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Research article

Formulation and evaluation of herbal face mist

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Key words: Face mist, Herbal extracts, Natural ingredients, Anti allergic.

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Abstract

Nature has its own beauty, and anything related to this nature can impart its true pure beauty. It's best to embrace the natural beauty within us. A regular self-care in this rat race is also very important to retain the beauty, nature has provided with. In today's world, artificial chemicals are taking over pure natural elements. But now it's time to realize once again, the magic nature has within itself. My present work is to combine the beautiful nature with the beauty it has provide us with. The face mist is formulated with aqueous extract of Rosa, and apple cider vinegar. The formulation also contains *Allium cepa* (contains quercetin), *Ananus comosus* (contains bromelain), *Citrus limonis* (contains Vitamin C) and aqueous extract of *Aloe vera*. Rose oil is used for fragrance. The herbal extracts has soothing effect for the skin, it is also proven to have anti allergic properties. The entire formulation is prepared using natural ingredients, minimizing the use of any artificial elements available. The formulation once again proves the magic nature has within itself.

Introduction

From the ancient days people use naturally available resources to enhance their beauty [1]. It is known that cosmetics are the products used to enhance and impart beauty to the user [2]. In earlier days, naturally available ingredients were generally used as cosmetics, but with the passage of time and improvement in science, several chemicals came into existence which are said to impart or enhance the beauty, thus used as cosmetics [3]. Using these chemical based products can impart beauty for the particular time but it harms our skin when used for a long time. Many harmful effects has been noticed due to usage of chemical based products, thus now a day's cosmetics industry mainly focuses on the preparation of herbal products [4]. The face mist prepared is completely chemical free and it will also provide a soothing effect to the skin, protect the skin from sun burn, and it also has proven anti allergic properties.

Materials used

Rosa (Common name – Rose, Family –*Rosaceae)*
Rose water helps maintain the skin's pH balance, controls excess oil, helps reduce redness and get rid of acne.
It helps hydrate, revitalize and moisturize the skin giving it with that refreshed look.
The antioxidant properties of rose water help to strengthen skin cells and regenerate skin tissues.
Due to the astringent like properties it possesses, rose water helps clean pores and tone the skin.
Applying rose water after steaming tightens capillaries reduces redness and blotchiness.
It also helps aging skin, keeping fine lines and wrinkles at bay [5].

Ananus comosus (Common name – Pineapple, Family – *Bromeliaceae*)
Pineapple juice has the ability to enhance your beauty in totality and keep you acne, pimples and wrinkles free.

Its bromelain content also shows reduction in anti allergic sensitization and allergic airway disease.
Its is full of vitamin B1, B2, B3, B5, B6, and C, manganese, copper, potassium, beta-carotene, folic acid.
As an anti-inflammatory and anti-blood clotting agent, it is often used to help reduce the redness, bruising and pain that typically follow invasive cosmetic procedures.
Recent studies have shown bromelain, when administered locally eliminate burn debris and expedite wound healing.
The topical application of bromelain would digest the skin's dead proteins (such as broken down collagen), exfoliate, rebuild collagen and reveal a younger and more even layer of skin [6].

Allium cepa (Common name – Onion, Family – *Amaryllideceae*)
Vitamins A, C and E benefits of onion has made it a wonderful ingredient for our skin. These vitamins protect our skin from premature aging.
It contains quercetin, which is one of the most powerful anti oxidants, that keep our skin wrinkle free and also posses anti allergic properties.
The sulfur and vitamins present in onion also help to keep the skin soft and supple. The sulfur rich phytochemicals benefits of onion contributes to anti aging.
The anti microbial, anti bacterial and anti inflammatory benefits of onion has made it a great natural cure for acne.
The blood purifying benefits of onion juice helps to lighten complexion by removing toxins and impurities from our body.
The flavonoid named quercetin present shows antihistaminic properties and can block allergic airway pathways [7].

