iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** VI **Month of publication:** June 2023

DOI: https://doi.org/10.22214/ijraset.2023.53837

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue VI Jun 2023- Available at www.ijraset.com

Formulation and Evaluation of Herbal Antiacne Face Serum

Miss. Bhakti Shriram Patil[1], Miss. Bhagyashri Govind Patil[2], Miss. Bhagyashri Sunil Patil[3], Mr. Amit Dhankani[4], Dr S.P. Pawar[5]
[1,2,3]Student, [4]Professor, [5]Principal, P.S.G.V.P Mandals College of Pharmacy, India

Abstract: ***Although acne is a common bacterium on human skin, it acts as a primary pathogen that causes skin irritation and inflammation. Because of the resistance of acne-causing bacteria to antibiotics, research on novel antibacterial chemicals is crucial. This present research work aims to formulate and evaluate herbal anti-acne face serum containing extract of Neem, Aloevera, Hibiscus, and Nutmeg essential oil. The pinene component of nutmeg oils was principally responsible for their antibacterial properties. various vitamins, like vitamins B12, A, C, and E, as well as enzymes, anthraquinones, minerals, carbohydrates, proteins, hormones, saponins, and lignin are found in aloevera plants. Aloevera has anti-inflammatory & antibacterial properties therefore it can decrease acne & reduce skin inflammation. Saponins, flavonoids, and tannins are antimicrobial substances found in hibiscus flowers (Hibiscus rosa sinensis L.). The best antibacterial activity is seen in neem (A. indica) leaf extract. This study provides information that A. indica leaves have an anti-P. Acne activity which causes acne. Based on this research, herbal antiacne face serum significantly inhibited Staphylococcus aureus and Staphylococcus epidermis growth without causing any irritation.***

Keywords: Anti-acne face serum, acne, A. indica, Hibiscus rosa sinensis L, p.acne

I. INTRODUCTION

Serum is a concentrated solution which is commonly used in cosmetology. In water or oil, the cosmetic serum is just as potent as any other cream Therefore, it deals with the skin problem quickly and effectively.

Because serum is composed of a small molecule that can penetrate the skin deeply and deliver a very high concentration of active substances, it is especially well suited for this role. This makes them a tool to identify specific skin care concerns, such as colour, signs of aging, acne.

A skin condition called acne vulgaris causes acne. It is one of the most prevalent skin conditions and can cause comedones or severe inflammatory lesions on the face, back, and chest. The condition of the disease is linked to an increased rate of sebum excretion .[1-4].

A persistent inflammatory process of the polisebasea glands that results in the development of blackheads, papules, pustules, and nodules is the cause of acne [5]. Numerous elements, including hormones, foods, genetics, stress, inflammation, and bacteria, contribute to acne [6].

According to reports, Propionibacterium acnes bacteria are the primary cause of acne-related inflammation [7]. Moreover, acne lesions have reportedly been shown to contain germs such Staphylococcus aurous and Staphylococcus epidemidis [8].Giving antibacterial is one step that can be taken to treat acne. Acne can frequently be treated with antibiotics. In this instance, an antibiotic functions as a chemical that might hinder bacterial growth or even cause bacterial death by interfering with its metabolism.

Using antibiotics derived from natural resources is an alternate method for treating acne. One of the compounds created by plants, essential oil, contains the oxygenated hydrocarbon substance (phenol), which has antibacterial properties [2, 3, 5]. Certain essential oils, like nutmeg oil, work as anti-bacterial to treat acne. Its capacity to activate complements and its capacity to metabolize sebum triglycerides into fatty acids, which chemo tactically attract neutrophils, are implicated in the development of inflammatory acne [9].S. epidermidis, an aerobic organism, is usually involved in superficial infections within the sebaceous unit. [10] Modern acne therapy has been designed to interrupt the pathogenic pathway at one or more points. For the treatment of acne, there are two options: topical therapy, which uses comedolytic agents, antibiotics, and various anti-inflammatory medications, and systemic therapy, which uses antibiotics, zinc, and hormones. The excessive use of antibiotics for long periods has lead to increased resistance in acne causing bacteria i.e. P. acne and S. epidermidis against antibiotics that used to treat acne. [11] To overcome the problem of antibiotic resistance, essentials oils and medicinal plant extracts have been extensively studied as an alternative. Herbs are safe, efficacious and multifunctional. Herbs and naturally derived compounds have less adverse effect than synthetic agents in topical acne treatments [12].

