

Herbal face pack containing *Coffea arabica* Linn, *Myristica Fragrans* and *Lens Culinaris* as an antioxidant and antiseptic activity

Research Article

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Abstract

The goal of the project is to test and develop an herbal face pack that contains natural herbal compounds that act as antioxidants, antiseptics, and skin brighteners. Natural herbal components including coffee, *multani mitti*, arjuna powder, rice flour, gram flour, orange peel powder, nutmeg, milk powder, saffron, aloe vera gel. All natural components were sieved through #120 mesh, carefully weighed, and geometrically blended for a homogeneous formulation, and then tested for phytochemical, morphological, physical, stability, and irritancy, microbial as well as physicochemical properties. Herbal face masks or packs are used to revitalize muscles and improve blood circulation while maintaining healthy skin and eliminating pollutants from pores. All face pack formulations were determined to be good in physical criteria and clear of skin irritations, indicating that the face packs have good qualities, according to this report's results. To identify the practical aids of face packs for human consumption as cosmetic items, more optimization research are needed on this study.

Key Words: Face pack, Herbal, Cosmetic, Natural glow, *Coffea Arabica*, *Red lentil*, *Myristica Fragrans*.

Introduction

Cosmetics are generally accessible goods that are intended to beautify, clean, and enhance the beauty of the skin (1, 2). Herbal cosmetics are used to cleanse and enhance the appearance of the skin (3). These are also the configurations that indicate cosmetics including functional compounds or pharmaceuticals (4). Everyone desires bright and attractive skin. Acne, blackheads, and dark circles are becoming frequent among teenagers and those who deal with it. The most significant advantage of utilizing herbal cosmetics is that they are natural and have no side effects on the body. People have skin texture, which darkens as a result of sun damage, pollution, and other things if they do not take adequate care of it. Skin disorders are usually caused by blood impurities, according to Ayurvedic medicine. Pollutants accumulated in the bloodstream as a result of poor nutrition and Infections of the skin are caused by our lifestyle. Ayurveda describes many herbs and treatments for blood purification. Blood purifier herbs include *Manjistha*, *Lodhra*, *Chandana*, *Haridra*, and others (5). *Mukhalepa* is an Ayurvedic herbal paste used to cure acne, scars, markings, and pigmentation on the face. "*Mukhalepana*" refers to the process of rubbing this herbal mixture on one's face (6). This cosmetic

treatment is also now known as a facial. The face pack requirements for each type of skin are unique (7).

Several types of face packs nowadays are available for normal, dry and oily skin. Essential vitamins are available in face packs containing certain substances, making them ideal for skin health and beauty. These compounds have been shown to be advantageous to the skin in a variety of ways. Normal face packs are easy to use. Packs are used to enhance the skin's smoothness and brightness (8). Pimples, acne, wrinkles, and dark circles under the eyes are reduced. For oily, acne-prone skin, face packs are advised. Due to the numerous benefits of herbal face packs over chemical-based face treatments, they are becoming increasingly popular. They're anti-allergic, non-habit and non-toxic. Turmeric, sandalwood, milk powder, *multani mitti*, orange peel, saffron, rice flour and other natural ingredients are used to make them(9). These treatments are applied to the face as liquids or pastes and let too dry to provide the skin a tightening and cleansing effect. They're normally kept on face for ten to fifteen minutes to allow the water to drain fully and compress and stiffen the resulting film, making it easier to remove. The warmth and fixing effect of the face pack helps to remove dirt particles from the skin of the face. Skin waste and accumulated dirt are expelled with the applied face pack when it is removed. Face packs are useful for preventing, promoting, and curing skin issues. The following are some of the most important herbs for skin fairness.

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Benefits of Applying Face pack: (10)

- Face pack nourishes the skin by providing essential nutrients.

- Face packs for acne, pimples and blackheads usually regulate excessive sebum production from the sebaceous glands and remove dangerous bacteria from the acne lesion.
- By mixing fine powdered with rose petals, orange lentils, and sandal, remove scars, acne, and markings on the skin can be eliminated.
- Face packs are used to eliminate dead skin cells.
- The calming and relaxing properties of these face packs and masks are beneficial to the skin.
- They aid in the restoration of the skin's natural radiance and brightness in a short period of time.
- Using natural face packs on a regular basis will give your skin a healthy shine and improve the texture and appearance of your skin.
- By correctly applying a face pack, the detrimental effects of pollution and harsh elements can be effectively prevented.
- They aid in the prevention of premature skin aging.
- Natural face packs can effectively control the formation of wrinkles, fine lines, and skin sagging.
- Natural face packs give the appearance of fresh and healthy skin.