Citrus limonis (Common name – Lemon, Family – *Amaryllidaceae*)
The vitamin content, especially vitamin C present in onion helps nourish our skin, making it healthy and glowing.
Lemons provide a dose of the free radical fighting antioxidant vitamin C, which helps keep skin even-toned and helps boost the body's immune system.
Lemon can be used as a skin astringent as it helps motivate your pores to close and your face to tighten resulting in smoother skin.
Lemons have antiseptic qualities which help exfoliate dead cells and aid in fighting dandruff and pesky flakes.
Its antibacterial and anti-inflammatory qualities can also help soothe skin irritations affiliated with dandruff.
Lemons are a natural stimulant to the liver and adding lemon juice to a large glass of water in the morning is a great liver detoxifier. Not only will this help detoxify your liver, it will help replenish your body's mineral supply and quench your thirst.
The juice of a lemon is a natural alkalizing agent, and helps to maintain a steady pH balance in the body. [8]

Aloe vera (Common name - Indian aloe, Family - *Asphodelaceae*)
Aloe moisturizes the skin without giving it a greasy feel.
It also helps soothe your skin making it look smooth and perfect.
Aloe vera helps with sunburn through its powerful healing activity at the epithelial levels of the skin.
It is rich in antioxidants and minerals that boost the healing process; it unclogs the pores and softens the skin.
It helps to increase the production of collagen in the body and skin elasticity.
Its antimicrobial properties treat pimples without causing any damages to the skin.
Aloe Vera contains polysaccharides and gibberellins. These help in the growth of new cells and at the same time, reduce inflammation and redness.

Apple cider vinegar
It helps in keeping your skin pores bacteria, oil and dust free.
It will soothe your skin and will leave it soft and supple.
Its alpha hydroxyl acid removes the dead skin cells and reveals healthy new skin cells.
It has astringent properties, which helps in increasing the blood flow to the skin and minimize the pores, a great remedy for the ones with oily skin. It also regulates the pH level of your skin [10].

Materials and methods

The selected plant materials were authenticated by Botanical Survey of India, Central National Herbarium, AJC Bose Indian Botanic garden, Howrah, Kolkata The authentication number of *Rosa, Ananus comosus, Allium cepa, Citrus limonis, Aloe vera* are PR-05, PR-06, PR-07, PR-08 and PR-09 respectively.
The plant extracts used with medicinal use and figure are shown in table 1.

Ananus comosus extract: - Extraction of Bromelain

Extraction was done by using deionized water. Fresh pineapple were taken and washed with water to takeoff the dust particles, sand and other foreign or extraneous matter from the fruit. The waste parts were separated according to the requirement (crown, peel and core) care should be taken that the pulp part is excluded while removal. The wastes are taken separately and weighed and is crushed using phosphate buffer with pH 6.0 in ratio 1:1.5. The mixture is filtered twice using muslin cloth and then collected and stored at 4^0C (Figure 1) [11].

Table 1. Plant extract used with medicinal use and figure.

Sr. No.	Plant extract	Medicinal use	Image
1.	Common Name –Rose Scientific Name – *Rosa* Family - Rosaceae	Rosewater helps maintain the skin's pH balance, controls excess oil, helps reduce redness and get rid of acne [5].	
2.	Common name- Pineapple Scientific name- *Ananuscomosus* Family - Bromeliaceae	Pineapple juice has the ability to enhance your beauty in totality and keep you acne, pimples and wrinkles free. Its bromelain content also shows anti allergic properties [6].	
3.	Common name – Onion Scientific name – *Allium cepa* Family - Amaryllideceae	The vitamin content, especially vitamin C present in onion helps nourish our skin, making it healthy and glowing. Not just your skin, buttakes care of your lips too. Presence of quercetin also shows anti allergic effect [7].	
4.	Common name – Lemon Scientific name – *Citrus limonis* Family - Rutaceae	Its antibacterial property helps in treating acne. Lemons are rich in vitamin C and citric acid, so they can help brighten and lighten your skin when used over time [8].	
5.	Common name – Indian Aloe Scientific name - *Aloe vera* Family - Asphodelaceae	Aloe moisturizes the skin without giving it a greasy feel, It also helps soothe your skin making it look smooth and perfect. Aloe vera helps with sunburn through its powerful healing activity at the epithelial levels of the skin [9].	
6.	Apple cider vinegar	Apple cider vinegar contains antibacterial, anti-fungal, and anti-viral substances that help prevent skin infections. It opens our skin pores, making the treatment more effective when treating acne and pimples [10].	



