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To Prepare Herbal Face Toner and ComparativeEvaluation with Marketed Herbal Toner

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I. INTRODUCTION

SKIN - The skin and its derivatives (hair, nails, sweat and oil glands) make up the integumentary system. One of the main functions of the skin is protection. It protects the body from external factors such as bacteria, chemicals, and temperature. The body's largest organ contributing to one sixth of the total body weight
. It covers 20 square feet in area (adult)[1]

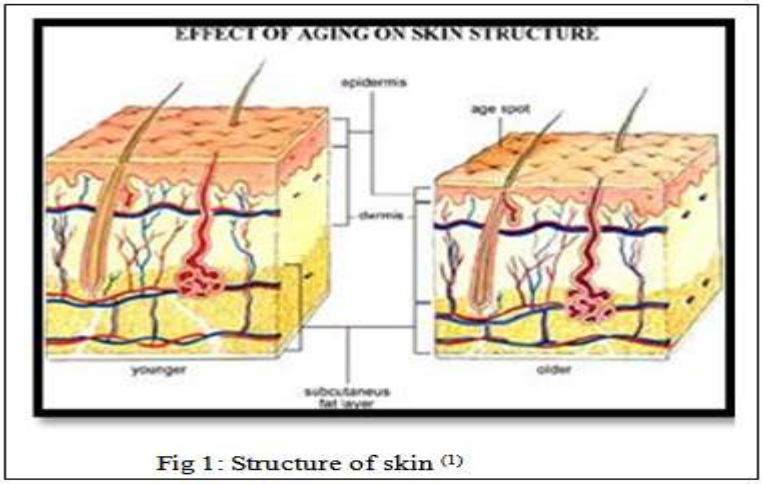
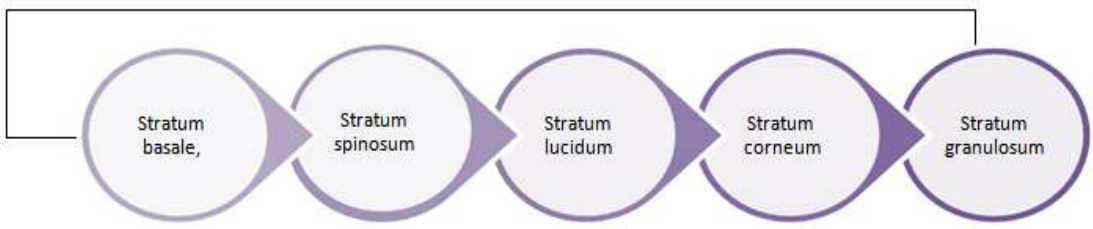


Fig 1: Structure of skin [1]

LAYERS OF SKIN: It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which vary significantly in their anatomy and function. The skin's structure is made up of an intricate network which serves as the body's initial barrier against pathogens, UV light, and chemicals, and mechanical injury.[2,3]



A) EPIDERMIS-The outmost/top layer of the skin (protective layer). Has an average thickness of 0.1mm (15- 100 cell layers).It is a Avascular (no blood vessels) layer. It is divided into five sub layers:[2,3]

B) DERMIS –Immediately below the epidermis (nourishes epidermis), Fibroblasts,

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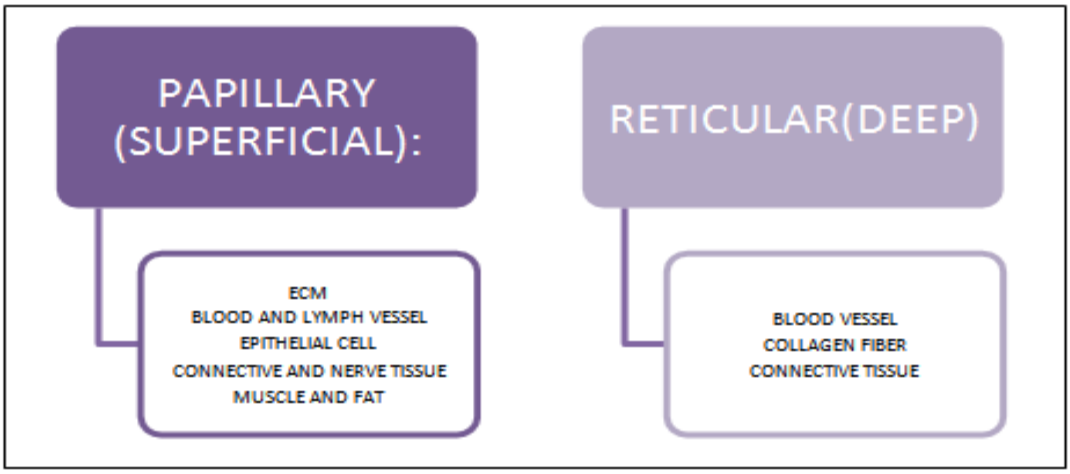
macrophages, mast cells. It covers the largest portion of the skin.• It is composed of two layers:[1]



C) HYPODERMIS

The hypodermis is the bottom layer of skin in your body. It has many important functions, including storing energy, connecting the dermis layer of your skin to your muscles and bones, insulating your body and protecting your body from harm.[2,3]

FUNCTION OF SKIN:

SIX PRIMARY FUNCTION OF SKIN ARE: [4,5]

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SKIN AGEING:

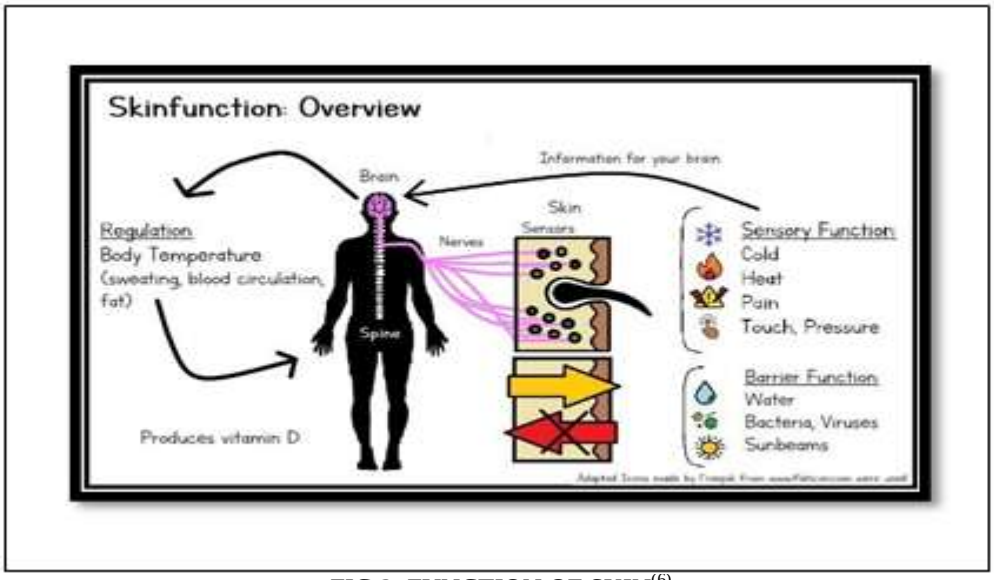

FIG 2: FUNCTION OF SKIN[6]

20% decrease in dermal thickness leads to thinning of the skin. Epidermal-dermal papillae become flattened, increasing susceptibility to friction and shear. Loss of penetrability to substances in the environment –irritants more readily absorbed. Elastin fibers are lost – skin less elastic [7,8]

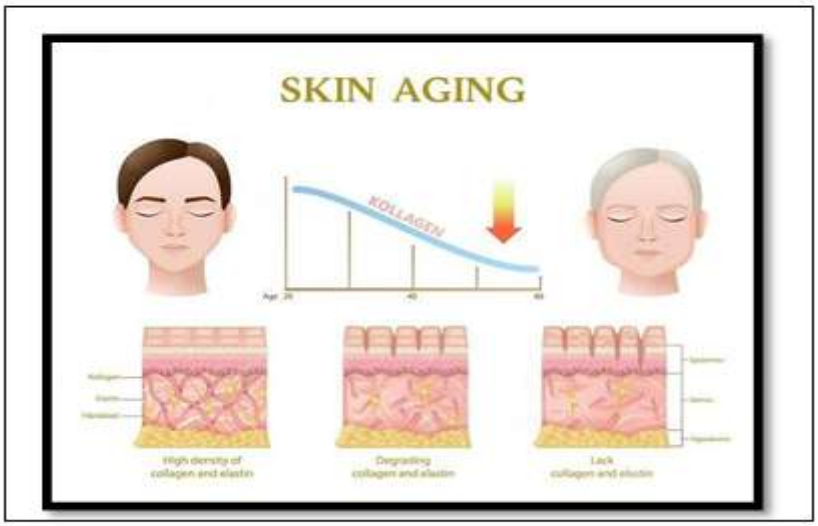

FIG 3: AGING OF SKIN[9]

Skin and the Effects of Ageing:

Dermis atrophies:

- Slows wound contraction
- Increases risk of dehiscence
- Diminished dermis vascularity

Subcutaneous fat atrophies :(most noticeable in face, backs of hands and shins)

- **Collagen in the skin reduces** (collagen fibers become compressed)[10,11]

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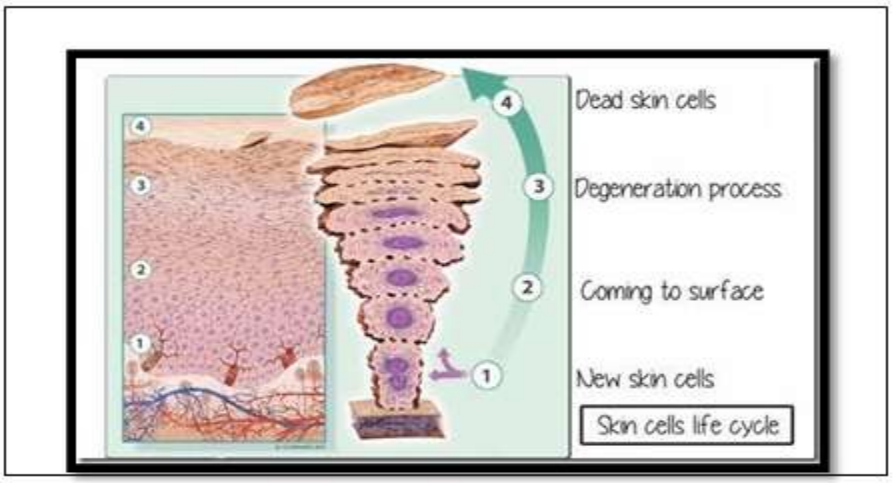

FIG:4 EFFECT OF SKIN AGING[12]

SKIN CYCLE CLOCK- skin cycle is the process where a new skin cell is formed at the deepest layer of the epidermis and works it's way up to the surface of the skin. At this point the skin cell has matured and ultimately flakes off. A skin cycle can vary with each individual and is affected by such factors as age, hormones, skin condition/health and stress. On average a skin cycle is 5-6 weeks. At the age of 19-21,the process can take 14-21 days compared to a middle-aged adult where it is estimated to be 28 days. As we grow older, this skin cycle slows to about 45-60 days in our 40's and 50's. It can further slow to about 60-90 days in our 50's and 60's.[13,14]

FIG 5 : SKIN CYCLE CLOCK[15]

COMMON SKIN PROBLEM

SKIN CARE: Skin care product can also fall under the general category of cosmetics. It is used to improve the appearance and health of skin , formulated for different types of skin and associated characteristics. These are products designed to improve the appearance and feel of skin. India skin care market is segmented into five categories such as facial care, body care, sun care, and hand care and other makeup removal & depilatory products. The skin care market makes up about 30% of all cosmetics sold which is the largest share of any category. Skin care products can be classified further by how they work and what they do. First, there are products that are left behind on the skin. As far back in time people use natural extract resources for health care and cosmetic purpose according to nowadays consumer depend on natural ingredients an additive, effect especially in cosmetics.[17,18]

