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A REVIEW OF HERBAL ANTI-ACNE GEL FORMULATION AND EVALUATION

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ABSTRACT

An herbal anti-acne gel was made using Ocimum sanctum, Tabernaemontana divaricate aloe Vera, and tea tree oil. Its antibacterial activity against Propionibacterium acnes was tested, and compared with a standard antibiotic and a marketed herbal product formulation 5 showed the activity[1] acne vulgaris is a common skin problem that effect most people almost every person experienced at least once in their life especially teenagers[2] herbal anti-acne gel using extracts of Bougainvillea glabra, antibacterial activity against Escherichia coli and Bacillus subtilis. This herbal gel may help in acne treatment.[3] The medicinal plants can reduce acne lesions and severity with few side effects. Therefore, herbal treatment may be useful for mild to moderate acne.[4] Nowadays, people are using more herbal medicines. This research makes and research an herbal anti-acne face gel with dried guava leaf powder. Guava leaves have lots of antioxidants, antibacterial and anti-acne properties, plus vitamins B and C. Both good and bad bacteria are affected by guava's antibacterial power.[5] This review focuses on making a herbal anti-acne gel using Nymphaea pubenscens and Achyranthes aspera plant extracts. The gel was prepared using Carbopol 940 as the base. After preparation, the gel was tested for its pH, appearance, and thickness.[6] Acne is a common skin issue in teens. The gel was tested and worked well-it was stable, gentle on the skin and fought bacteria. It could be a safe acne treatment.[7] Acne is caused by the sebaceous gland, leading to solid bumps[papules] and filled spots[pustules] on the skin. It also aims to clear excess waste and toxins from the body. Making an herbal face wash with water-based extracts of neem leaves, turmeric roots, aloe

vera and green tea is a promising idea.[8] Modern medicines are available to treat acne, which usually appears as pimples, blackheads, whiteheads, nodules and sometimes causes scarring. The prepared'' gel was also tested for various physical properties such as colour, smoothness, spreadability, viscosity, and pH. The topical gels are prepared by using natural plant extracts such as aloe vera, Allium cepa, and Eucalyptus to check their effectiveness against acne.[9]

KEYWORDS: Acne vulgaris, formulations, herbal gel, neem, turmeric, aloe vera, clove, tea tree oil.

1. INTRODUCTION

Acne vulgaris is a very common skin condition that affects the face, back, and trunk—areas with the greatest oil glands. The pathophysiology of acne is significantly influenced by the oxygen-independent pathogen Propionibacterium acnes (P. acnes). Its capacity to activate complements and convert sebaceous triglycerides into fatty acids, which chemotactically draw neutrophils, is linked to the development of inflammatory acne. Acne is one of the most socially vexing skin problems, especially for teens who have to deal with a disfiguring disease that appears just when sexual maturation makes them most sensitive about their appearance, even if it poses no serious danger to general health. Furthermore, severe acne can result in skin scarring that lasts into adulthood and causes social discomfort. Antibiotics have been used to treat acne vulgaris for a long time.[1] Although the prevalence of acne peaks in adolescence, a significant portion of men and women in their 20s and 30s are also afflicted. Acne is caused by the fast growth of microorganisms such as Staphylococcus aureus, Propionic bacterium acnes, and Staphylococcus epidermidis. The inflamed glands brought on by infections, medications, hormones, stress, and genetics. Sebum is produced and secreted by the androgen-sensitive sebaceous glands. An increase in the hormones known as androgens in both boys and girls during puberty, hormonal changes associated with pregnancy or beginning or stopping birth control pills, stress, skin irritation, and heredity are some of the causes of acne. Large volumes of aqueous hydroalcoholic liquids are trapped in a network of colloidal solid particles to create gels, a relatively new class of dosage form. These particles can be inorganic (like aluminium salts) or organic (like tragacanth, carrageen, pectin, agar, and alginic acid), semi-synthetic (like methyl cellulose, hydroxy ethyl cellulose, hydroxyl propyl methyl cellulose, and carboxy methyl cellulose)[2] Gels are intended to promote a healthier, more radiant complexion while hydrating, calming, and revitalising the skin. Face gels, in contrast to creams or lotions, have a light, water-based consistency that

