Abstract: Medicinal plants are used all over the world to treat various diseases due to its variety of phytochemical constituents. Ideally, topical therapy is the first line treatment for many skin diseases. Among the various topical formulations, gels have been consideredas a potential vehicle due to its non-sticky nature, stable and greater aesthetic value. The objective of this proposed study was to develop a polyherbal topical gel formulation containing *Citrus limon, Aloe barbadensis, Curcuma longa* is used to treatacne asa safe, effective and an alternative therapy to the current conventional harmful antibiotics. Medicinal plants used for this study are selected based on their antibacterialactivity. Extracts of the selected plants were combined into a gel base and evaluatedfor its physicochemical properties such as pH, viscosity, spreadability .The physicochemical evaluation of the developed formulation showed no lumps, had uniform color dispersion and from any fiber and particle. It was also observed to have easy washablity, good spreadability and pH was found to be 6.94, similar to pH of the skin. The study results concluded that the Lemon peel extract , Aloevera extract, and Turmeric extract is an aqueous gel base system is an appropriate formulation for the fortopical therapy of glowing skin, acne and moisturize the skin.

Keywords: Aloevera , Lemon , Turmeric , Antibacterial, Antiacne.

INTRODUCTION:

In human being, skin is the most susceptible part for entering of various pathogens,microorganisms and spreading of diseases. In general, acne vulgaris originates at puberty stage due to hormonal changes which ultimately results in changes in pathophysiologic factors1-3. Microorganisms such as *Staphylococcus*, and *Escherichia* species are responsible for the formation of acne. *Staphylococcus* is an abundant organism responsible for localizing cutaneous infections and colonizes in the skin. [1,8] During the puberty stage, sebum is secreted in higher amount from the sebaceous glands due to increased production of androgens. Sebum is a lipid rich secretion whichacts as a media for growing of acne causing bacteria's. The severity of acne formation is depends upon the sebum production. Acne is the 8th most prevalent disease worldwide and the prevalence of acne is about 9.4%. Globally, the epidemiology of theacne were found to be around 85% of adults in the age between 12 and 25 years old, 8% of adults in the age between 25 and 34 years, 3% of adults in the age between 35 and 44 years old and 42.5% of men and 50.9% of women are getting affected in their twenties. Acne is treated by antibiotics either oral or topical application, hormonal therapies, corticosteroids or surgery. Prolong use of antibiotics may leads to develop antibiotic resistance and various side effects such as erythema, photosensitivity, allergicdermatitis, excessive skin irritation, urinary problem, joint and muscle pain, headache, depression etc . [5,6]
Due to the increasing frequency of intake of antibiotics, expensiveness and its side effects, there is a need to focus on the scientific exploration of herbal drugs. According to World Health Organization (WHO) estimate, nearly 75- 80% ofthe worldpopulation still uses herbs and other traditional medicines for their primary health careneeds9. India has about 45,000 plant species among which, medicinal property has beenattributed to several thousands.
India is a hub for medicinal plants, about 15% out of the 20,000 medicinal plants of theworld is found growing wild in different climatic conditions10. There is a need for continuous search of indigenous drugs which can provide cheaper and better therapeutic efficacy. Literatures have proven that plants of varying potency when combined theoretically might produce the synergistic therapeutic effect. The reason for thesynergistic effect of the polyherbal formulation might be due to the potentiating effectsof other plants active constituent's leads to require lower dose to produce the desired therapeutic effect which can improve patient's. Plant such as *Citrus limon*, *Curcuma longa* and *Aloe barbadensis* possess many potential therapeutic activities due to individually presence of rich phytoconstituents.
The ripen pericarp of *Citrus limon* is reported to have several bioactive compoundsincluding geranial, Beta linalool, D– limonene, Beta myrcene, Diethyl phthalate whichare mostly used in brighten the skin, removing tan layer and provide fairness. This essential oil also used to treat erythema, papules, and vesicles upon the skin. Rhizomesof *Curcuma longa (*Zingiberaceae) have more potent superoxide anion, hydroxyl radical, singlet oxygen, peroxynitrite and nitric oxide which shows anti-inflammatory, antioxidant property and therefore used in various skin infection. Leaves of *Aloe barbadensis* (Liliaceae) is reported to have Bradykinase helps to reduce excessive inflammation when applied to the skin topically and Aloin and emodin act as analgesics,antibacterial [8,9]

Advantages:
1.It helps moisturize the skin. 2.It reduce infection and acne.3.It helps healing of wound.