Figure 1. Showing Bromelain extraction from *Ananus comosus.*

***Allium cepa* extract:** Extraction of Quercetin
The onion peels were separated and dried. The dried peels were soaked in 59% ethanol at 60^0C for 15 minutes. The solution was cooled and filtered, then the filtrate was collected (Figure 2) [12].

***Citrus limonis* extract:** Extraction of Vitamin C
The peels were removed and the fruit was crushed to extract its juice. The extracted juice was filtered using muslin cloth to remove all the unwanted maters. The filtrate collected was refrigerated and stored for further use (Figure 3).

***Aloe vera* extract**
The succulent leaves were collected and peeled off. The remaining part of the leaves was crushed properly and strained using muslin cloth. The filtrate obtained was collected and stored for further use (Figure 4).

***Rosa* extract**
The rose petals were separated and heated with water for 30 minutes at 60 degree celsius. After 30 minutes, the solution was kept to be cooled and then strained to separate the petals (Figure 5).

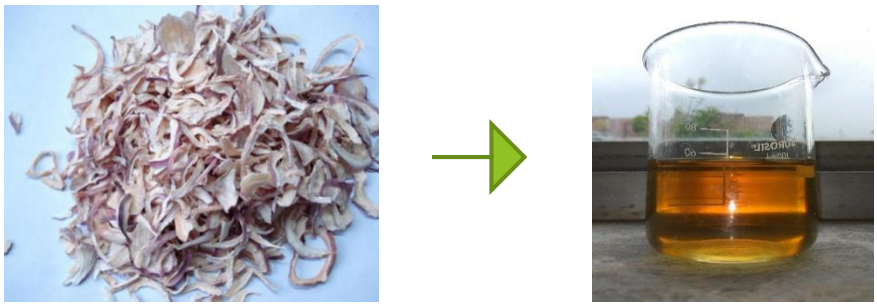


Figure 2. Showing quercetin extraction from *Allium cepa*.

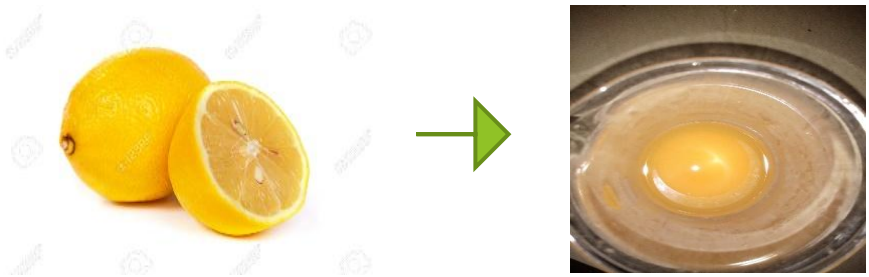


Figure 3. Showing Vitami C extraction from *Citrus limonis*.

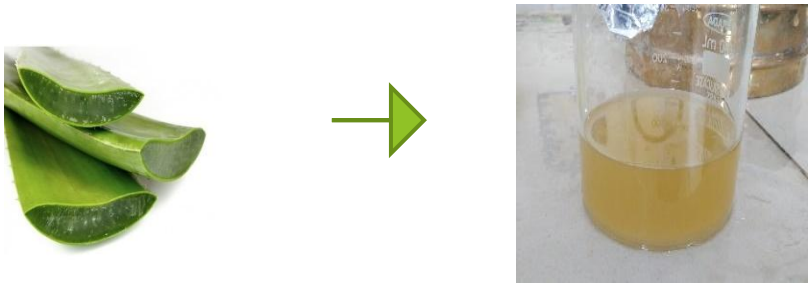


Figure 4. Showing Vitami C extraction from *Aloe vera*.



Figure 5. Showing extraction from rose petals.

Table 2 shows the formula of the herbal face mist and the figure 6 shows the formulated face mist in a suitable container. The details of the phytochemical test of the different plant extracts used are given in table 3 and results are reported.