Materials and Methods

Coffee, Gram Flour, Rice Flour, *Multani Mitti*, Arjuna Powder, Orange Peel Powder, Nutmeg, Milk Powder, Saffron, Turmeric, Aloe Vera, and other natural ingredients were employed in this investigation. All substances were verified at Parul University's Botany department. The natural ingredients that were used in the formulation of the herbal face pack are listed below.

Ingredients and Formulation

Coffee (11)

Coffee has calming properties, anti-aging properties, and anti-cancer properties. It also reduces inflammation, which helps with acne treatment and dark circles. Care for the skin when the sun has gone down.

Multani Mitti (12)

Multani mitti benefits the skin in a variety of ways, including reducing pore size, fading freckles, soothing sunburns, cleansing skin, removing blackheads and whiteheads, improving blood circulation, reducing dark spots and acne and give a glowing effect due to the beneficial nutrients it contains. *Multani Mitti* has magnesium chloride.

Gram flour (13)

It contains anti-acne effects and has been used in India for centuries for this reason. To begin started; the zinc in gram flour has been shown to treat infections that cause facial acne breakouts. Second, it aids in the regulation of excessive secretion as well as the relaxing of inflamed skin.

Rice Flour (14)

It can be used to treat different types of skin conditions. Rice water is suggested in its undigested form by Ayurvedic practitioners on the Indian subcontinent. It promotes the growth of beneficial

bacteria for regular bowel movements and is a good treatment for soothing sensitive skin.

Arjuna bark Powder (15, 16)

Arjuna bark extract slows down the aging process of the skin. Arjuna bark's main and most important function is to naturally eliminate acne marks (*Ghadde*). An increase in the number of free radicals is linked to aging. Arjuna has strong antioxidant properties that protect the skin from free radical damage. It enhances the skin barrier and increases sebum production to reduce the characteristics of dry skin and protect the skin from external challenges.

Saffron (17)

Crocus sativus, a plant belonging to the *Iridaceae* family, is mostly made up of dried stigmas and upper sections of styles. It's high in carotenoid glycosides, most of which are terpenoids. It provides fair and radiant skin by lightening the skin tone.

Turmeric (18, 19, 20)

Turmeric was employed in this preparation because of its blood purifying properties and antibacterial properties, which aid wound healing. It treats skin conditions caused by blood impurities. It has anti-allergic properties and anti-inflammatory. It contains mainly terpenoids, phytoconstituents, which assist to brighten the skin tone. Turmeric helps to prevent wrinkles and enhances skin suppleness. It improves the appearance of pigmentation, uneven skin tone, and dull skin.

Aloe Vera (21)

Aloe Vera is a wonderful moisturizer for the skin. Aloe Vera hydrates and rejuvenates the skin's surface layer, ensuring that it is always appealing. Aloe Vera has antibacterial qualities, making it an effective acne and pimple treatment. Aloe vera powder contains sodium palmate, sodium palm kemelate, sodium carbonate, glycerin, sorbitol, and other nutrients.

Nutmeg (22)

Nutmeg's analgesic, anti-inflammatory, antiseptic, and antibacterial properties are well-known. It helps to reduce fine lines, wrinkles, and other signs of ageing. It also helps to reduce and hide acne scars.

Milk Powder (23)

It is quite useful to the skin since it gives long-term nourishment for dry, rough skin. Whether in the form of powdered raw milk or plain milk, milk cream gives skin a delightful glow. This deeply moisturize and makes it appear younger, shinier, and smoother. It lightens the skin to remove acne, dark spots, pigmentation and other imperfections. This pack also helps to decrease whiteheads, blackheads, and other skin problems in a natural way.

Orange Peel Powder (24)

It treats blackheads, cell build-up around pores, dark circles, dry skin, wrinkles, and aging, as well as

preventing acne. Orange peel can be used to make cosmetics for the face. Orange is used as a traditional remedy. It's also high in vitamin C, B, flavonoids, and terpenes, and it's a traditional Chinese sign of good fortune and prosperity. Antibacterial, antifungal, and Larvicidal activities are all present.