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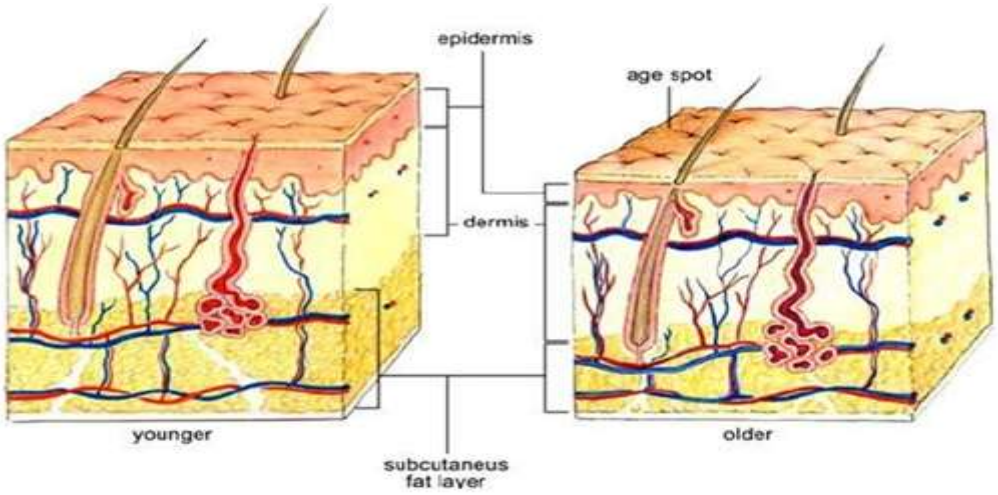
EFFECT OF AGING ON SKIN STRUCTURE



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TONER :

Toner is water based totally liquid which contains energetic components to cleanse the skin, keeping skin pH stable ,shrink pores and grant an immediately glow. Before washing your face , it removes the dirt and impurities which are stuck on pores of skin. When brought to daily routine of skin treatment and used regularly, it having major positive impact on the appearance and ageing skin.[20] It has an antioxidant property which hydrates the skin. It removes any last traces of dirt, grime and impurities stuck in your pores after you wash your face. When added to your daily skincare routine and used regularly, it can have major positive impact on the appearance and tightness of your pores (hello, aging skin). Toner also restores your skin's pH level, smoothsskin by refining rough patches and improves skin tone.[21,22]

Fig- 6: different type of marketed toners[23]

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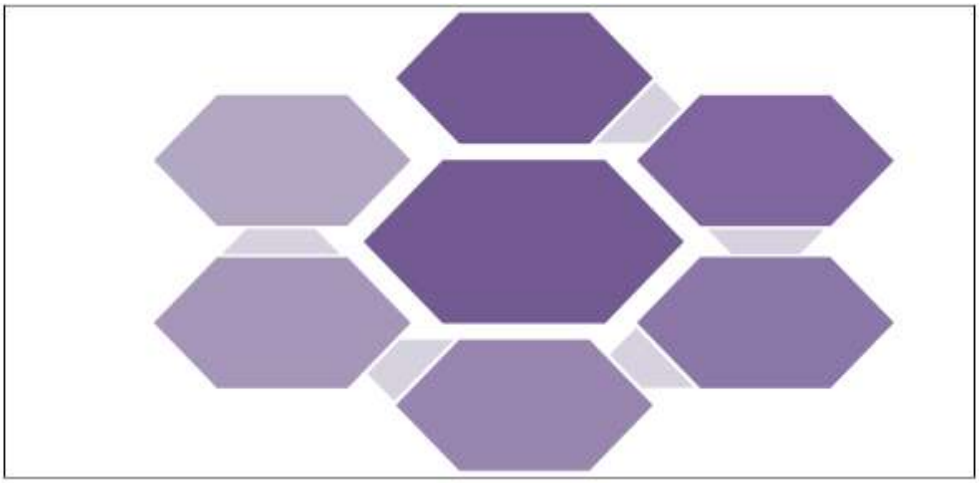
BENEFITS OF TONER-



TYPES OF TONER :THERE ARE 4 TYPES OF TONER:

Skin bracers or fresheners:

These are the mildest form of toners; they contain water and a humectant such as glycerine, and little if any alcohol (0–10%). Humectants help to keep the moisture in the upper layers of the epidermis by preventing it from evaporating. A popular example of this is rosewater. These toners are the gentlest to the skin, and are most suitable for use on dry, dehydrated, sensitive and normal skins. It may give a burning sensation to sensitive skin.**(25,26)**

FIG.7 :SKIN FRESHENERS[27]

Skin tonic - These are slightly stronger and contain a small quantity of alcohol (up to 20%), water and a humectant ingredient. Orange flower water is an example of a skin tonic. Skin tonics are suitable for use on normal, combination, and oily skin[28].

FIG 8 : SKIN TONIC[29]

Acid Toners - These are a strong form of toner that typically contains alpha hydroxy acid and or beta hydroxy acid. Acid toners are formulated with the intent of chemically exfoliating the skin.[2] Glycolic, Lactic, and Mandelic acids are the most commonly used alpha hydroxy acids, best suited to exfoliate the surface of the skin. Salicylic acid is the most commonly used beta hydroxy acid best for exfoliating into the deeper layers of the skin.[30]

FIG 9: ACID TONER[31]

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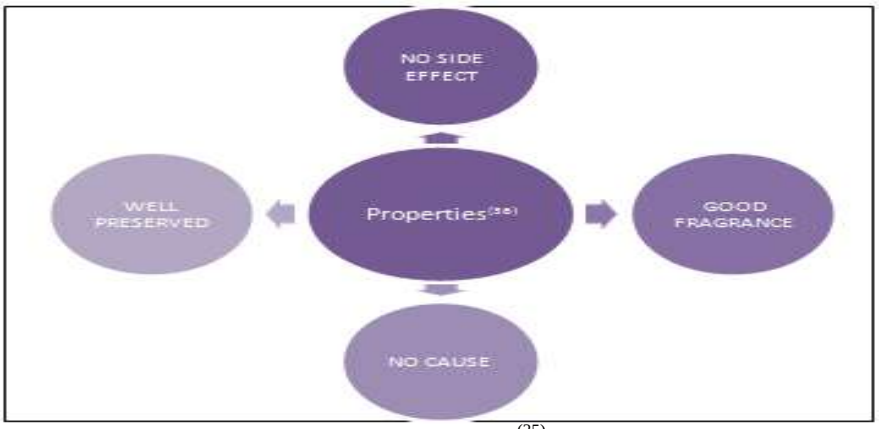
Astringents - These are the strongest form of toner and contain a high proportion of alcohol (20–60%), antiseptic ingredients, water, and a humectant ingredient. These can be irritating and damaging to the skin as they can remove excess protective lipids as well as denature proteins in the skin when a high percentage of alcohol is used.[32]

