



“Formulation and Evaluation of Anti-Aging FACE SERUM SPRAY”

¹Miss. Telange-Patil P.V*, ²Miss.Bochare V.B, ³Miss.Padale A.H, ⁴Miss.Chavan R.S,

¹Assistant Professor, ²Student, ³Student, ⁴Student,

¹Pharmaceutic Department,

¹College of Pharmacy Paniv, Malshiras, INDIA.

Abstract:

Nowadays, the demand for skin care products which can give instant beauty effect is increasing rapidly. This has urged some components to take shortcut by incorporating hazardous chemicals into skincare products, consequently caused adverse skin effect over time. Instead incorporation of face serum into daily skincare routine can give noticeable difference. Ingredients used in our serum included salicylic acid and benzoyl peroxide. Salicylic acid works best for blackheads and whiteheads. According to American Academy of Pediatrics, benzoyl peroxide is most effective acne fighting ingredient available without prescription (OTC).

They both are also considered safe to use during pregnancy. Niacinamide used to act as antibacterial action and boost collagen production. Cosmetic serum are the products based on oil by water. The serum has property of rapid absorption ability to penetrate into deeper layer of skin. It is non greasy and intensive formula with high concentration of active substances. Based on this formula the aim of this work was to formulate fairness, antiacne, antiwrinkle use.

Key words: Serum, Salicylic acid, Benzoyl peroxide, Anti wrinkle, Anti acne, Fairness.

1.Introduction:

Nowadays, skincare routine is set of process to taking care of individual skin. This process is important to ensure the good and healthy condition of skin. This skin routine needs to be considered based on skin type. ^[1] Acne treatment options vary depending on the severity of disease. Mild acne is often treated with topical retinoids, benzoyl peroxide or topical antibiotics. Moderate acne treatment usually includes the addition of oral antibiotics, oral contraceptives. Severe acne often necessitates implementation of systemic medication such as antiandrogens like isotretinoin. ^[2] The clinical sequelae of photodamage including wrinkling pigmentary changes, roughness laxity can all result in appearance of aging skin. ^[3] The development of acne proceeds into four stages starting with excess sebum production and modified lipid. Composition in the sebaceous gland at the base

of hair follicles which is followed by blocking of skin pore the colonization by Propionibacterium acne which induce inflammation and puss formation. ^[4] Dermatology visits for prevention and treatment of aging skin are rapidly increasing. Since 1997 the number of inventions for facial photodamage in united states has increased 293 percent with an 87 percent, increase in surgical procedure and 471 percent increased in non surgical procedure. ^[5] To assess the efficacy and tolerability of a facial serum in improving appearance of fine lines, wrinkles and signs of photodamage. Facial serum ingredients associated with an improvement in stratum corneum barrier function. ^[6] Salicylic acid is beta hydroxy acids with comedolytic properties. This lipid soluble phytohormone is moderately effective in therapy of acne. ^[7]

Being a lipophilic agent, salicylic acid removes intercellular lipids which are linked

covalently to the cornified envelope surrounding the surface epithelial cells.^[8] Salicylic acid has been a common ingredient in cosmetic product which intended for treatment of acne, blackheads, whiteheads, pigmentation. It also works as antiaging, exfoliate, reduces oily skin.^[9] Salicylic acid has been used topically to treat various skin disorders for more than 2000 years.^[10] Salicylic acid also decreases secretion of sebum in patients with acne which adds to its therapeutic effect in these patients with *acne vulgaris* and concluded that salicylic acid had a greater sebumeter effect than pyruvic acid.^[11] Apart from fighting bacteria salicylic acid also reduces inflammation and exfoliate your skin that is outer layer of your skin and penetrate pores deeply, removing sebum. This process prevents pore clogging and get rid of already formed clogs. Moving forward from its spot fighting abilities, the keratolytic agent will reduce the skin's pH and increase hydration and desquamation process. Salicylic acid can directly dissolved keratin plugs known as keratosis pilaris and regulate skin cells to efficiently fight blemishes and acne. Salicylic acid suitable for all skin type but ideal for blemish-prone and varying skin types as it significantly helps to block pores and has anti-inflammatory property.^[12]