makes them perfect for persons with oily or acne-prone skin because they absorb quickly and don't leave behind a greasy residue.[6] Acne is a chronic inflammatory condition of the pilosebaceous follicles that results from multiple factors, including increased sebum production due to androgens, changes in follicular keratinization, hormonal imbalances, immune hypersensitivity, and colonisation by bacteria (Propionibacterium acnes). While acne is not as urgent as a life-threatening illness and does not affect overall fitness, it can lead to significant long-term consequences, including both physical and emotional scars that may persist for a lifetime. It can have a detrimental impact on an individual's self-confidence, causing physical, social, and psychological issues, as well as reducing self-esteem and inducing emotional distress. Although this condition rarely results in death, it often leads to considerable physical and psychological suffering. Statistics indicate that around 85 per cent of young adults between the ages of 12 and 25 experience acne at some point in their lifetime, approximately 8% of individuals aged 25 to 34, and 3% of adults aged 35 to 44. In the case of acne vulgaris, a well-documented connection is present between testosterone levels and the production of sebum. The condition begins with the enlargement of sebaceous glands that is induced by androgens, leading to an overproduction of sebum. Within these glands, enzymes that metabolise steroids convert dehydroepiandrosterone sulphate (DHEAS) into dihydrotestosterone (DHT). Moreover, testosterone is converted into the more active DHT by two types of the enzyme 5-α-reductase, specifically type-1 and type-2, which are found in tissues such as sebaceous glands, dermal papillae, genitourinary tissues, hair follicles, as well as on the scalp and chest.[3]

2. CAUSES OF ACNE

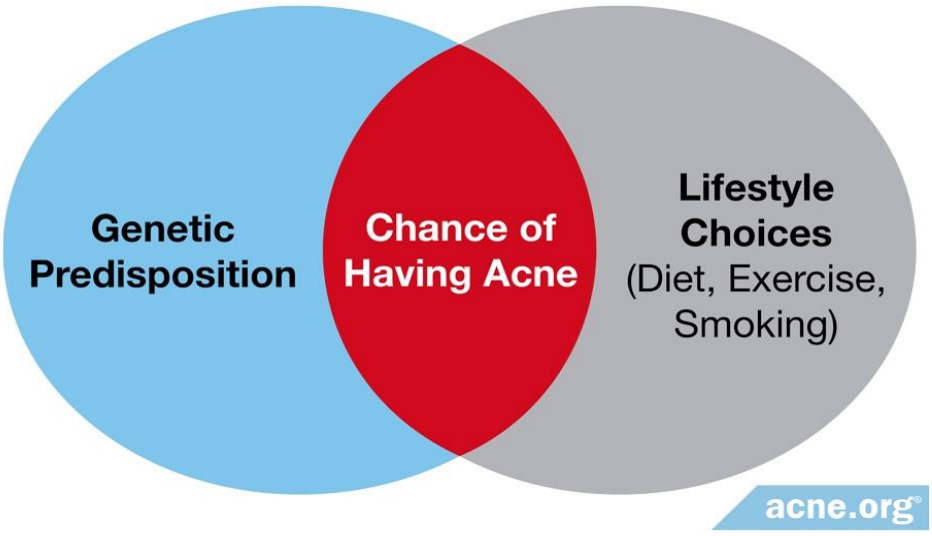
2.1 Infection contribution

Human skin contains pores that link to oil glands situated beneath the surface. Follicles serve as connectors between the glands and the pores. These follicles are tiny sacs that generate and release liquid. The glands produce a fatty substance known as sebum. Sebum transports dead skin cells through the follicles to the outer layer of the skin. A fine hair emerges from the follicle, extending outside the skin. Pimples form when these follicles become clogged, causing oil to accumulate beneath the skin. Skin cells, sebum, and hair can combine to create a plug. This plug can become infected with bacteria, leading to inflammation. A pimple begins to form when the plug starts to disintegrate. Propionibacterium acnes (P. acnes) is the name of the bacteria that live on the skin and contribute to the infection of pimples.

2.2 Genetic contribution

In order to understand the research investigating which genes may lead to an increased susceptibility to acne, it's important to grasp the concept of genetic predisposition. Genetic predisposition is an increased probability of developing a disease due to the genes you inherited from a parent. A genetic predisposition for acne means that a person has a genetic makeup that may increase the chance of that person developing acne during his or her life.