© IJRASET: All Rights are Reserved |

In the present study, essential oil (nutmeg Oil) and 3 herbal extracts (Neem Extract and aloevera extract, hibiscus extract) which have been traditionally used as antimicrobial.

II. MATERIALS AND METHODS

A. Materials

DETAIL PROFILE OF MATERIAL USED:

1) NEEM

SYNONYMS: Nira, Nimb, Vespa, Limba, Nimba [13] [14]

BIOLOGICAL SOURCES: Neem is made out of the seed oil and fresh or dried leaves of the Meliaceae family plant Azadirachta indica. [13][14]

CHEMICAL CONSTITUENTS:

various photochemical can be found in neem fruit, seeds, leaves, stems, and bark; some of these compounds were initially found in azadirachta seed extracts, such as azadirachtin, which was first used as an insecticide and anti infectant in the 1960s[15][16]. The seed oil contains glycerides, various polyphenols, imboiled, triterpenes, and beta-sitosterol in addition to azadirachtin and related limonoids. [15][17] About 2% of the oil's composition is limonoid molecules, which have a garlic-like aroma and are yellow and bitter. [17] Quercetin, catechins, carotenes, and vitamin C are all present in the leaves. [17]

It contains Quercetin, n-hexaacosanol, amino acids, 6-desacetylnimbinene, Nimbiene, Nimbandiol, nimbolide, Nimbin, and Nimbidinin.

GEOGRAPHICAL SOURCES:

It can be found in tropical Australia, India, Pakistan, Sri Lanka, Malaya, Indonesia, Japan, and Africa. It is present in Uttar Pradesh, Maharashtra, Tamil Nadu, Rajasthan, and M.P, in India. [13][14]

USES:

Neem can help cure inflamed skin because of its antibacterial and anti-inflammatory qualities. Neem is advantageous for treating skin irritation since it has the benefit of cooling the skin. Neem also has a calming effect on dry or parched skin.

Benefits of Neem for skin:

a) Decreases the appearance of early signs of ageing
b) Neem protects the skin from damaging UV radiation, pollution, and other environmental factors
c) Aids in the management of acne
d) Addresses blackheads and whiteheads
e) Encourages collagen synthesis
f) Use for bright skin
g) Prevents skin infection



Figure 1: Neem

2) HIBISCUS

SYNONYMS: Bombycidendron Zoll. And Moritzi, Bombycodendron hassk, Brockmania W.Fitzg, Pariti Adnas, Wilhelminia Hochr.

BIOLOGICAL SOURCES: A genus of blooming plants known as hibiscus belongs to the Malvaceous family of plants.

CHEMICAL CONSTITUENTS: Hibiscus rosa sinensis includes proteins, saponins, cardiac glycoside, glucose, reducing sugars, essential oils, steroids, anthraquinones, tannins, and alkaloids.

© IJRASET: All Rights are Reserved |

USES: Hibiscus has a legendary reputation for boosting skin elasticity to deliver a spectacular natural youth-boost and is one of the most potent anti-ageing plant actives. Hibiscus actively fights the ageing process by firming and lifting your skin thanks to its amazing capacity to suppress the activity of the enzyme elastase, which is responsible for breaking down our skin's priceless elastin.
Benefits for skin:

a) Combats ageing symptoms
b) Clears the skin's pore
c) Tightens pore-opening skin
d) Eliminates acne and inflammation
e) Hasten the healing of wounds
f) Guard skin collagen