Table 2. Formula of face mist

Ingredients	Amount (for 100ml)
Bromelain extract	10ml
Quercetin extract	10ml
Vitamin C extract	2ml
***Aloe vera* extract**	15ml
Apple cider vinegar	2ml
Rose water	Q. S.

Benefits of using face mist

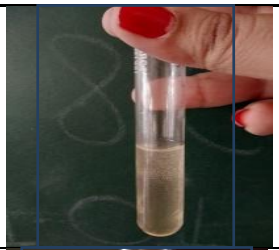
It can be used as toner or fluid packed with nutrients that restore the moisture of our skin.
Refreshes the skin at any time of the day.
Helps to soothe irritated skin.
Protects from sun burn.
Creates a protective layer over the skin.
Helps treat allergies caused due to dust and sunburn.

The prepared face mist



Figure 6. The herbal face mist.

Table 3. Phytochemical tests of extracts.

Sr. No.	Test	Procedure	Result	Image	Reference
1.	Gelatin test (Bromelain test)	Dissolve gelatin in water-let it cool-add 5 ml extract and let it stand.	+		[15]
2.	Shinoda test (Quercetin test)	2 ml extract in a test tube-drops of HCl added-pieces of magnesium turning added.	++		[16]
3.	DCPIP test (Vitamin C)	2 ml extract in a test tube-drops of 1% DCPIP added-DCPIP added until blue color disappears.	++		[17]

Antibacterial study

The microbiological assay of an antibiotic is based upon a comparison of the inhibition of growth of micro-organisms by measured concentrations of the antibiotics under examination with that produced by known concentrations of a standard preparation of the antibiotic having a known activity. In this, we used two most popular methods of antibacterial assays.

Disc plate method

The disk-diffusion agar method tests the effectiveness of antibiotics on a specific microorganism. An agar plate is first spread with bacteria, then paper disks of antibiotics (Here we used the prepared polyherbal face mist) are added. The bacteria is allowed to grow on the agar media, and then observed. The amount of space around every antibiotic plate indicates the lethality of that antibiotic on the bacteria in question (Figure 7) [18].

Streak plate method

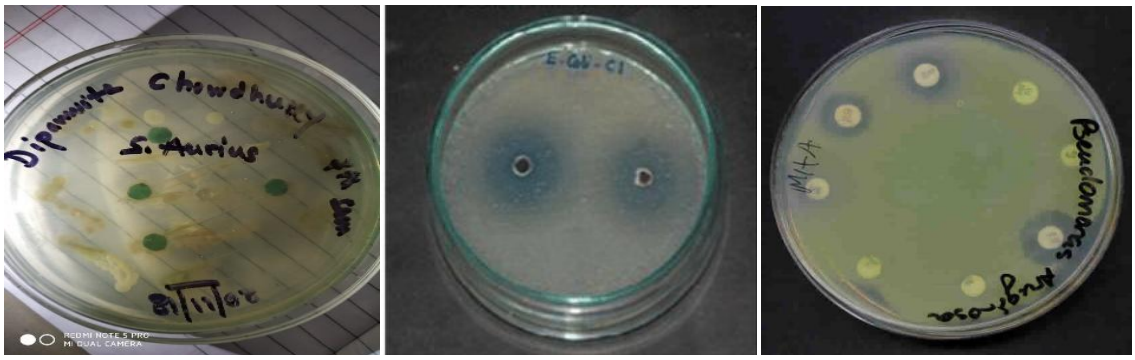
Streak plate technique is used for the isolation into pure culture of the organisms (mostly bacteria), from mixed population. The inoculum is streaked over the agar surface in such a way that it "thins out" the bacteria. In this, we streaked the prepared polyherbal face mist and checked whether the prepared formulation shows any bacterial growth (Figure 8) [19].

Microbial tests

The main microbe present in our skin that causes infections are *Staphylococcus aureus*, *Escherichia coli, Pseudomonas aeruginosa* [18]. Thus, it is checked whether the prepared formulation can inhibit the growth of these microbial strains or not.

Results

The various physical parameters of the prepared formulation was studied and the results are shown in table 5 are reported.