Sandalwood (25)

Anti-tanning and anti-aging properties are found in sandalwood. It also has toning, emollient, and antibacterial effects, as well as cooling, astringent, relaxing, and therapeutic characteristics.

Masoor Dal (26)

Masoor Dal exfoliates dead skin cells, giving you a healthy glow. After regular usage, the lentil performs as an excellent cleaner, removing blackheads and acne patches. Improves the texture of the skin and hydrates it. Scars of lightness and dark areas. Rose oil, coconut oil, light liquid paraffin, stearic acid, neem oil, vitamin E, glycerin, methyl paraben, and honey are some of the other chemicals used.

Table 1: list of ingredients

Sr. no.	Ingredient name	Use
1	Coffee	Antioxidants stimulate blood flow, killing dead cells and removing pollutants, making skin smoother and brighter, and preventing cancer.
2	Multani mitti	Removes all impurities and dead skin cells, while the cooling action calms the skin, increasing blood circulation, complexion, acne reduction, and a glowing appearance.
3	Rice flour	Antibacterial, Antifungal, Antioxidant, Heal acne .anti-aging
4	Orange peel	It cures blackheads, cell build up around the pores brightness skin , dark circles, dry skin, wrinkles, aging, prevent acne, Antibacterial, Antifungal.
5	Aloe Vera	Antiseptic, Antioxidant, soothing effect to skin. Moisturizing Agent.
6	Turmeric	Anti-Bacterial, Anti-septic, improve skin colour.
7	Saffron	Soothing agent, Improve complexion and skin tone, Treats dry skin, Remove suntan, treat acne.
8	Gram Flour	Tan removal, anti-Bacterial, reduces redness and irritation, treat acne, removes dark spots.
9	Nutmeg	Treat Acne and spots Smoothing, cooling effect and improves fairness, reduces rashes, burns and infections
10	Arjuna bark	Anti-ageing,removes acne scars
11	Milk powder	Long-term hydration for dry, rough skin, removal of dark spots, pigmentation, and acne treatment
12	Sandalwood	Anti-agingand anti-tanning property, antioxidants, anti-inflammatory.
13	Masoor Dal	Antioxidants eliminate dead cells and remove pollutants from the skin, making it smoother, cleaner, and more effective at treating blackheads and acne.

Method of preprataion of face pack

Face pack preparation was used to make several formulations with variable concentrations of all constituents. Using sieve #120, the exact amount of components was weighed and processed into a fine powder. To ensure consistent mixing, the ingredients were geometrically blended using the serial dilution method. The produced face pack was then enclosed in an airtight container for testing various parameters. (23, 27)

Table 2: Composition of herbal pack

Sr.No.	Ingredient name	Scientific name	Quantity in Percentage
1	Multani mitti	Calcium bentonite	10
2	Rice Flour	Oryza sativa	5
3	Orange Peel	Citrus sinensis	10
4	Aloe Vera	Aloe barbadensis	5
5	Turmeric	Curuma longa	5
6	Saffron	Crocus sativus	2
7	Gram Flour	Cicer arietinum	10
8	Nutmeg	Myristica fragrans	5
9	Masoor Dal	Lens culinaris	10
10	Coffee	Coffea Arabica	8
11	Arjuna Bark	Terminalia arjuna	5
12	Milk Powder	-----	15
13	Sandalwood	Santalum	10

Procedure for application of face pack

The pack must be applied on the face every three days. It should be applied evenly with a brush to the face and left to dry for 15-20 minutes. After that, remove it with a wet sponge.

Evaluation of face pack (28)

Physical evaluation

Physical characteristics such as color, look texture and odour were visually examined.

Physicochemical Evaluation (29)

Total ash:

Place around 2-3g of crushed air-dried powder in a tarred and lighted beaker, properly weighed. Spread the material evenly and ignite it at 500-600°C till it goes white, showing the absence of carbon. Weigh after cooling in desiccators. If can't get carbon-free ash this way, cool the beaker and wet the residue with about 2 mL water or a saturated ammonium nitrate solution. Dry in a water bath, then burn on a hot plate to a consistent weight. Allow 30 minutes for the residue to cool in suitable desiccators before weighing. Calculate the total ash content in mg per g of air-dried material.

Water-soluble ash (30)

In the beaker containing the ash, bring 25 mL of water to a boil for 5 minutes. In a crystalline beaker or on ash-free filter paper, collect the insoluble components. Wash with hot water and burn in a beaker at 450°C for 15 minutes. Subtract the weight of the

residue in mg from the total ash weight. Calculate the amount of water-soluble ash per g of air-dried material in mg.