Figure no.2: Hibiscus

3) NUTMEG

SYNONYMS: Myristica fragrans, nutmeg tree.
BIOLOGICAL SOURCES: The Banda Islands in Indonesia, a small group of islands, are where nutmeg originally came from. It is the seed of a fruit that resembles a peach and grows on the Myristica fragrans tree.
CHEMICAL CONSTITUENTS
5 to 15% volatile oil, lignin, stearin, starch, gum, colouring material, and 0.08% acid substance are all present in nutmeg. Clemicine, myristicin, geraniol, borneol, pinene, camphene, and dipentene are all present in the volatile oil. It also has trace amounts of isoeugenol, p-cymene, safrol, and eugenol.
USES: Nutmeg For Skin

a) Reduces Pigmentation
b) Gently Exfoliates Your Skin
c) Promotes Youthful Skin
d) Acts As a Natural Toning Cleanser
e) Reduce acne

Antibacterial activity of nutmeg:
Both gram-positive and gram-negative bacteria can be defeated by the oils: Escherichia coli, Aeromonas hydrophile, Salmonella chlorosis, Pseudomonas aeruginosa, Staphylococcus aureus, Listeria monocytogenes, Listeria innocuous [18] and others: Actinobacteriacalcaemic, Alcaligenesfaecalis, Bacillus subtilis, Benecken antigens, Eubacterium linens, Brochure theosophical, Citrobacter fundi, Enterobacter aerogenes, Erwiniakrotovina, Flavobacterium suaveolens, Kleb-siellapneumonia, Micrococcusluteus, Moraxella sp., Proteus vulgaris, Serratia marcescens and Yersinia enterocolitica [19].

4) ALOE VERA

SYNONYMS: Aloe indica Royle, Aloe perfoliate L.vera and Aloe vulgaris Lam.
BIOLOGICAL SOURCE: Aloe is dried latex of leaves of it
FAMILY: Liliaceae
CHEMICAL CONSTITUENTS:
Anthracene glycoside (11-40%)
Barbaloin or Aloin, C glycoside.
Isobarbaloin, aloe-emodin and aloesone.

© IJRASET: All Rights are Reserved |

Resins (retinol+cinnamic acid or Coumaric acid).
Aloinosides A and B (only in cape aloes).
Aloetic acid, homonataloin etc.
USES:

a) Helps soothe sunburn
b) Helps in moisturize the skin
c) Boosts healing of wounds
d) Fights skin ageing
e) Helps in treating Eczema
f) Helps in the treatment of psoriasis
g) Use to treat inflammatory acne



Figure 3. Aloevera (aloe barbadensis)

B. Methods

EXTRACTION OF MATERIALS:

1) Neem extraction: For water extraction of neem mixture of 100 gm of dried leaves and 1000 ml of distilled water was heated for 10 minutes while being stirred. Then, filter paper was used to separate the extract.
2) Hibiscus extraction: For water extraction of hibiscus 100 gm of dried flowers was taken in 1000 ml distilled water and mixture was boiled for 10 minutes while stirring. Then, filter paper was used to separate the extract.
3) Aoevera extraction: In the early morning, Aloe barbadensis leaves that had just been picked were manually cut. Aloe vera leaves are picked and carefully removed from the mother plant to avoid breaking the rind. Immediately following cutting, the leaves were preserved in an icebox at a temperature of 4-5° C and delivered to the lab. Fresh water was used to completely wash the leaves. To create the fillet, the outer peel and exudates of the leaves were painstakingly removed with the use of a knife. The fillets were ground in a household blander to create homogenised pulp. To separate the crude gel and fibre, the 60 ml of pulp on a volume basis was centrifuged in a cooling type centrifuge. To purify the charcoal, crude gel was combined with it. The process of vacuum filtering was employed to separate the pure gel from the crude gel.
4) Nutmeg oil: procured from market.

III. FORMULATION OF FACE SERUM

The serum was prepared which comprised extract of Neem, Aloevera, Nutmeg, Hibiscus with a different concentration. The serum was prepared by using Tween 60, Span 80, Sodium benzoate, glycerin and required amount of water in a sufficient quantity to prepare 50ml serum.