Biological sources of medicinal plants:

1) Aloe vera :

Biological source: It is obtain from the dried juice of the leaves of Aloe barbadensisbelonging to family Liliaceae.

Figure no 1: Aloe Vera

2) Turmeric:

Biological sources: It is obtain from dried from dried rhizome of Curcuma longabelonging to family Zingiberaceae.

Figure no.2 Turmeric

3) Lemon:

Biological sources: Lemon peel is obtained from the fresh ripe fruits of Citrus limonbelonging to family Rutaceae

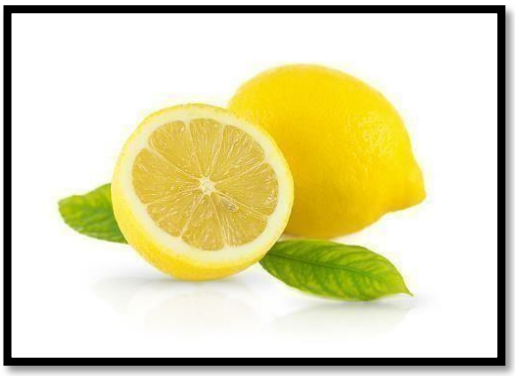

Figure no 3. Lemon

✓ **AIM AND OBJECTIVE:**

➢ **AIM :** Formulation and Evaluation Polyherbal Face Gel.

➢ **OBJECTIVES :**

- To formulate herbal face gel for improvement beauty of face.
- To moisturize the skin and give clarity and improve texture tothe skin.
- To evaluate herbal face gel for various parameters.

✓ **PLAN OF WORK:**

- Introduction
- Literature survey
- Material and methods of preparation
- Methods ofevaluation
- Result and Discussion
- Summary and Conclusion

LITERATURE SURVEY:

Sakthivel lakshmana Prabhu. Formulation and evaluation of polyherbal gel containing natura antimicrobials for the management of acne vulgaris. (2017): Acne vulgaris is collective disorder of the skin affects approximately 80% adolescents during their puberty stage. Medicinal plants are used all over the world to treat variousdiseases due to its variety of phytochemical constituents. Ideally, topical therapy is thefirst line treatment for many skin diseases. Among the various topical formulations, gelshave been considered as a potential vehicle due to its non-sticky nature, stable and greater aesthetic value. The objective of this proposed study was to develop a polyherbal topical gel formulation containing to treat acne as a safe, effective and an alternative therapy to the current conventional harmful antibiotics. Medicinal plants used for this study are selected based on antibacterial activity.

Mangesh Bhutkar Formulation and evaluation of polyherbal gel containing extracts of Azadirachta indica, Adhatoda vasica, Piper betle, Ocimum tenuiflorumand Pongamia pinnata (2018):
In the Indian system of medicine-Ayurveda, azadirachta indica, adhatoda vasica, piperbetle, ocimum tenuiflorum and pongamia pinnata has been mentioned as a remedy for treatment of various infectious diseases and ailments. Based on the folkloric use, the present studywas designed to formulate and evaluate polyherbal gel containing extractsof Azadirachta indica, Adhatoda vasica, Piper betle, Ocimum tenuiflorum and Pongamia pinnata. Gel formulations (Formulation A, B and C) were prepared which comprised of the ethanolic extracts of Azadirachta indica, Adhatoda vasica, Piper betle,Ocimum tenuiflorum and Pongamia pinnata in a concentration of 0.1, 0.3 and 0.5 %, respectively in a base.