FIG 10: ASTRINGENT[33]

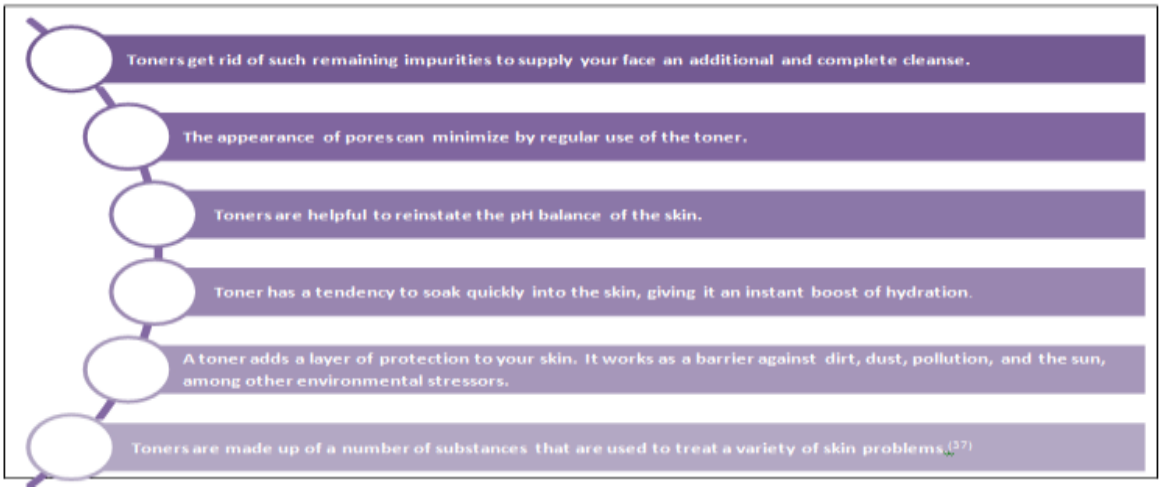
HERBAL TONERS:

Toner is water based totally liquid which contains energetic components to cleanse the skin, keeping skin pH stable ,shrink pores and grant an immediately glow. Before washing your face , it removes the dirt and impurities which are stuck on pores of skin. When brought to daily routine of skin treatement and used regularly, it having major positive impact on the apperance and ageing skin. It has an antioxidant property which hydrates the skin. the preparations containing phytochemical from a variety of botanical sources, which influences the functions of skin and also provide nutrients necessary for the healthy skin and body.[34]The natural herbs and their products or extract when used for their aromatic value in cosmetic preparation are called as herbal cosmetics . There has been a common belief that the chemical-based cosmetics may be harmful to the skin and turned in increased awareness among consumers for herbal products which triggered the demand for natural products and natural extracts in cosmetics preparations.[35]



HERBALTONER[35]

Properties of herbal toner-



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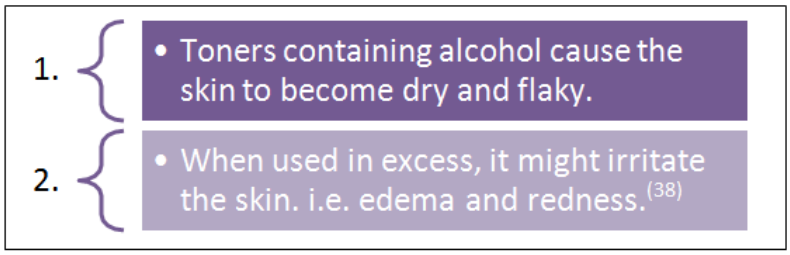
DISADVANTAGES OF HERBAL TONER:



MECHANISM OF SPRAY

When the button on the top of the spray bottle is pressed, it pumps the grooved button. This pumping action forces the air from the nozzle to the dip tube. Now there is a drop in the pressure of top of tube due to pressing the top button. After this difference pressure falls in the tube and the liquid is foced up from the tube. The liquid now leaves the nozzle through the actuator as small mist droplets due to pressure and applied on skin through force penetrating inside skin.(39)

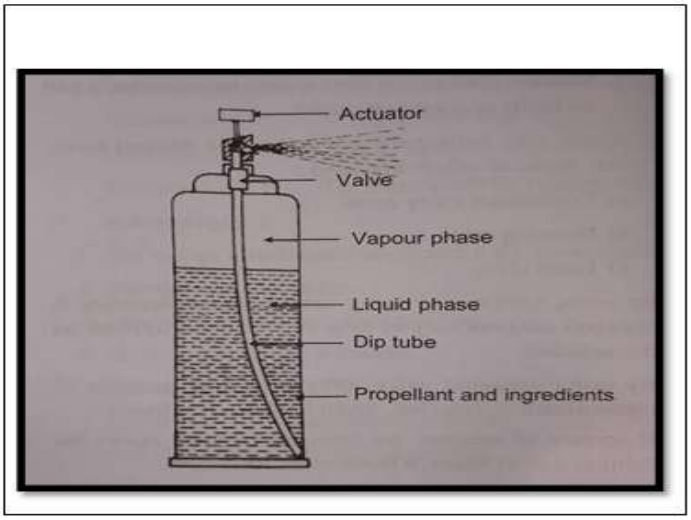
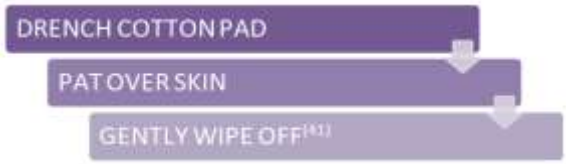


FIG. 12: MECHANISM OF SPRAY(40)

APPLICATION OF TONER



II. LITERATURE SURVEY

1. **Bunleu Sungthong* and Methin Phadungkit (2019)** reported that plant-derived materials traditionally used for skin lightening may produce satisfactory results. Besides innate tyrosinase activity, oxidative stress also plays an important role in skin darkness by activating tyrosinase. Therefore, herbal extracts with strong anti-tyrosinase and antioxidant activities could be considered as efficacious skin lightening agents. The aims of the present study were to determine the anti-tyrosinase and antioxidant activities of Thai medicinal plant extracts indigenously used as skin toners.
2. **Liao, Wayne C., and Ching-Yi Lien. (2019)** reported that the experiment perform a distillation to collect some fragrant components from the plants. By combining this distillate with other ingredients, students learn to prepare a cosmetic product and acquire knowledge in both organic and cosmetic

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chemistry. Because the facial toner is a colloid, students also learn the properties of colloidal mixtures by investing the Tyndall effect.