1) Preparation of oil phase: The oil soluble ingredients such as tween 60, span 80, nutmeg oil are taken into one beaker and melted at 70°c.
2) Preparation of water phase: The water phase is prepared at same time by mixing Aloevera gel, neem extract, hibiscus extract, glycerine, sodium benzoate and water upto qs
3) Preparation of emulsion: Emulsion was prepared by adding oil phase into liquid phase drop wise under mechanical stirring at 700 to 800 rpm to obtain o/w biphasic emulsion. Perfume is then added at last just before the finished product transferred to suitable container

© IJRASET: All Rights are Reserved |



Figure 4. Formulation of face serum

Table no. 1: composition of developed formulation

Sr.no	Ingredients	Quantity (%)	Category
	Oil phase		
1.	Nutmeg oil	1%	Antibacterial
2.	Tween 60 and span 80	3% (60:40)	Emulsifier
	Aqueous phase		
3.	Neem extract	10%	Antiacne, anti inflammatory
4.	Hibiscus extract	10%	Antioxidant
5.	Aloevera gel	30%	Anticancer, antiseptic
6.	Glycerin	25%	Humectants
7.	Water	q.s	Vehicle
8.	Sodium benzoate	q.s	Preservative
9.	Perfume	q.s	Fragrance

IV. ANTIMICROBIAL ACTIVITY OF FACE SERUM

Antibacterial activity testing were carried out using the well diffusion method, with the zone of inhibition (in mm) being measured. The effectiveness of the face serum was then contrasted with that of another commercial clindamycin acne cream. The herbal face serum's study findings demonstrated dose-dependent antibacterial efficacy against the acne-causing bacteria. The formulation's antibacterial activity research is depicted in Figure. The zone of inhibition for Staphylococcus aureus and Staphylococcus epidermis in the herbal face serum is 34 mm and 40 mm, respectively, respectively, better than that of the commercial anti-acne cream. Thus, this herbal face serum has better antibacterial activity as compared to commercial formulation and was suitable for the treatment of local anti-acne application and selecting for further tests.

© IJRASET: All Rights are Reserved |



Herbal anti-acne face serum Commercial anti-acne cream (clindamycin)

Figure 5. zone of inhibition study

V. EVALUATION OF FACE SERUM

1) Physical Evaluation: The formulation is tested by visual appearance and touch. The properties like colour, grade, etc are judged for their appearance
2) pH Value: With the use of a standard buffer solution, a pH meter was calibrated. The pH of the mixture was assessed after precisely measuring and combining almost 1 ml of the facial serum with 50 ml of pure water. The skin has an acidic pH range, and skin serums should have a pH of 4.1 to 6.7.
3) Determination of spreadability: Spreadability may be expressed by the extend of the area to which the topical application spreads when applied to affected part on the skin. By adding 20gm of weight to the pan and pulling on the top plate with the aid of a thread linked to the hook, a sample of around 3gm was placed between two glass slides and they were squeezed together to create a film of a consistent thickness. It is noted how long it takes the upper glass slide to travel 10 cm across the lower plate.
4) Stability Studies: A proper stability analysis must be performed on a pharmaceutical product's formulation and development in order to assess its physical and chemical stability and, consequently, its safety. The stability studies are conducted in accordance with ICH recommendations. For a few months, a short-term accelerated stability evaluation of the produced formulation was conducted. The samples were kept under a variety of storage conditions, including 35°C, 25°C, and 40°C with RHs of 60% and 75%.
5) Washability: Formulations were applied to the skin, and the amount of water washing was personally evaluated.

VI. RESULT

A. *Physical Evaluation*

Color	Light brownish cream
Odor	Characteristics odor
Texture	Smooth homogenous
Homogeneicity	Good

Table No. 2- Results of physical evaluation

B. *Chemical Evaluation*

1) PH Value: The formulation's pH was discovered to be 6.8. The pH range of skin is between 4.1 to 6.7, hence this selection of formulas is suitable.
2) Determination of Spreadability : For the skin to receive a typical dose of pharmaceutical formulation, the spreadability or ability of the face serum to spread over the skin is essential. Spreadability of face serum was determined to be 5 to 6 cm.
3) Determination of Viscosity: Viscosity is an important component of topical formulation. Topical therapies with low viscosity are easier to remove from the skin than viscous solutions. Additionally, the skin may experience negative side effects from very viscous liquids. The Face Serum's viscosity was determined to be 13769 Pa.

© IJRASET: All Rights are Reserved |

4) Stability Studies: Stability tests for the formulation were conducted for both chemical and physical changes. There were no observable significant differences in the formulation's qualities.