Acid-insoluble ash

Add 25 mL of hydrochloric acid (70g/l) TS to the beaker containing the whole ash, cover with a watch-glass, and slowly boil for 5 minutes. After rinsing the watch glass, fill the beaker with 5 ml of hot water. Collect the insoluble material on ash-free filter paper and wash the filtrate until it is neutral with hot water. Transfer the filter paper holding the insoluble particles to the original beaker, dry on a hot plate, and load to a constant weight. Before weighing, allow 30 minutes for the residue to cool in sufficient desiccators. Calculate the amount of acid-insoluble ash per g of air-dried material in mg.

pH (31)

Weigh the test sample (5 gm) and place it in a flask. Fill the flask with 100 ml distilled water, close it, and set it aside in the shade for a minute. Allow one hour for it to settle. Transfer an adequate amount of the clear aqueous solution from the flask into the beaker to calibrate the pH meter. Calculate the pH level and report it.

Determination of moisture content (32)

Fill a flat and thin porcelain plate with a 1.5 gm weighted powder. Dehydrate in the oven at 100°C or 105°C until the weight differences between successive weighing are no more than 0.5 mg. Allow desiccators to cool before weighing. Moisture is usually reported as a loss of moisture.

Physical Evaluation (powder property (33))

Particle size

It is a parameter that influences a variety of attributes such as grittiness, spreadability etc. Particle size was calculated using the sieving method with I.P. Standard sieves and 10 minutes of mechanical shaking.

Angle of repose (34)

The angle of repose is being used to estimate the friction forces in a powder. It's a measure for the flow of powder. The angle between the surface of the powder pile and the horizontal plane is determined. The powder combination was allowed to flow through a funnel placed on a stand at a specific height (h). The angle of repose was calculated using the height and radius of the powder pile generated. Through the funnel's sides, the powder particles were carefully slid and rolled over each other. Angle of repose and powder flow and Angle of repose characteristics are related

$$\tan \theta = h/r$$

Where, h= height of the cone, r= radius of the base, θ = angle of repose.

Bulk Density (34)

Bulk Density is the ratio of a powder's mass and its bulk volume. The required quantity of material is dried and placed to the 50 ml mark into a 50 ml

measuring cylinder. The cylinder is then dropped at 2-second intervals from a height of 1 inch onto a hardwood surface. The powder's volume is calculated. The powder is then weighed. To obtain average results, this process is repeated.

Bulk Density is calculated by using the below given formula.

$$\text{Bulk Density} = \frac{\text{volume}}{\text{mass}}$$

Carr's index or % Compressibility (33)

It indicates powder flow properties. It is expressed in percentage and is given by,

$$I = \frac{Dt - Db}{100} Dt$$

Where, Dt = the tapped density of the powder Db = the bulk density of the powder.

Hausner's ratio (34)

Hausner ratio is an indirect index of ease of powder flow. It is calculated by the following formula.

$$\text{Hausner's ratio} = \frac{Dt}{Db}$$

Tapped density (35-40)

The increased bulk density generated by mechanically tapping a container containing a powder sample is known as tapped density. The measuring cylinder or vessel is mechanically tapped for 1 minute while the original powder volume or mass is observed, and volume or mass readings are taken until there is little more volume or mass change. It was measured in gm per cubic centimeter.

ABTS assay (41)

With few changes, the ABTS method 2, 20 -azino-bis-(3-ethyl-benzothiazoline-6-sulfonic acid) was created using the methods designated by Contreras-Calderón et al. (2016). A cent microliter of the extract was diluted in 4,900 litres of distilled water, and an aliquot of 100 litres was taken from each of the dilutions, to which 1,000 litres of the ABTS radical was added, and then it was placed in a water bath at 30°C for 30 minutes. Finally, a UV spectrophotometer was used to measure the absorbance within each sample at a wavelength of 730 nm.

Antimicrobial evaluation: (42, 43)

The Pharmaceutical Biotechnology lab examined the formulation for antibacterial activity against test organisms such as Staphylococcus aureus and Propionibacterium acnes. In this procedure, 100 micro litre standardized bacterial suspension was planted on nutritional agar plates and reinforced clostridial agar (RCA). 200 mg of formulation was combined with distilled water and placed into the wells once the dosage was optimized. The diameter of Zones of Inhibition (mm), including cupsize, was measured under standard circumstances to assess antibacterial activity. Three times the trials were carried out.

