **Homogeneity:** After the gels have been placed in the container, all generated gels were visually inspected to determine their homogeneity.

They underwent examinations to check for aggregates and to see how they looked. Modes:

Standard

6. **Skin irritation studies:** Test for irritation was performed on human volunteer. For each gel, five volunteers were selected and 1.0 gm of formulated gel applied on of 2.0 sq. inch to the back of hand.

6. **Antimicrobial Susceptibility Test:** The gels were examined for their physiochemical characteristics and stability before being chosen for the antimicrobial assay to determine whether any substantial changes in the activity had taken place after manufacture.

By using the agar Disc diffusion method, the gel's antifungal activity was evaluated.

An inoculum of 0.2 ml of uniformly turbid bacterial suspension was added to previously liquefied media.

The sterile petri dish was filled with the culture media (20 ml).

The media was distributed uniformly with care.

The sterile filter paper discs of 6 mm in diameter were impregnated with material and aseptically placed on the infected plates. The plates were then kept at room temperature for 30 min to allow diffusion before being incubated at 37 C for 24 h.

The antifungal activity was calculated by measuring the diameter of the zone of inhibition after the incubation period.

Result:-

The formulation and evaluation of the anti-acne gel.

The necessary amount of the active ingredient, as shown in the formulation table, was added to the anti-acne gel to create the desired consistency.

The mixture was discovered to be smooth in appearance, brownish in colour, and aromatic in smell.

A stability investigation was appropriate for the skin physiology and the spreadability was found to be good. The produced gel underwent a number of evaluation tests.

1. Physical characteristics
 2. • Shade: brownish
 3. • Good consistency; aromatic odour
- Grease: free of grease
 - 4. pH:- 4.5 3.
 - 5. Excrudability: Excellent

6. Homogeneity: Excellent
5. Skin irritability: Not bothersome
6. Antimicrobial susceptibility: The zone of inhibition measures 1.5 cm in diameter.

Conclusion:-

Tea tree (*Melaleuca alternifolia*) leaves were used to make a gel.

Tea tree oil contains compounds that may destroy bacteria, fungi, and mites as well as lessen allergic skin reactions by reducing swelling. Tea tree oil is used to treat athlete's foot, toenail fungus, and acne. It's also used to treat other ailments like dandruff, lice, and foul breath. Less toxicity risk and fewer adverse effects are benefits of topical preparation.

The mixture was discovered to be smooth in appearance, brownish in colour, and aromatic in smell.

The stability investigations were appropriate for the skin physiology, and the spreadability was deemed adequate.

The outcome is promising, but more research on optimisation is needed to determine its efficacy.

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