Table no. 3: result of chemical evaluation

Ph	6.8
Spreadability	5-6
Viscosity	13769
Phase separation	Nil

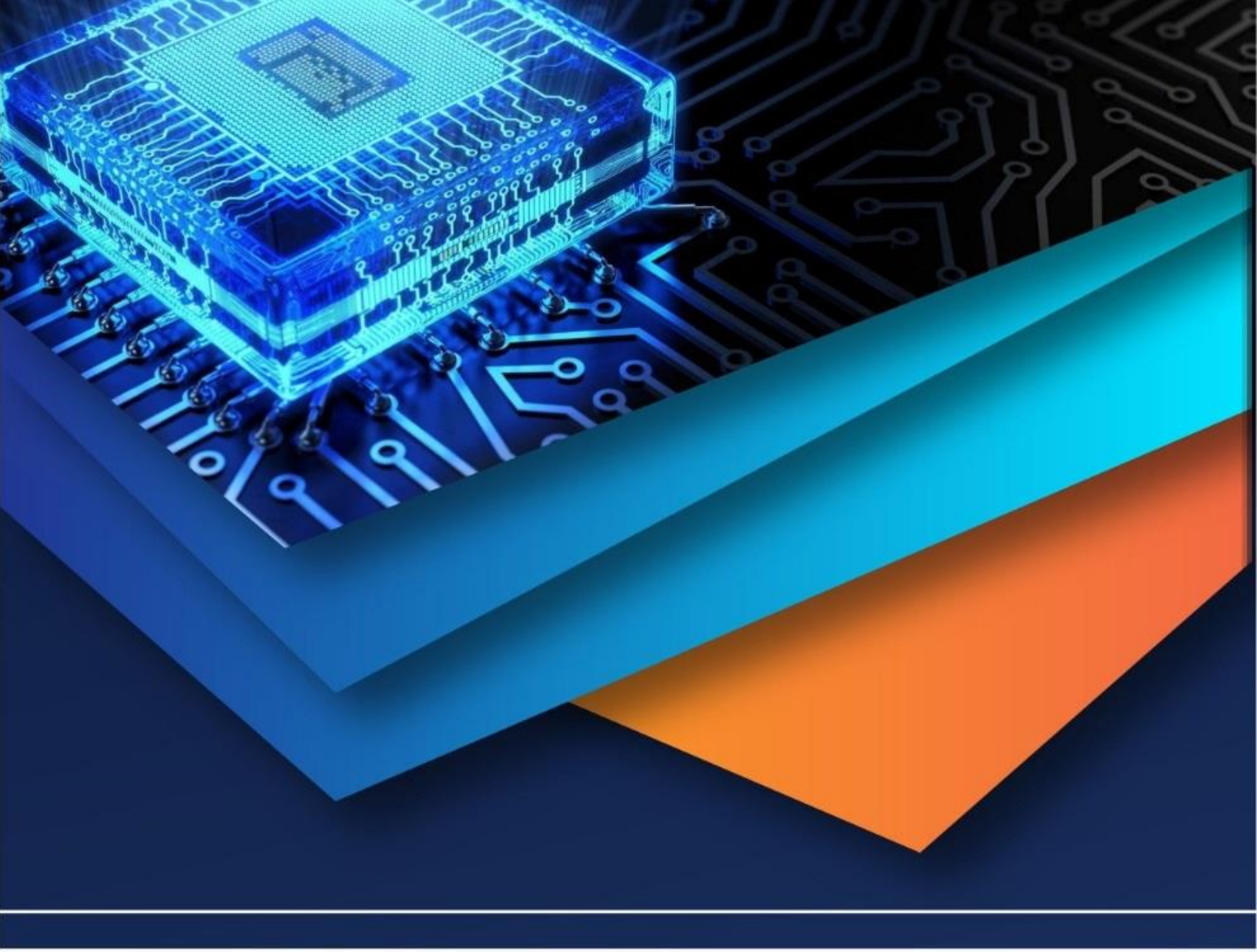
VII. CONCLUSION

Synthetic medications are no longer as popular for treating acne vulgaris as safe, all-natural treatments with fewer adverse effects. Consequently, in the global market sphere of nature Herbal medicines are sought after by many people. The design and evaluation of the herbal acne face serum are great. Studies have demonstrated significant antibacterial performance on Staphylococcus epidermis and Staphylococcus aureus coupled with No Irritability in a herbal face serum produced from the extract of Aloevera (30%), Nutmeg oil (1%), Neem (10%), and Hibiscus (10%). Comparing the herbal face serum to a stable extract, a synergistic effect was obvious. Thus, according to the study's findings, acne vulgaris can be treated with a herbal face serum including neem, hibiscus, nutmeg, and aloe vera at concentrations of 10%, 10%, 1%, and 30%, respectively.

REFERENCES

[1] J. Leyden and A. Kligman, Drugs 12, 292-311 (1976).
[2] T. Robinson, Kandangan Organs Tumbuhan Tingkat Tinggi, translated by K. Padmawinata (ITB, Bandung,1991)
[3] S. Soetarno, Terpenoid (PusatAntarUniversitasBidangIlmuHayati ITB, Bandung, 1990).
[4] U Sukatta and P Rugthaworn, Kasetsart J. (Nat Set) 42 163-168 (2008)
[5] K. Heyne, Tumbuhanberguna Indonesia II (BadanLitbangKehutanan, Jakarta, 1987).
[6] A. Vats and P. Sharma, International Journal of Pharmacy and Pharmaceutical Science Research 2, 3, 61-66 (2012)
[7] J. C. Harper, Acne Vulgaris (Departement of Dermatology University of Alabama, Birmington, 2007).
[8] E. C. Davis and V. D. Callendar, Journal Clinical Aesthetic dermatology 41, 4, 24-35 (2008