However, if a person has a genetic predisposition for acne, it does not mean that they will definitely develop acne. This is because the manifestation of genes is often controlled through lifestyle choices, like diet, exercise, or smoking. For example, if two people have the same genetic predisposition for acne but widely different lifestyles, one may develop more severe acne than the other, or one may develop acne and the other may not.[2]



2.3 Hormonal changes

Hormonal acne happens when fluctuations in your hormones cause your pores to get clogged and your skin to become inflamed. Androgens, like testosterone, are usually the main culprits—they can boost oil production, and more oil means more chances for pimples, cysts, and blackheads to appear. While most people think of acne as a teenage problem, hormonal acne can affect both teens and adults, especially during times of hormonal changes like puberty, your period, pregnancy or menopause.

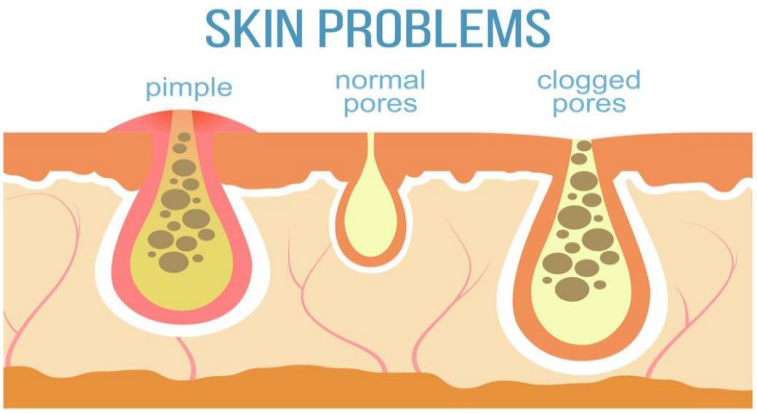
Unlike typical acne caused primarily by bacteria or external irritants, hormonal acne is caused by factors inside your body, which can make it a bit trickier to manage. For many women, hormonal acne tends to get worse in the days leading up to their period when estrogen levels drop, and androgens increase. This hormonal imbalance triggers the skin's oil

glands to go into overdrive, which is why breakouts often seem to follow a cycle.

Cleansing and exfoliating can help, but for hormonal acne, they're often not enough to keep breakouts under control long term.[9]

3. STAGES OF ACNE

3.1. Early Stage – Clogged Pores (Microcomedones)



What happen

Oil (sebum) + dead skin cells block pores

Not visible yet (very early stage)

This is the starting point of all acne

3.2 Comedonal Acne – Whiteheads & Blackheads

Comedonal acne may not resemble typical acne, leading many to not recognise it as acne. It includes blackheads and whiteheads, which are non-inflamed and neither painful, red, nor pus-filled.

Comedones start as small, non-inflamed bumps, known as papules, that can be closed or open. They are commonly found on the forehead, chin, and jawline, but can appear on the face, neck, shoulders, back, or chest.

The severity of comedonal acne can vary from mild, with a few blemishes, to severe, covering large areas of the skin. They can occur alone or alongside acne vulgaris.

3.3 Inflammatory Acne – Papules & Pustules

Inflammatory acne causes red, swollen, painful blemishes on your skin, often on your face, back, chest and shoulders. The pustules, nodules or cysts contain bacteria, pus, dead skin cells and excess oil. Over-the-counter skincare products can help clear your skin.

3.4 Severe Acne – Nodules & Cysts

Of acne is thought to be complex, involving aberrant keratinization and elevated sebaceous gland activity of follicles, microbial activity, and ensuing inflammation.

The following are particular risk factors for nodulocystic acne:

Genetic variables medications including imatinib, etanercept, and anabolic steroids; dietary supplements like whey; and hemodialysis.

3.5 Healing Stage – Marks & Scars

Acne scars represent permanent structural changes to skin. When severe acne damages the deeper layers of skin, body attempts to repair this damage by producing new collagen fibres. Sometimes it produces too little collagen, creating indented scars. Other times it produces too much, forming raised scars. There are three main types of acne scars: atrophic scars (the most common, appearing as indentations), hypertrophic scars (raised above skin level), and keloid scars (thick, raised scars that extend beyond the original wound area.[9,7]

4. ACTIVE HERBAL INGREDIENT

4.1. Antibacterial and Anti-Inflammatory Ingredients

These herbs lessen inflammation, stop infection, and eradicate Cutibacterium acnes, the bacteria that cause acne.