3. **Vibhavari M Chatur *, Sanjay G Walode, Siddhi A Awate** et. al,. **(2020)** reportedthat this project was to formulate a natural and safe herbal skin toner which has calming, soothing, and astringent, effect on the face and skin to reduce the facial irritancy and enhance the beauty and can be used in day today busy schedule. The extracts used are from the ingredients which are easily available, economical and has nutritional value from topical point of view. Toner has gained the popularity as it can be used daily and helps in restoring the skin texture hence the purpose of the study was aimed for the similar formulation.
4. **Yuanxi L, Wei H, Lidan X, Li L. (2020)** reported that when toners were applied successively, the application order has little effect on skin hydration. The application of toner only was an effective and brief way to achieve favorable moisturization especially for dry skin. As a complement, repeated application of toner rather than spray water is efficacious for skin hydration.
5. **Eo J, Seo YK, Baek JH, Choi AR, Shin MK, Koh JS. (2021)** reported that facial cleansing is important to clean and exfoliate the skin while maintaining optimal physiologic function. However, there is insufficient data on the very early stage of skin change after applying toner. We investigated the recovery kinetics of facial skin physiology during 180 min after exposure to the cleanser.
6. **Miss. Gayake Ranidevidas** et al,. **(2022)** reported that topical applications of the drugs have an advantage of delivering the drug directly to the site of action and acting for longer period of time. To reduce the facial irritancy and enhance the beauty and can be used in day today busy schedule.
7. **Jackson EM. (2022)** reported that the composition and pharmaceutics of currently marketed toners, the use of fragrances and preservatives in these products, how cosmetic facial toners work on wrinkles, sunscreen-containing facial moisturizers, and the Food and Drug Administration's record regulating drug claims for anti-wrinkling products.
8. **Kam O, Na S, Guo W, Tejeda CI, Kaufmann T. (2023)** reported that this systematic review and meta-analysis intend to be the first to analyze the relationship between FFA and cosmetic/personal care products and treatments, including sunscreen, moisturizer, foundation, facial toners ,chemical/laser facial resurfacing, aftershave, and facial cleanser.
9. **Suraj Agaldare, Dr. Vivek Satpute, Mr. Santosh A. etal (2023)** reported that natural ingredients like aloe vera, cucumber also the pippermint, lemon grass and rose water used in the formulation. It having ability to reduce the facial irritation as well as to enhance beauty. Face toner is estimated for its physicochemical properties, surface tension, pH and stability. Most popular advantages of herbal cosmetics are, they are non- toxic in nature and they having tendancy to reduce allergic reactions. The main reason behind this study, we found good properties of the face toner.

III. METHODOLOGY AND EVALUATION

FORMULATION OF HERBAL FACE TONER 1FORMULATION 1

Ingredients	Quantity given	Quantity used	Use
Aloe vera	1g	2g	Antifungal
Cucumber juice	14ml	28ml	Antioxidant
Pipper mint	22ml	44ml	Antimicrobial
Rose water	6.6ml	13.2ml	Mild Astringent
Lemon grass	2ml	4ml	Antibacterial
Distilled water	-	Q.S	Vehicle

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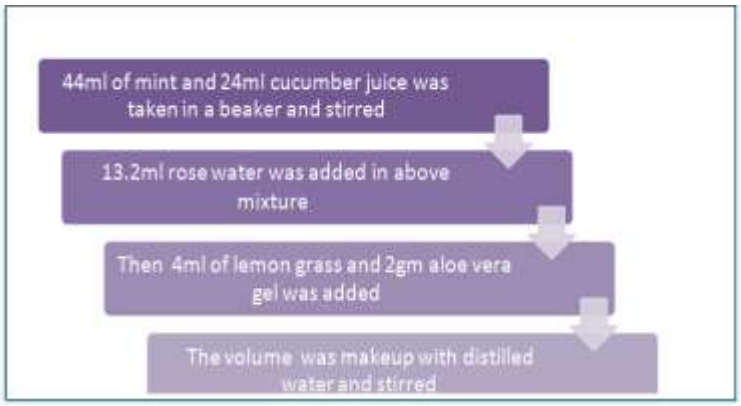
METHOD OF PREPARATION



FORMULATION OF HERBAL FACE TONER 2
FORMULATION 2

Ingredients	Quantity given	Quantity used	Use
Aloe vera gel	1gm	4gm	Antifungal
Cucumber juice	2.5ml	10ml	Antioxidant
Honey	1gm	4gm	Cleansing action
Tween 80	1ml	4ml	Solubilizing agent
Methanol	5ml	20ml	Preserve the product
Distilled water	Upto 25ml	Upto100ml	Vehicle