Ajinkya Mate, Formulation and Evaluation of Polyherbal Gel for the Management of Acne (2021):
Acne vulgaris is a chronic inflammatory disorder of the skin which affects approximately 80% adolescent during pubertystage. The increasing frequency of intakeof antibiotics to overcome this problem explores several side effects. Therefore it needsto focus on the herbal formulation as a topical first-line treatment.

A.mate ,P Ade. Formulation and Evaluation of Polyherbal gel for themanagement of Acne. (2021):
Acne vulgaris is a chronic inflammatory disorder of the skin which affects approximately 80% adolescent during pubertystage. The increasing frequency of intakeofantibiotics to overcome this problem explores several side effects. Therefore it needsto focus on the herbal formulation as a topical first-line treatment .

Rajasekaran Aiyalu , Formulation and evaluation of topical herbal gel for the treatment of arthritis in animal model (2016):
The objective of the study is to formulate and evaluate a topical herbal gel containing Cardiospermum halicacabum and Vitex negundo leaf extracts for their anti-arthritic activity in rats. Twelve herbal gel formulations were prepared using 1.5% of gelling agents carbopol 934 (F1-F6) and carbopol 940 (F6-F12) and they were evaluated for physical appearance, net content, viscosity, extrudability, pH, spreadability, in vitro diffusion profile and primary skin irritation tests. The stability study for the topical herbal gel formulation was done as per ICH guidelines and anti-arthritic activity was evaluated by Freund's Complete Adjuvant (FCA) induced arthritis method.

Sharma Mayank Formulation Development and Evaluation of Novel Poly-HerbalAnti-Acne Gel (2014):
Herbal remedies are more acceptable in the view that they are safe with fewer side effects than the synthetic ones. Herbal formulations have more demanded in the market.The present work deals with the Development and Evaluation of Novel Poly-Herbal Anti-Acne Formulation containing hydro-alcoholic extract of neem leaves,(Azadirachtaindica), extract from leaves of Ocimum Sanctum (OS), Aloe vera powder &tea tree oil.Although various anti acne herbal formulations for acne are available in the market, wepropose to make use of hydro-alcoholic extract of neem (Azadirachta indica) leaves ,extract from leaves of Ocimum Sanctum (OS), Aloe vera powder &tea tree oil.

Gowada bhaska , Formulation and evaluation of topical polyherbal antiacne gelscontaining Garcinia mangostana *and* Aloe vera (2009):
The objective of the study was to develop a topical poly herbal gel for the treatment ofmild acne vulgaris. Aqueous extracts of *Garcinia mangostana* and *Aloe vera* were formulated in an aqueous based carbopol-934(1%w/w) gel system. Preformulation studies on solubility, partition co-efficient, MIC, MBC were determined along with compatibility studies using a validated HPLC method. Six formulations of the gel wereprepared by varying the proportions of polymers and evaluated for their physicochemical properties like pH, spreadability, viscosity and microbial assay. Basedon these tests, formulation F-6 containing 1% carbopol-934 was selected as bestformulation and carried over to *in-vitro* drug diffusion studies wherein it showed Cumulative Drug Release of 81.03% at the end of 8 hours with a flux of 0.0879 mg/cm2/hr.

Arun Rasheed Formulation and comparative evaluation of poly herbal anti-acne face wash gels (2010):
Rauvolfia serpentina (L). Benth. ex Kurz. (Apocynaceae) possessing antibacterialproperties are widely used in modern herbal medicines. Curcuma longa L.(Zingiberaceae), a readily available antiseptic, possess antioxidant, antibacterial, blood purifying and antiinflammatoryproperties and used in various skin creams. Azadirachtaindica A. Juss. (Meliaceae) possess astringent, antiviral, distimulant and antibacterial.