Benzoyl peroxide works on the bacteria that cause acne, *Propionibacterium acnes* or *p. acnes* by killing it. Benzoyl peroxide reduces inflammation and works well on mild to moderate acne, including acne with puss. It causes unclogging of pores in acne prone skin and dries out acne effectively. Coming to salicylic acid it is lipophilic in nature which means it dissolves in fats, oils ,etc. which helps it to work well for oily skin and well absorbed into oily skin.^[13] Benzoyl peroxide has been an important component or topical therapy of *acne vulgaris* ,ability to reduce *Propionibacterium acnes* and inflammatory acne lesions.^[14] Benzoyl peroxide remains the gold standard of topical acne treatment based on antimicrobial

and anti-inflammatory activities that result in the aerobic death of *Cutibacterium acnes* without causing bacterial resistance.^[15] However a potential limitation of benzoyl peroxide is concentration dependent dryness and irritation that aggravates wrinkles and redness. Further affecting patient compliance and antiacne efficacy.^[16]

Niacinamide is one of building of active ingredient present in many over the counter product available to treat various skin issues. This vitamin (B3) is water soluble and renowned for giving you glowing and healthy skin. Many product such as moisture, face serum gel and anti-acne face washes have niacinamide as one of their primary ingredient. Using niacinamide for your face is great way to attain a glowing complexion known to be versatile ingredient. It can used in many ways such as fight free radicals, fades pigmentation, reduces wrinkles, clear acne, regulates oil production, reduces redness and also reduces the dryness.^[17] Niacinamide is one of the to active forms of vit b3 called niacin. These is water soluble product giving you glowing and healthy skin. It is beneficial as including vit C in your skin care routine. It fights with free radical, wrinkle, acne and pigmentation.^[18] Topical niacinamide in the form of a commercial five percent has been shown to provide anti-inflammatory activity in treatment of *acne vulgaris*.^[19]

Among the different type of essential oils Australian tea tree oil obtained from *Melaleuca alternifolia* L. It is best essential oil used to treat skin airway, cutaneous infections, vaginal infection. These are also used an antiseptic and disinfectant.^[20]

Rosehip oil may help your skin region elasticity if you noticed some sagging lately. Ultimate beauty ingredient trio anti-inflammatory fatty acid and vit A, vit C. Make this solution for fading any facial scars.

2.Methods and Preparation:

Methods used for the preparation of Serum spray are as following:

- 2.1.Geometric Dilution Method
- 2.2.Centrifugation method
- 2.3.Agitation method