Determination of microbial load

The prepared face pack formulation was evaluated for total viable count of gram negative pathogens for instance *E.coli*, *Pseudomonas* at Microbiology lab, Parul Institute of Pharmacy & Research.

Spreadability (44)

The pack's spreadability was evaluated by carefully layering it between two glass slides (parallel plate method). A total of two slides were taken. Between the slides, the pack was placed. The upper slide was easily moved under a 20 g weight, whereas the 100 g weight was uniformly distributed across glass slides. The Spreadability in g.cm/s was calculated by measuring the time it took the higher slide to move over the lower slide. The experiment was carried out again with all of the herbal face packs that had been made. To calculate spreadability, the following formula was used.

$$S = W \times \frac{L}{T}$$

Where, S = Spread ability, W = weight tied to upper slide, L = length of slide, Time = Time taken by upper slide to slip.

Irritancy test (45)

The irritancy test is used to observe the allergic reactions of packs. It's done by spreading a small amount of the pack on the hand and examining it after 24 hours to see if there was any allergy or irritancy. Each pack was subjected to the same test.

Stability studies (46)

One month of storage at different temperatures was used to test the stability of the optimized formulation. Physical parameters such as color, odour, pH, consistency, and feel were tested in packed sample bottles of the formulation maintained at several temperature conditions such as 400°C and room temperature.

Results and Discussion

To ensure the quality of the created face pack, the following evaluation parameters were used.

Organoleptic Evaluation

Organoleptic characteristics of the herbal face pack were tested it is shown in Table 3. The color of a formulation was pale yellow. The aroma of the final formulations was pleasant and tolerable, which is ideal for cosmetic formulations. Texture and smoothness were acceptable in terms of cosmetic formulation requirements.

Table 3:- Organoleptic Evaluation

Sr.no.	Parameter	Observation
1	Color	Brown
2	Odour	Slight
3	Appearance	Smooth, fine
4	Texture	Fine
5	Smoothness	Smooth

Physicochemical Evaluation

The physicochemical properties of the herbal face pack are listed in Table 4. The pH of the formulation was likewise found to be near neutral. Both the ash content and the moisture content were within permissible standards.

Table 4:-Physicochemical Evaluation

Sr.n	Parameter	Observation
1	Total Ash content	2.6%
2	Water soluble Ash	1.2
3	pH	7
4	Acid insoluble ash	0.59
5.	Moisture content	2.5%w/w

Physical Evaluation (powder property)

Table 5 shows the physical characteristics (powder property) of the herbal face pack that were investigated. Rheological experiments confirmed the herbal face pack's flow (powder) properties. It was found to be non-sticky as well as free-flowing.

Table 5:-Physical Evaluation

Sr.no.	Parameter	Observation
1	Particle Size	22.5
2	Bulk Density	0.74gm/ml
3	Angle of Repose	31.60°
4	% Compressibility Index	22.89%
5	Hausner's Ratio	1.31
6	Tapped Density	0.70gm/ml
7	Washability	Easily washable

ABTS assay

The *Arabica coffee* plant includes flavonoid chemicals that act as antioxidants, according to prior study. Free radicals are neutralized/stabilized by the oxidation-reduction (redox) characteristics of phenolic substances, such as flavonoids and phenolic acids. Green coffee beans are high in polyphenolic antioxidants for instance chlorogenic, caffeic, ferulic, and n-coumarinic acids, among others. Cream or emulsion *Arabica green coffee* beans, which have antioxidant activity, could be used to counteract UV-induced and physiological ageing.

Antimicrobial evaluation

Table 6- Antimicrobial evaluation

Sr.no.	Bacteria	Observation
1	<i>Escherichia coli</i>	7
2	<i>Pseudomonas aureginosa</i>	7

Determination of Microbial load:

Table 7-Determination of Microbial load

Sr.no.	Test	Observation
1	Total viable count (CFU/g)	917
2	Gram negative pathogens (CFU/g); <i>E. coli, Pseudomonas</i>	Absent

Irritancy Test

The findings of the irritancy test are shown in Table 8. The formulation showed no irritation, redness, or swelling during irritancy testing. This formulation can be applied to the skin.