J. PRATHYUSHA, Formulation And Evaluation Of Polyherbal Face Scrubber For Oily Skin In Gel Form (2019):
Cosmetics play a vital role for everyone to have a joyful and sanguine life. In present scenario herbal cosmeceuticals have more demand because they have no side effects. People having oily skin suffer from acne, whiteheads and blackheads quite often so scrubbing become more essential. or oily skin by using turmeric, aloe Vera, cinnamon,potato starch, activated charcoal powder, honey, green tea, lemon juice, onion, walnutshell, coconut oil, beet root juice powder, sodium lauryl sulphate, water and evaluatedby using various parameters such as physical appearance, viscosity, pH, Spreadability,irritability, washability, stability studies .

Prasanna A Datar, Formulation and Evaluation of the Polyherbal Gel Prepared Using Carbopol 934 for Treating Skin Diseases in Comparison with Ointment Using Emulsifying Ointment (2017):
Present study deals with Topical Drug Delivery system composed of polyherbals including Neem, Tulsi, Aloe and Fenugreek which are having Antifungal and Antibacterial activity in the form of gel, were formulated using gelling agent asCarbopol 934 and was compared with ointment prepared by taking same herbal drugs using emulsifying ointment base B. P. The gels and ointments were evaluated for various physicochemical parameters like pH, viscocity, spreadability, skin irritation testand microbial evaluations. Among the various formulations prepared for each of the geland ointment.

❖ MATERIALS AND METHODS PREPARATIONS

Materials:
Collection of the instance such as Ripen pericarp of fruits Citrus limon (Rutaceae), leaves of Aloe barbadensis (Liliaceae) and Rhizomes of Curcuma longa (Zingiberaceae). The specimens for the proposed study were collected and authenticated. [10]

(1) Extraction of the pericarp of fruits Citrus Limon (Lemon peel)

Citrus Limon peels were collected from an lemon peel manufacturer. The peels werethen washed and fully dried in an oven at 60ºC for 72 hrs. Using Mortar and pestle the dried peels were powdered with particle size ranging of 0.5 mm to 0.1 mm and sockedin methanol with mass to volume ratio 1:25(g/mL) for 72 hrs. It was then filtered through Whatman No. 1 filter paper and collected into glass Petriplates (Figure 1). Thiscomplete process of extraction and purification was repeated two-three times followedby evaporation of the collected extracts and dry at 37°C. [6,7]

Figure 4: Extract of the pericarp fruits Citrus limon (lemon peel)

(2) Extraction of leaves of Aloe barbadensis (aloe vera)

Aloe Vera leaves collected from the local nursery. The leaves washed with water and rinds were removed **(Figure 2).** The inner gel scrapped and cut into pieces, solar-driedat 30-45oCfor 3 weeks and dry gel particles were collected. [2,3]

Figure 5: Extract of leaves of Aloe barbadensis (Aloe vera)

(3) Extraction of Curcuma longa (Turmeric extract)

Take 20gmof ***Curcuma longa*** powder was mixed with a sufficient amount of n-Hexaneand kept aside for 2 hrs. Then the solution was filtered and then precipitated powder was mixed within acetone for 10-15 minutes. The solution was filtered again and the filtrate was dried in air **(Figure 3)**, the extracted curcumin was isolated by scrapping using a spatula. [7,4]

Figure 6: Extraction of Curcuma longa (Turmeric extract)

(4) Antibacterial Activity

➢ **Preparation of inoculum**

Uniform suspension of microorganism is obtained by suspending 24 h fresh culture ofbacteria (*S. aureus and S. epidermis*) in several 15mL of the sterile water.[1,3]

➢ **Determination of the zone of inhibition**

Agar well diffusion method was used to determine the antibacterial activity of the prepared extract. Transferred 20 mL of liquefied agar medium previously inoculated with 0.1 mL bacteria into the sterile petri dish having an internal diameter of 8.5 cm andallowed to form the uniform thickness of the medium in the petri dish. After complete solidification of the liquefied inoculated medium, the wells were made asepti- cally withcork borer having 6 mm diameter. 100mg/mL of each extract was carefully added into the well and the plates were kept for 30 min for pre-diffusion of the extracts. After pre-diffusion, the Petri plates were incubated at 37ºC for 24 hrs in the incubator and measured the zone of inhibition for its antibacterial activity. [3, 4]