3. Materials and Equipments:

3.1. Equipments:

3.2. Materials:

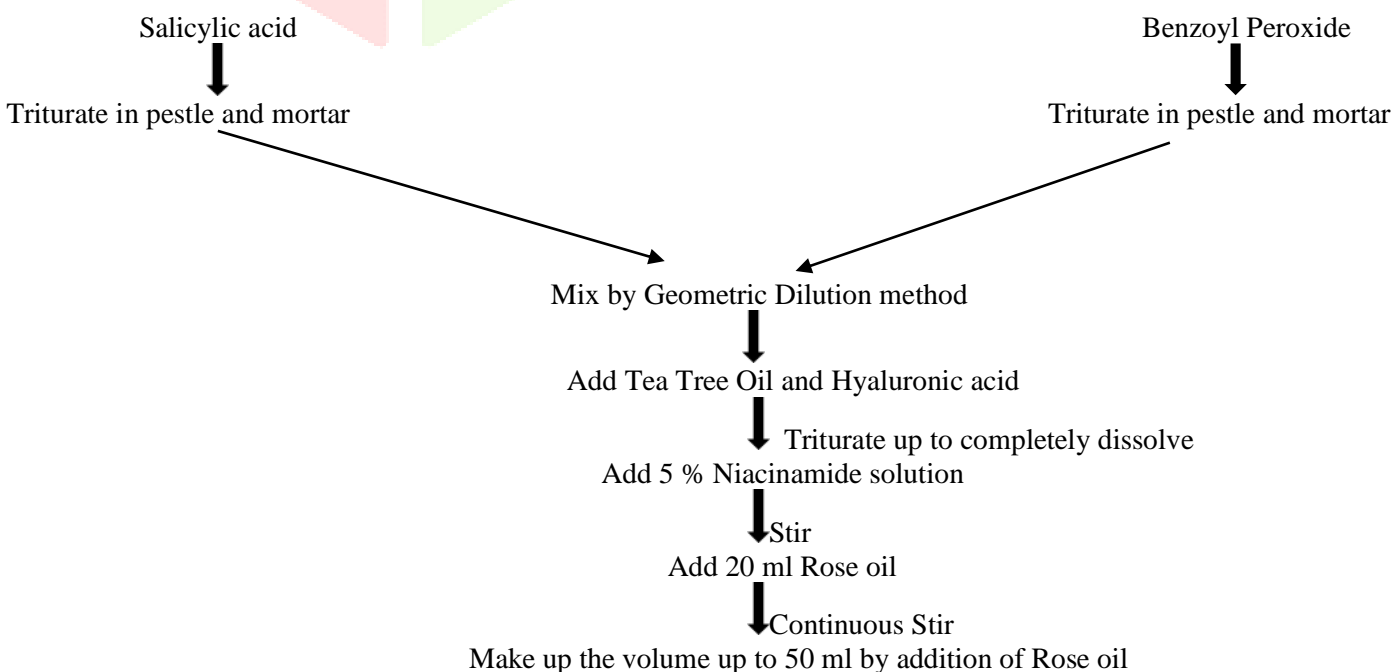
Sr.no	Equipment
1	Ultra violet spectroscopy
2	Infra-Red spectroscopy
3	NMR
4	Centrifugation
5	Microscope
6	Incubators

Sr.no	Materials
1	Salicylic acid
2	Benzoyl peroxide
3	Tea Tree Oil
4	Niacinamide
5	Rose Oil

4. Formula:

Sr.no	Ingredient	Qty Given (100gm)	Qty Taken (50gm)	Uses
1	Salicylic acid	38.0gm	19.0gm	Anti-wrinkles
2	Benzoyl Peroxide	27.5gm	13.75gm	Anti-acne
3	Tea tree oil	11.0ml	5.5ml	Improve skin texture
4	Niacinamide	20.0ml	10.0ml	Anti-pigmentation
5	Rose Oil	4.0ml	2.0ml	Flavouring agent

5. Formulation:



- Salicylic acid and benzoyl peroxide are insoluble in water but soluble in hyaluronic acid or alcohol.
- Take 19gm of salicylic acid in a pestle and mortar, triturate it until fine powder is formed.
- Take 13.75gm of benzoyl peroxide in a mortar and pestle. Triturate it to reduce particle size.
- Mix salicylic acid and benzoyl peroxide by geometric dilution method. Stir both until it completely mixed.
- Then dropwise add 5.5ml of tea tree oil and stir it with glass rod until solid particles get dissolved.
- Add 5% niacinamide solution with continuous stirring until homogeneous mixture is formed.
- Add suitable amount of rose oil to make up the volume up to 50 ml.
- Fill the above product to the spray container



Fig.1.Filtration



Fig.2 .Measuring.



Fig.3.final formulation

6.Evaluation Test:

6.1.Spread ability Test :

Standard as per IP, BP, USP and NF:

Sr no.	Viscosity range (mPa-s)	Spraying ability	Spread ability	Flowability
1.	1 to 10	Spraying possible	7400 cm ²	Spread over spread area die flowing down of formulation.
2.	11 to 50	Spraying possible	100- 400 cm ²	Flowing down of formulation.
3.	51 to 250	Spraying possible	<100 cm ²	Maintained across spread area over time
4.	251 to 400	Leakage only	No spread ability	Maintained across spread area over time.
5.	More than 400	Impossible spraying	No spread ability	Maintained across spread area over time.