(a) **(b)** **(c)**

Figure 7. Zone of inhibition by disc diffusion method (a)*S. aureus* (b)*E. coli* (c)*P. aeruginosa* [19].

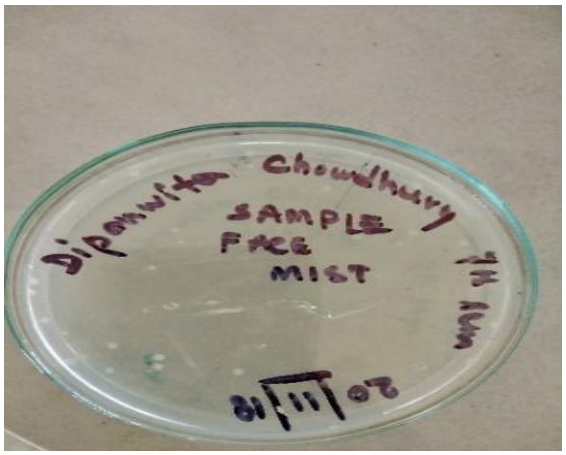


Figure 8. Antimicrobial contamination study of the formulation by streak plate method [20].

Table 5. Physical parameters of the formulation.

Test	Description	Observation
pH	The pH of the formulation is checked using pH meter.	5.5
Surface tension	The surface tension is measured using stalagmometer.	53.5 dyne/cm_2
Viscosity	The viscosity is measured using Oswald viscometer.	1.6 cP
Skin irritation	The product when applied on skin causes irritation or not.	Refer to figure 9a and figure 9b
Stickiness	The product after application sticks particles or not.	Refer to figure 9c and figure 9d
Skin conditioning	The appearance of the skin after the application of the product.	The skin was soft, supple and moisturized.
Temperature Variations	The product is stored at 45^0C and -10^0C for 3 months to check its stability.	Products remains stable at extreme temperature conditions, thus it can be stable for 2 years at room temperature.
Light exposure testing	The product is placed in its actual packaging at direct sunlight/in light chamber for 48hrs to check any discoloration of the product.	No discoloration/physical changes observed in the product.



Figure 9a (before)



Figure 9b (after)



Figure 9c (before)



Figure 9d (after)

Figure 9. Showing the effect of prepared face mist on skin (figure 9a and 9b showing skin irritancy effect, figure 9c and 9d showing skin stickiness effect).

Antimicrobial study

The present research investigation was carried out to determine the antimicrobial efficacy of the herbal face mist on against skin micro flora isolates *Staphylococcus aureus*, *E. coli* and *Pseudomonas aeruginosa*. Results obtained from the experimental data revealed that the prepared formulation has antimicrobial activity, though to varying degrees as indicated by the inhibition of the growth pattern of the isolates. Table 6 shows the details of susceptibility pattern of crude ethanolic herbal extracts against different microorganisms

Table 6. Susceptibility pattern of crude ethanolic herbal extracts against different microorganisms.

Microbial strains	Zone of Inhibition in mm
S. aureus	7
E. coli	9
P. aeruginosa	8

Conclusion

In the present scenario, people need cure for various skin problems without side effects. Herbal ingredients opened the way to formulate cosmetics without any harmful effect. Herbal face mists are considered as sustaining and productive way to advance the appearance of skin and giving a soothing effect to tanned skins. Thus in the present work, It is a very good attempt to formulate the herbal face mist containing naturally available ingredients like Bromelain extract Quercetin Vitamin C *Aloe vera* extract Apple cider vinegar and Rose water. It is suggested that the prepared formulation was physico-chemically and microbiologically stable, and possessed characteristics of a standard cosmeceuticals formulation for skincare.

Future aspects

The present work is based upon the usage of some natural ingredients in the formulation of face mist. The ingredients here used imparts soothing effect to the skin as well as it protects the skin from sun burns, thus in today's world it can be very essential. This formulation

also keeps the skin hydrated and fresh throughout. The ingredients here used also has proven anti allergic properties, thus in future this formulation can also turn into a pharmaceutical product that will also contains anti allergic properties.

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