Nimbidin and azadirachtin, which have potent antibacterial and antifungal qualities to stop acne outbreaks, are found in neem (Azadirachta indica).

Melaleuca alternifolia, or tea tree oil, is a naturally occurring antimicrobial that combats germs that cause acne and lowers inflammation.

Curcumin, which has anti-inflammatory and antioxidant qualities and helps lessen acne swelling and redness, is abundant in turmeric (Curcuma longa).

Basil (Ocimum sanctum): Also referred to as holy basil or Tulsi, this plant possesses calming and antimicrobial properties that aid in the natural treatment of acne.[12]

4.2 Sebum-Regulating Ingredients

These ingredients help control excess oil production, which is a major cause of acne. Green Tea Extract (Camellia sinensis) – Contains epigallocatechin gallate (EGCG), which reduces sebum production and prevents oxidative stress on the skin. Lemon Extract (Citrus limon) – Acts as a natural astringent, helps control excess oil, and brightens acne scars. Cinnamon Extract (Cinnamomum verum) – Has antibacterial and sebum-controlling properties, helping to prevent clogged pores. Horsetail Extract (Equisetum arvense) – A natural astringent that reduces sebum secretion and tightens skin pores. Burdock Root (Arctium lappa) – Helps in detoxifying the skin by removing excess sebum and toxins. Rosemary Extract (Rosmarinus officinalis) – Controls excess oil production while preventing bacterial growth. Sandalwood Powder (Santalum album) – Known for its oil-absorbing and anti-inflammatory effects, reducing acne breakouts.

4.3 Skin Soothing and Healing Ingredients

These components aid in encouraging wound healing, lowering redness, and calming irritated skin.

Aloe Vera (Aloe barbadensis miller) helps acne-prone skin heal by hydrating, calming, and promoting wound healing.

Liquorice extract (Glycyrrhiza glabra) gives the skin a more even tone by reducing pigmentation and scars left by acne.

Because of its relaxing and anti-inflammatory properties, chamomile extract (Matricaria chamomilla) is perfect for skin that is sensitive and prone to acne.

Rich in flavonoids and saponins, calendula extract (Calendula officinalis) helps heal wounds and lessens skin irritation.

Asiaticosides, found in gout kola (Centella asiatica), aid in skin regeneration and lessen acne scars by encouraging the creation of collagen.

Tagetes erecta, or marigold extract, has antibacterial and anti-inflammatory qualities that help relieve skin prone to acne.

Lavender oil (Lavandula angustifolia) is a naturally occurring relaxing substance that helps

lessen skin irritation and redness.

4.4. Natural Exfoliating and Detoxifying Ingredients

These ingredients help in removing dead skin cells and unclogging pores, which prevents acne formation. Salicylic Acid (From Willow Bark – Salix alba) – A natural beta-hydroxy acid (BHA) that exfoliates the skin and prevents pore blockages. Clay Extracts (Kaolin or Bentonite Clay) – Absorb excess oil and impurities, helping to detoxify acne-prone skin. Papaya Extract (Carica papaya) – Contains papain enzyme, which helps in gentle exfoliation and clearing clogged pores. Pineapple Extract (Ananas comosus) – Rich in bromelain enzyme, which reduces inflammation and promotes skin renewal. Apple Cider Vinegar (ACV) – A natural exfoliator that balances pH and helps in removing excess oil from the skin

5. HERBAL DRUGS USED IN ACNE TREATMENT

5.1 Aloe-vera

- Aloe vera can also be used to moisturise and soften skin.
- Aloe vera has the ability to reduce facial pigmentation and dark patches

Properties

- Antibacterial Activity
- Anti-inflammatory
- Antiacne

5.2 Turmeric

Chemical constituents

- Curcumin
- Curcuminoids

Uses

- Commonly used as a spice
- Used as a colouring agent.
- Used in various medications.

Properties

- Antioxidant
- Antimicrobial
- Anti-inflammatory
- Anti-septic

5.3 Neem

- **Chemical constituents**
- Nimbin
- Quercetin

- **Uses**
- Reduce acne.
- Reduce bacterial growth.
- Used in the preparation of dental products and hair products.