[9] H.A.Sawarkar, S.S.Khadabadi, D.M.Mankar, I.A.Farooqui and N.S.Jagtap, Development and Biological Evaluation of Herbal Anti-Acne Gel, International Journal of Pharm Tech Research, 2(3), 2010, 2028.
[10] G.S. Kumar, et al, Antimicrobial effects of Indian medicinal plants against acne-inducing bacteria, Topical journal of Pharmaceutical research,6(2), 2007, 717-723.[Available online at: http://www.tjpr.org]
[11] FJG Ebling, "Acne Vulgaris", Text book of dermatology (6th edition.1998, 3)552-554.
[12] G. Amrita, N .Greeshma, M. Deepa and E.H. Poornima, A review on anti-acne potential of medicinal plant extracts against Propionibacterium acnes, International Journal Pharm and Bio Sciences; 3(3), 2012, 98
[13] Goyal S et al. "Novel Anti-Inflammatory Topical Herbal Gels Containing Withaniasomnifera and Boswellia serrata". International Journal of Pharmaceutical and Biological Archives. 2011; 2(4):1087-1094.
[14] Sharma Mayank et al. Formulation Development and Evaluation of Novel Poly-Herbal Anti-Acne Gel. Int.J.PharmTech Res.2014; 6(1):58-62.
[15] "Neem". *Drugs.com. 13 August 2020*. Retrieved 21 September 2020.
[16] Jump up to: [a] [b] [c] *Anna Horsbrugh Porter (17 April 2006).* "Neem: India's tree of life". *BBC News*.
[17] "Nimbolide". *PubChem, US National Library of Medicine. 6 March 2021*. Retrieved 10 March 2021.
[18] Dorman, H.J.D. and S.G. Deans. 2004. Chemical composition, antimicrobial and in vitro antioxidant properties of Monarda citriodora var. citriodora, Myristica fragrance, Origanum vulgare ssp. Hirtum, Pelargonium sp. And Thymus zygisOils.J. Essent. Oil. Res., 16: 145-150.
[19] Lima, R.K., M.D.G. Cardoso, M.A Andrade, P.L. Guimares, L.R. Batista, and D.L. Nelson. 2012. Bacterial and Antioxidant activity of essential oils from Myristica fragransHoutt and Salvia microphyllaHBK. J Am Oil Chem Soc 89: 523–528. DOI 10.1007/s11746=011-1938-1

© IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)