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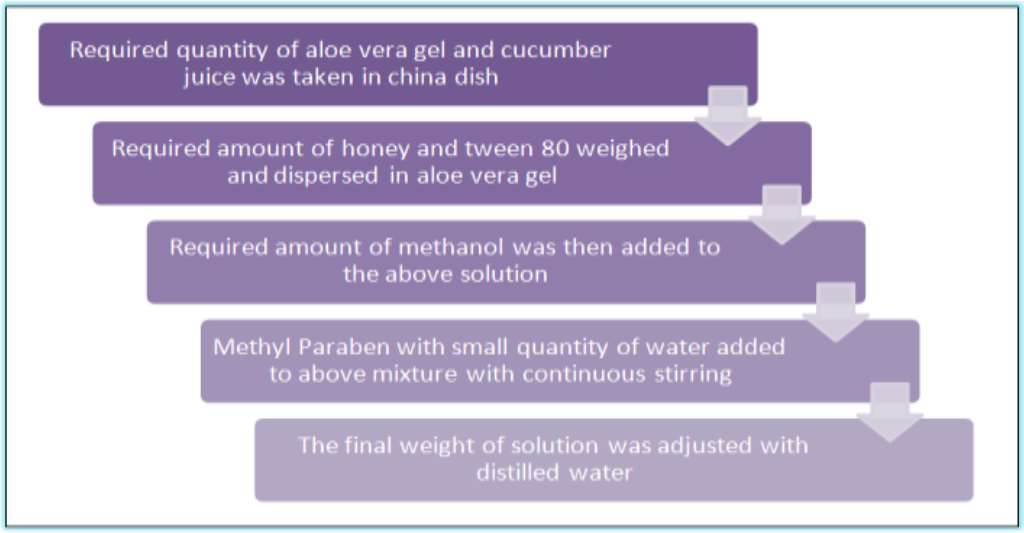
METHOD OF PREPARATION



EVALUATION OF HERBAL FACE TONER

For the evaluation and comparison of the formulated herbal face toner and marketed conditioner sample, first of all, quality control test such as visual assessment and physiochemical factor like pH, viscosity etc were performed.

Evaluation parameters: The different methods followed to evaluate the efficiency of marketed herbal face toner and the newly prepared formulation was as follows:

1. **Organoleptic evaluation/visual inspection:** The formulation prepared were evaluated in terms of their colour, odour, foam producing ability

- Colour
- Odour
- Texture
- Consistency

2. **Skin irritation:** Small amount of mist toner was sprayed on left hand dorsal skin and kept for sometime.
3. **Stickiness:** The mist particles were not found to be sticky in nature.
4. **Skin conditioning:** The appearance of the skin after application of the mist.
5. **Determination of pH:** The pH of 50ml solution by using pH meter was determined by the followingsteps:

- Before use, rinse the electrode with distilled water.
- Calibrate the pH meter by using buffer solutions of 4.01, 7, and 10.01.
- The electrode was transferred to the test solution
- The pH was recorded for 5 samples respectively.

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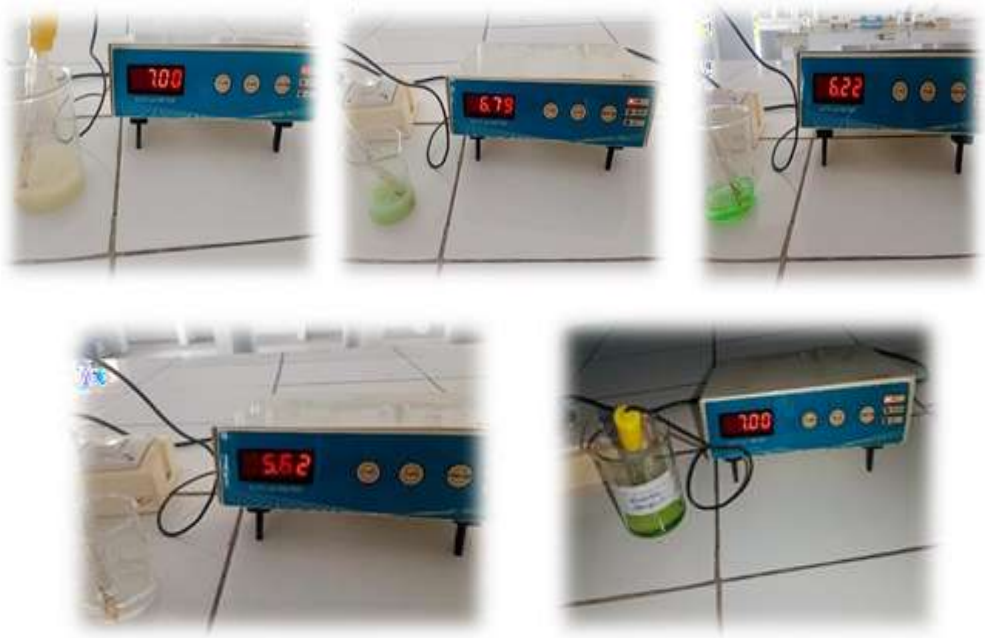

6. Surface tension: The formulation was transferred in the stalagmometer and the surface tension was recorded by drop count method.

7. Viscosity: The viscosity of the face toner was determined by Ostwald viscometer. Solution filled in y arm then sucked or blown up to point 1cm above A. The time for the liquid to fall from mark A to B is measured.