- **Properties**
- Anti-fungal
- Anti-microbial

- Anti- inflammatory
- Anti-acne
- Anti-ulcer

5.4 Honey

Chemical constituents

- Maltose
- Glucose

Uses

- Provide hydration to the skin
- Nourish skin
- Improve skin appearance

Proper ties

- Anti-bacterial
- Antioxidant

5.5 Clove

Chemical Constituents

- Volatile oil
- Eugenol
- Acetyl Eugenol
- Tannin

Uses

- Commonly used as a spice.
- Used in beverages.
- Used in dental products.

Properties

- Anti-microbial Properties
- Antioxidant Properties
- Anti-inflammatory
- Anti -viral activity

5.6 Tea tree oil

6 **Chemical Constituents**

7 Terpinene-4-ol

8 Gamma-Terpinene

9 A-Terpinene Terpinolene

10 **Uses**

11 Used in fungal infections.

12 Helps in reducing itching, redness and dryness.

13 Act as an anti-septic for minor wounds

14 **Properties**

15 Anti-acne

16 Antiviral

17 Anti-bacterial

18 Anti-fungal

6. FORMULATION OF HERBAL GEL

Following preformulation tests, gels of the samples (Eucalyptus and Allium cepa) and aloe gel were made at a concentration of 5%. In a different beaker, Carbopol 940 was added to distilled water and continuously stirred. In a separate beaker, 5 mL of distilled water was used to dissolve propylparaben and methylparaben. After adding the extracts, the mixture was completely levigated. The aforementioned mixture was then added to the Carbopol mixture and thoroughly stirred. Propylene glycol and triethanolamine were then added to the dispersion in drops while swirling steadily and continuously to get the pH down to 6.8–7.4 (neutralised).

Constituents for the formulation of gels

Ingredient	Part used	Concentration (%)	Use/function
Ethanolic extract of *Allium cepa*	Bulb	5	Antiscarring, anti-inflammatory
A slurry of *Aloe vera*	Large leaves	5	Kills acne-causing bacteria, scars, and moisturiser
Extract of *Eucalyptus globulus* by hydrodistillation	Leaves	5	Antiacne agent
Carbopol 940	—	1	Gelling agent
Methylparaben	—	0.1	Preservative
Propylparaben	—	0.1	Preservative
Triethanolamine	—	2	Neutralizer
Propylene glycol	—	2	Humectant
Distilled water	—	QS	Vehicle

7. EVALUATION OF HERBAL ANTI-ACNE GEL

After formulation, the gel is tested for quality, stability, and efficacy.

7.1. Physical Evaluation

Appearance: The gel should be smooth, uniform, and free from lumps. Colour and Odour: Should be natural and pleasant, without signs of degradation.

7.2 pH Measurement

Measured using a pH meter, the ideal range is 5.5–6.5 to match the skin's natural pH.

7.3 Viscosity

Determined using a Brookfield viscometer to ensure proper spreadability and consistency.

7.4 Spreadability Test

Measured by placing a fixed amount of gel on a glass plate and observing its ability to spread under pressure.

7.5 Stability Studies

Accelerated stability testing at different temperatures (4°C, 25°C, 40°C) is conducted to check separation, discolouration, or microbial growth.

7.6 In-Vitro Antibacterial Activity

Tested using the Agar Well Diffusion Method against Cutibacterium acnes (a common acne-causing bacterium) to evaluate antimicrobial efficacy.

7.7 Skin Irritation Test

Performed on volunteers or animal models (as per ethical guidelines) to check for irritation or allergic reactions.

8. ADVANTAGES OF ANTI ACNE HERBAL GEL

- 8.1 Natural and Safe for Skin
- 8.2 Antibacterial and Anti-inflammatory Properties
- 8.3 Fewer Side Effects
- 8.4 Cost-Effective and Easily Available
- 8.5 Good Patient Acceptance