Evaluation of test: The viscosity range in between 11 to 50 having possible spraying ability which shows 100-400 cm². Flowability shows moving down to formulation

6.2.Globule size determination: Serum has analysed under microscope to confirm the globule size a drop of serum was placed on glass slide and diluted with water covered by glass cover and was observed under microscope.^[22]

6.3.Test for microbial growth: serum inoculated plate media by omitting the product. Plate placed incubator at 37 °C for 24 hours. Check the microbial growth. ^[23]

6.4.Product storage: Stability testing requires different temperature and humidity condition. Some standard temperature include 40 °C/ 75%

RH; 30 °C / 65% RH; 25°C / 60 % RH; 5 °C no RH [24]

6.5.pH Test: The pH of optimised spray was determined using digital pH meter. 10 ml of test solution taken in small glass beaker. Electrode of pH meter was dipped into above solution for few minutes and pH noted.



Fig.4.pH paper



Fig.5.pH paper II

6.6.Viscosity: It was determined by Oswald viscometer. 10 ml solution filled in Oswald viscometer. Flow of solution was observed in time A to B point in viscometer. Atleast 3 readings taken. These readings taken against water viscosity.

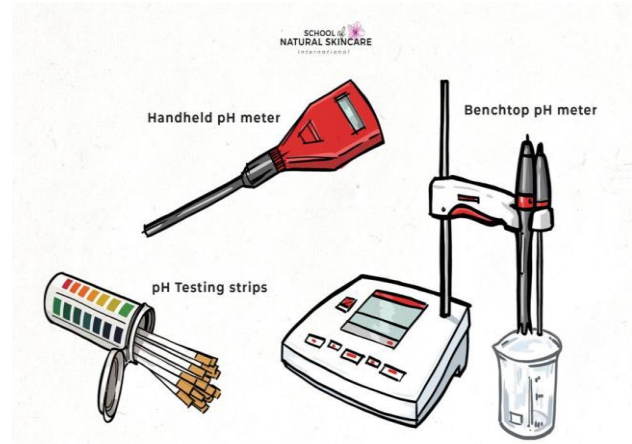


Fig.6.Viscometer

6.7.Leak Test: Filled containers are allowed to sink in warm water (50°C) for 10 sec. Immediately after filling, the bubbling in water is being identified as leakage in container. [25]

6.8.Delivery amount: Valves were pressed continuously for 5 seconds each time and sufficiently time was allowed between each actuation to avoid cooling. The total weight loss was calculated from each container as deliverable amount.

6.9.Light stability test: Pour the preparation to container. Allow to exposure of container to sunlight for certain period of time. Observed whether the changes occurred. [26]

6.10.Centrifugation test: To perform centrifugation test, 5ml / 5gm of sample spray was subjected to cycle of 300 rpm for 30 min at room temperature. At the end, formulation were examined for phase separation for stability. [27]



Fig.7 .Centrifugation machine

6.11. Temperature variation: Take 10ml sample solution. Place it in refrigerator at 3⁰ C for 10 min. After 10 min place it in the room temperature. observe the stability. ^[28]

7. Result and Conclusion:

7.1. Result:

Prepared serum spray was found to be colorless, viscous and pH was found to be acceptable limit. This serum spray is designed to boost your skins natural radiance and strengthen its defenses, fighting. It energizes, refreshes and hydrates your face and neck instantly in seconds.

The results demonstrated that the formulated anti-acne and anti-wrinkles spray are safe and usable for the skin and having good potential for cosmetic product development.

7.2. Conclusion:

Formulation of serums spray was done by geometric dilution method, agitation method, centrifugation method and further evaluated by various evaluation parameter such as physical properties, pH, Spread ability, non-irritancy test, viscosity, leak test and stability test gives good result.

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