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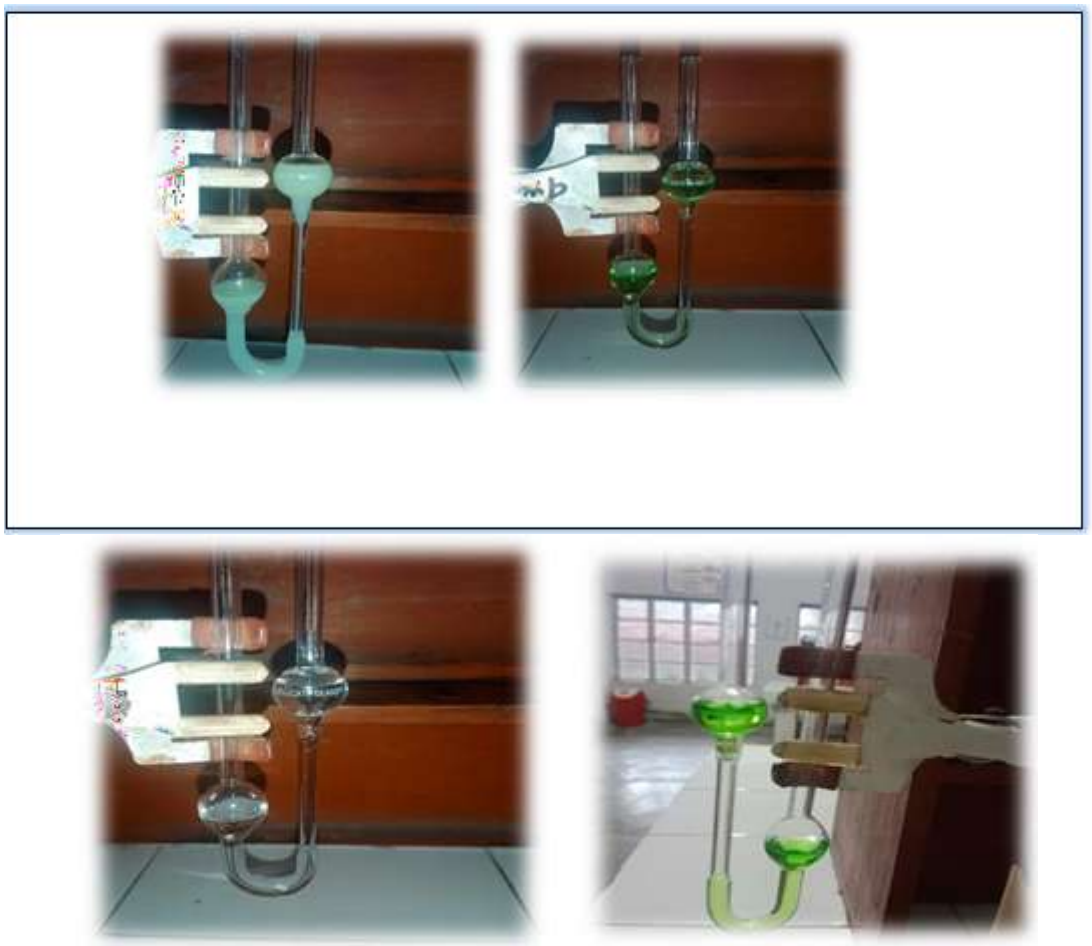

8. Centrifugation: To perform the centrifugation test, 2-3ml of formulation was added in test tubes. In centrifugation, the sample liquid was subjected to a cycle of 2500rpm for 30min. at room temperature.

9. Spreadability: Spreadability of the formulation is measured by spreading of 1ml of the liquid on a circle of 2cm diameter premarket on glass plate and then a second glass plate was employed. 100ml weight was permitted to rest on upper glass plates of 5 min. the diameter of circle after spreading of liquid was determined.

$S = M \times L/S$

Whereas, S=Spreadability

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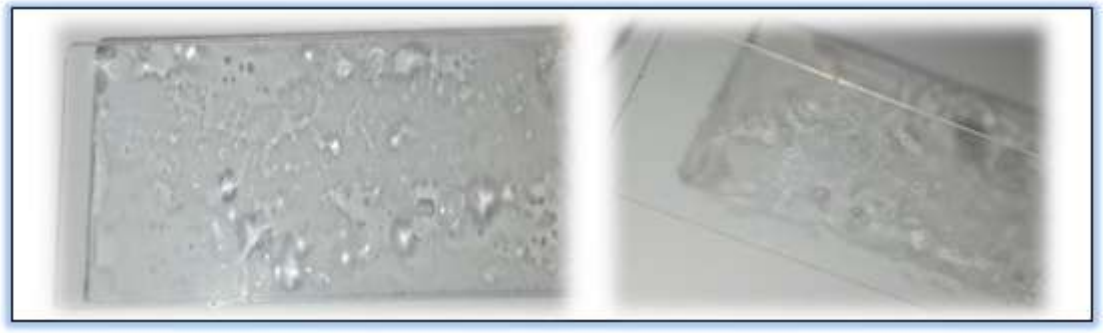
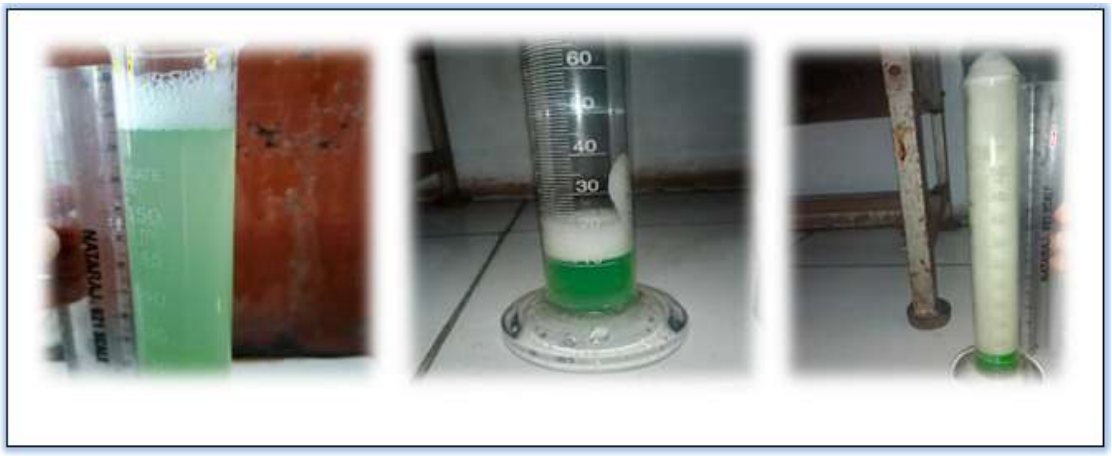
M=weight tide to upper slideL=length of glass slides T=time taken to separate the slides

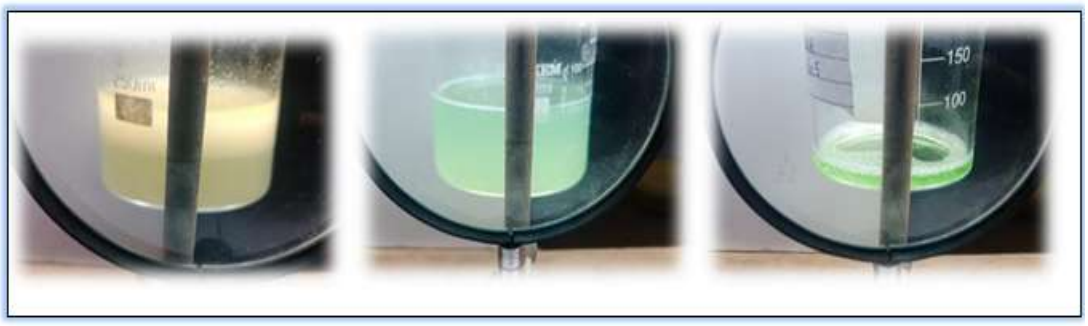


10. Foaming index: The materials contain saponins that can cause a persistent foam when an aqueousdecoction is shaken.

Foaming index=1000/a
Where a= the volume in ml of the decoction used for preparing the dilution in the tube where foaming to aheight of 1cm is observed.