CONCLUSION

The study shows that combining different herbal oils and natural ingredients can improve the effectiveness of the product the prepaid formulation showed good activity against anti acne causing bacteria. Therefore, this herbal formulation can be further developed and tested for a commercial anti-acne product.[2] The extract of Bougainvillaea glabra showed antibacterial activity against E. coli and Bacillus subtilis. The petroleum ether extract showed the highest activity but was less effective than Clindamycin. The formulated gel was found to be safe and

useful for treating acne.[3] Studies show that herbal and phytochemical treatment can help reduce symptoms of acne vulgaris, such as lesions, oil production, and disease severity and may improve patients' quality of life. Herbal medicines can be used alone or together with standard treatment, which may also help reduce side effects. Overall, herbal therapy shows promising results for acne treatment.[4] This study shows that a herbal anti-acne face made from guava leaves can be useful for skin care and acne treatment. It is considered safer and has fewer side effects than chemical products. The guava leaf extract contains natural substances like phenols, flavonoids, and tannins, which help in killing bacteria and protecting the skin. The gel was tested and found to have antibacterial activity, especially against bacteria like Staphylococcus aureus and E. coli. Among the prepared gel samples, F2 gave the best results. Overall, this herbal gel can be a good natural product for reducing acne and improving skin health.[5] Acne is a very common skin problem, and many people get it at least once in their lives. It usually affects teenagers, but adults can also have acne. In this study, many people preferred herbal remedies instead of chemical medicines because chemical products may cause side effects like skin irritation, scaling, redness, itching, pimples and dryness. So, this project prepared an herbal anti-acne gel as a safer and cheaper treatment. The main aim was to make a safe, affordable, and effective anti-acne gel using natural ingredients with no harmful side effects on the skin.[6] This research focused on creating an herbal gel to treat acne using extracts of Aloe vera and curcuma longa in a water-based gel system. Four gel formulas were made by changing the amount of gelling agents and were tested for physical-chemical traits such as PH, spreadability, thickness, and skin irritation, plus microbial safety checks. From these tests, formula G3 was chosen as the best. The microbial testing of all formulas showed better activity against various germs, matching or beating a standard product. The study concluded that this work could advance acne therapy with herbs and help develop safe, effective herbal treatment for managing diseases.[7] Herbal products are becoming very popular worldwide. Making an herbal face wash with water-based extracts of neem leaves, turmeric rhizomes, aloe vera, and green tea is a good idea. These plants are known in research for their strong antimicrobial, anti-inflammatory and refreshing properties. The evolution shows that both formulations give results as good as marketed face washes and do not cause any side effects or skin irritation.[8] Acne vulgaris is a very common skin problem that most people experience at some time in their lives. The combination of Aloe vera leaf extract, eucalyptus globulus oil, and allium cepa bulb extract works well together to treat acne. The gel also showed suitable physical and chemical properties, making it appropriate for use in acne treatment.[9]

REFERENCE

1. H.A Sawarkar*, S.S. Khada. Development and Evaluation of Herbal Anti-Acne Gel. International Journal of Pharm Tech Research.
2. M. Santhosh Aruna*, A. Sravani. Formulation and Evaluation of Herbal Acne Gel. World Journal of Pharmaceutical Research.
3. Madhukar Shende*, Ravi Khatri. Development and Evaluation of Anti-Acne Topical Gel Formulation Enriched with Herbal Extracts. International Journal of Medical & Pharmaceutical Sciences.
4. Ana Carolina Proenca, Ana Paula Duarte. The Role of Herbal Medicine in the Treatment of Acne Vulgaris. Wiley Online Library.
5. Aleena Musthafa, Emilin Mathew. Formulation and Evaluation of Herbal Anti-Acne Face Gel. World Journal of Pharmaceutical Research.
6. Dipesh Kumar, Tilotma Sahu. Review of Herbal Antiacne Gel. International Journal of Progressive Research in Science and Engineering.
7. Chandrasekar R, G. Satheesh Kumar. Formulation and Evaluation of a Polyherbal Anti-Acne Gel. Research Journal Topical and Cosmetic Sciences.
8. Susmitha Biyyala, Teja Nayudu. Formulation and Evaluation of Anti-Acne Herbal Gel. Innovative Journal of Medical Sciences.
9. Julia Afrakoma Ansong, Emmanuel Asante. Formulation and Evaluation of Herbal-Based Antiacne Gel Preparations. Biomed Research International.
10. Dipesh Kumar, Yashraj Sahu. Review of Herbal Antiacne Gel. International Journal of Progressive Research in Sciences and Engineering.
11. Suryawansh Pranjali Atmaram, Mr Syed Abdul Azeem. A Review on Formulation and Evaluation of Herbal Antiacne Gel. Journal of Emerging Technologies and Innovative Research.
12. Rahul Rangila, Arshdeep Kaur Sidhu. Formulation and Evaluation of Herbal Anti-Acne Gel. International Journal of Pharmaceutical Science and Research.