➢ **Method of Preparation of Gel Containing Extract**

The topical gels were prepared which comprised extract of orange peel, aloe vera, and turmeric with a different concentration (Table 1). The gels were prepared by using Carbapol 940, propylene glycol-400, ethanol, methylparaben, propylparaben, EDTA, triethanolamine and required amount of water in a sufficient quantityto prepare 50 g ofgel. Water required for these formulations was divided into two parts. In one part, an accurate amount of extracts were separately dissolved in 15 mL of water and to this calculated quantity of propylene glycol-400 and ethanol were added.8 In another part, Carbapol-940 was dissolved in 35 mL and to this solution methylparaben, propylparaben EDTA(Ethylenediaminetetraacetic acid) were added. (15) Both ofthese solutions were mixed in a beaker and triethanolamine was added dropwise to the formulation for adjustment of required skin pH (6.8—7) and to obtain the gel with re- quired consistency. It was then stirred by using propeller for 2 hours at 500 rpm. After stirring, the prepared gel appeared to be homogeneous and devoid of any bubbles. The prepared gel was kept at room temperature for 24 hours.[2,4]

Table 1: Formulation of polyherbal gel with different concentration of herbalextract

Step-1

Sr. No	Ingredient	F1	F2	F3	F4
1	Lemon peel extract	0.1%	0.2%	0.3%	0.5%
2	Aloe Vera extract	0.5%	1.5%	2.0%	2.5%
3	Turmeric Extract	0.6%	0.9%	1.2%	1.5%
4	Propylene glycol-400	4%	4%	4%	4%
5	Ethanol	3%	3%	3%	3%
6	Water	15ml	15ml	15ml	15ml

Table 2: (Continued) Step-2

Sr.No	Ingredients	F1	F2	F3	F4
1	Carbapol-940	1%	1%	1%	1%
2	Water	35ml	35ml	35ml	35ml
3	Methylparaben	0.2%	02%	0.2%	0.2%
4	Propylparaben	0.02%	0.02%	0.02%	0.02%
5	Ethylenedi-amine(EDTA)	0.03%	0.03%	0.03%	0.03%
6	Triethanolamine	0.025%	0.025%	0.025%	0.025%

METHODS OF EVALUATION:

Physicochemical evaluation of formulations:

Physical evaluation

Physical parameters such as color, homogeneity, phase separation and uniformity werechecked visually.

pH

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

Rheological study

By using Brookfield viscometer, the viscosity of the formulated batches was determined. In a procedure, a definite quantity of gel was added to a beaker covered with a thermostatic jacket. The gel was rotated at 100 rotations per minute with spindle 7. 17 [9]

Figure 7: Brookfield viscometer

Spreadability:

Two sets of a glass slide with standard dimension were taken. Polyherbal formulation gel was placed in between the two slides and sandwiched about the length of 60mm. Removed the adhered excess gel on the surface of the glass slides and fixed to a stand without any disturbance. In the upper slide, 20 g weight was tied and noted the time taken for movement of the upper slide to the distance of 60mm under the influence of weight.18 Meantime was calculated by repeating the experiment three times and the spreadability was calculated using the following equation 1. Spreadability = (Weight × Length) / Time [7]

Antibacterial activity studies :

Transferred 20 mL of liquefied agar medium previously inoculated with 0.1 mL bacteriainto the sterile petri dish having an internal diameter of 8.5 cm and allowed to form theuniform thickness of the medium in the petri dish. After complete solidification of the liquefied inoculated medium, the wells were made aseptically with cork borer having 6mm diameter. 500mg concentrations of polyherbal gel were weighed and diluted with 2 mL of sterile water in sterile test tubes. The drug solution was carefully transferred into the cup and incubated at 37 °C for 24 h and the zones of inhibition were measured. [5,8]

❖ RESULT AND DISCUSSION:

In general, oral or topical antibiotic formulation is used for the treatment of skin diseases. Traditional medicinal and aromatic plants are interesting and explore its various bioactive natural organic compounds for various treatments. In the last two decades, more research has been carried out towards the identification of the bioactivecompound from medicinal plants and developing into drug for the various treatments.