11. Clarity test: The clarity of the formulation before and after gelling is determined by visualexamination of the formulation under light alternatively against white and black backgrounds.



12. Homogenization: Evaluation of the solution with the help of homogenizer. It is a type of mixing equipment used to create a uniform and consistent mixture

13. Freeze thaw test: Freeze-thaw test conducted by placing the sample in a freezer for 18 hours followed by thawing at room temperature for 4 to 6 hours. Repeat the freeze-thaw cycle 10 times. This test is conducted to determine the tendency to crystallize or colour.

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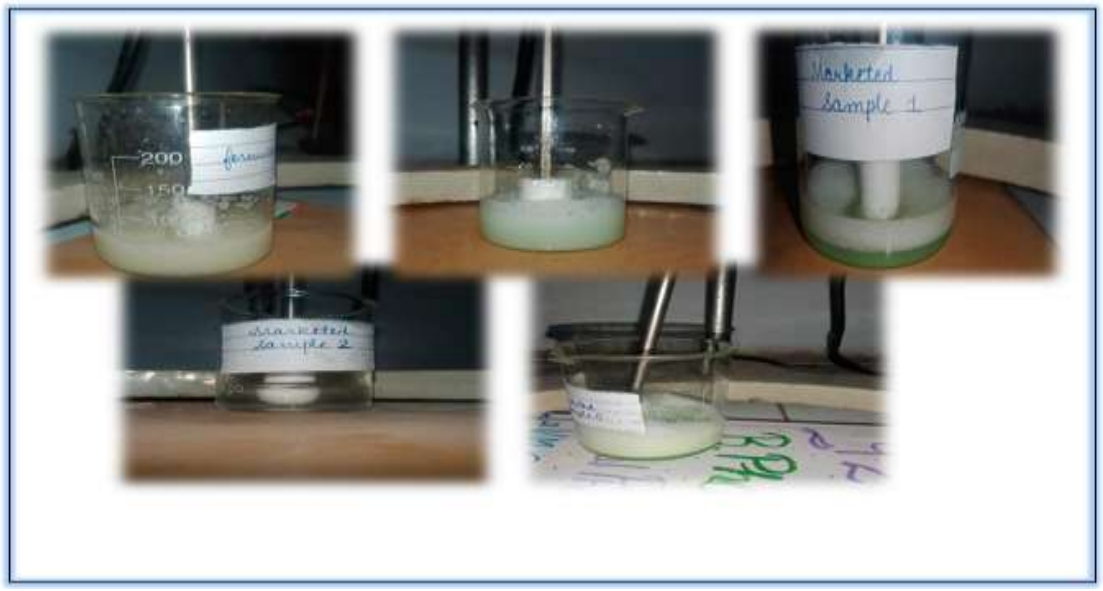

12. **Temperature variation:** The formulation was exposed to different temperatures at 45˚C and 4 to 5˚C for 5days to check the ability.
13. **Pourability-** The test is carried out on the phases of suspension after mixing to ensure that the final preparation is pourable and will not cause any problem during filling and during handling.
14. **Creaming:** Creaming is the concentration of globules at the top or bottom of the emulsion.

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15. Dye test: Take 2ml of the formulation and put 2-3 drops of methyl red dye and crystal violet to perform thedye test.

16. Feel on application: Small amount of mist toner spray on right hand dorsal side and kept for some time.

Organoleptic properties-

RESULT AND DISCUSSION

S.no.	Sample	Colour	Odour	Consistency
1	Formulation 1	Brown	Pleasant	Good
2	Formulation 2	Green		Good
3	Marketed sample 1	Green	Pleasant	Very good
4	Marketed sample 2	White	Pleasant	Very good
5	Marketed sample 3	Green	Pleasant	Very good

Physical evaluation-

S.no.	Sample	Skin irritation	Stickiness	Skin condition
1	Formulation 1	Non irritable	Not sticky	Skin moisturised
2	Formulation 2	Non irritable	Not sticky	Skin moisturised

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3	Marketed sample 1	Non irritable	Not sticky	Skin moisturised
4	Marketed sample 2	Non irritable	Non sticky	Skin moisturised
5	Marketed sample 3	Non irritable	Non sticky	Skin moisturised

pH-

S.no.	Sample	pH
1	Formulation 1	7
2	Formulation 2	6.79
3	Marketed sample 1	6.22
4	Marketed sample 2	5.62
5	Marketed sample 3	7

Surface tension-

S.no.	Sample	Surface tension(dyne/sq cm)
1	Formulation 1	60.52
2	Formulation 2	60.921
3	Marketed sample 1	53.41
4	Marketed sample 2	57.89
5	Marketed sample 3	60.12

Spreadibility-

S.no.	Sample	Spreadibility (in cm)
1	Formulation 1	4.1
2	Formulation 2	3.9
3	Marketed sample 1	4.5
4	Marketed sample 2	4.9
5	Marketed sample 3	4.7

CONCLUSION

The present study was carried out with the aim of preparing the herbal toner for face cleansing, makeup remover, hydrating skin, which is safer than chemical agents. Herbal toner was formulated with aqueous extract of natural occurring drugs that are commonly used fir hydrating skin traditionally. it is clear that the

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herbal toner prepared is effective for the smoothening, calming, astringent, and rejuvenating effect on the skin. It is non irritable and can be used on daily bases for enhancing the natural beauty of human skin. The formulation was also found to possess significant antioxidant activity which may contribute to its sunscreen activity. In addition to the above-mentioned parameters the gel toner was found to have good homogeneity along with good spreadability and pH in the range of skin. Thus, the herbal toner can be used topically for improving the health and rejuvenation of the dried and pale skin. It was also found that the ingredients like cucumber and Aloevera gave the best results for hydration and acne problems.

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