Antibacterial activity:

The antibacterial activity study results showed that all the selected herbal plants showed antibacterial activity against acne causing bacteria staphylococcus aureus and staphylococcus epidermis. The antibacterial activity study.

Physicochemical evaluation of Gel formulation :

Physicochemical parameters like color homogencity, presence of fiber and particles, washability, pH and viscosity are evaluated. The visual inspection of the prepared formulation indicated no lumps and to have uniform color dispersion, free from any fiber and particle, easy washable, pH was found to be 6.94, it is near to the skin pH which indicates that the prepared formulation can be compatible with skin and viscositywas found to be 6506 cps.

Spreadability

Rheological property of the semisolid formulations gel can be assessed by spreadability. Spreadability test is a qualitative tool to evaluate physical state as well asthe bioavailability of the formulation. The spreadability value was found to be 7.1±0.1 (gm. cm/sec) which indicates the better spreadability of the formulation.

Antibacterial activity of the formulation

The antibacterial activity studies were performed by well diffusion method by measuring the zone of inhibition (in mm). The study results of the polyherbal gel showed antibacterial activity in a dose dependent manner against the bacteria's causingacne. The antibacterial activity study of the formulation is shown in Fig.8.

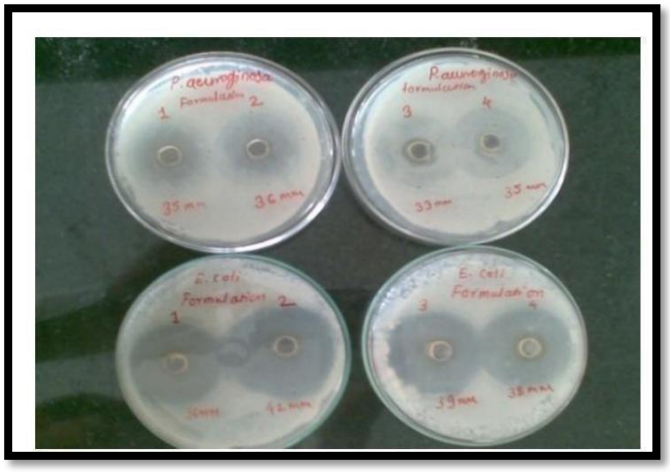

Figure 8: Zone inhibition study of polyherbal gel formulation

On storage of anti-acne polyherbal gel sample at 40±2 C at 72±5% RH, the appearanceof the formulation was found to be formulation F2 be clear with no significance variation in pH, spreading coefficient and viscosity .

Table 2 : Observation table

Sr. no	Parameters	Result
1	Appearance	Clear
2	Colour	Yellow
3	pH	6.94
4	Viscosity	6506cps

❖ SUMMARY AND CONCLUSION:

The objective of this proposed study was to develop a polyherbal topical gel formulation containing Citrus Limon, Aloe Barbadensis and Curcuma Longa treat acneas a safe, effective and an alternative therapy to the current conventional harmful antibiotics.

Recently herbal medicines are more considered as safe with fewer side effects thansynthetic drug for the treatment of acne vulgaris. Therefore In the global market. Naturalremedies including herbal formulation are in great demand. It is a very good attempt toformulate and evaluate the polyherbal anti-acne gel along with the stability studies. Based on this studies, polyherbal anti-acne gel prepared from the extract of Citrus limonAloe barbadensis and Curcuma longa showed significant antibacterial activity on Staphylococcus aureus and staphylococcus epidermis with no irritation. The polyherbalgel showed a synergistic effect as compared to individual extract with good stability. Thus the studyresult concludes that the formulated polyherbal gel with extract of Citruslimon, Aloe barbadensis and Curcuma longa with concentration 0.2%, 1.5% and 0.9% respectively can be used for the treatment of acne vulgaris.

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