Table 8:-Irritancy Test

Sr.no.	Parameter	Observation
1	Irritation	Not observed
2	Swelling	Not observed
3	Redness	Not observed

Stability Studies

Table 9 shows the results of the stability test. Except for pH, no change in colour, aroma, texture, or smoothness was noticed at the indicated stability conditions. The pH of the formulation changed somewhat at 40 C, according to the stability experiments.

Table 9:-Stability Studies

Sr.no.	Parameter	Room temperature	40 C
1	Color	No change	No change
2	Odour	No change	No change
3	pH	7	6.8
4	Texture	Fine	Fine
5	Smoothness	Smooth	Smooth

Conclusion

Herbal face packs are used to muscle rejuvenation, skin suppleness, the removal of dirt from skin pores and promote blood circulation. Herbal face pack cosmetic have several benefits such as, nontoxic and reduces allergic reactions. This face pack is economical, useful, in addition satisfied all of the characterization criteria. After testing, we discovered that the face packs had good characteristics, were free of skin irritation, and kept their consistency even after being stored in stable settings. Also it has the ability to provide effective bright, healthy, and crystal clear skin. Because of its beneficial effects on humans, the total study is important in supporting evidence product claims.

Reference

- Kumar R. Formulation and evaluation of herbal face pack. Asian Journal of Pharmaceutical Research. 2021 Mar 1; 11(1).
- Rani S, Hiremanth R. Formulation & Evaluation of Poly-herbal Face wash gel. World J Pharm Sci. 2015; 4(6); 585-8.
- Vanithamani M, Mathivani G, Yamuna K, Kaviya S. Formulation and evaluation of traditional herbal cosmetics. Agricultural Science: Research and Reviews. 95.
- Ijaz N, Durrani AI, Rubab S, Bahadur S. Formulation and characterization of Aloe vera gel and tomato powder containing cream. Acta EcologicaSinica. 2021 Feb 3.

- Yadav N, Yadav R. Preparation and evaluation of herbal face pack. International Journal of Recent Scientific Research. 2015 May; 6(5); 4334-7.
- Okereke JN. Udebu1Cosmaceuticals: Definitions and Regulations. Clin Dermatol. 2001; 19 (4); 37
- Ani AC, Ezeji EU, Obasi KO, Nnoli MC. Possible Health Implications Associated with Cosmetics: A Review. Sci J Public Health. 2015; 3(5-1); 58-63.
- Anilkumar V, Kalyani R, Padmasri B, Prasanth D. In-house preparation, development, and evaluation of herbal cosmetics face pack using various natural powders. Journal of Drug Delivery and Therapeutics. 2020; 10(5);159-164
- Bhagwat S, Aglawe A, Gayle U, Mindhe SA, Rane SG. Formulation and evaluation of Herbal Face pack Int J Pharm Biol Sci. 2018; 8; 49-52.
- Kumar R. Formulation and evaluation of herbal face pack. Asian Journal of Pharmaceutical Research. 2021 Mar 1;11(1).
- Bhutkar MK, Shah MM. Formulation and evolution of herbal antibacterial face pack.
- Putri DE, Djamil R, Faizatun F. Body scrub containing Virgin Coconut Oil, coffee grounds (Coffea arabica Linn) and carbon active coconut shell (Activated carbon Cocos nucifera L) as a moisturiser and a skin brightener. Scripta Medica. 2021 Mar 26; 52(1); 76-81.
- Hwang JK, Shim JS, Gwon SH, Kwon YY, Oh HI et al. Novel use of Panduratin derivatives or extract of Kaempferia pandurata comprising the same. U.S. Patent 0065272A1; 2012.
- Bhagwat S, Aglawe A, Gayle U, Mindhe SA, Rane SG. Formulation and evaluation of Herbal Face pack. Int J Pharm Biol Sci. 2018; 8; 49-52
- Barsagade PD, Patil P, Umekar MJ. A formulation of face pack and hair products of rice water for the use of skin and hair problem.
- Vijayalakshmi A, Tripura A, Ravichandiran V. Development and evaluation of anti-acne products from Terminalia arjuna bark. Int J Chem Tech Res. 2011 Jan; 3; 320-27.
- Kokate CK, Purohit AP, Gokhale SB. Textbook of Pharmacognosy 49th ed. ; 2014
- Sao AP, Pounikar GV. A polyherbal face pack: preparation and evaluation using in-house ingredients.
- Michelle O'Sullivan. Turmeric is an effective homemade face pack ingredient to help open pores. Nov 2016
- Koli DS, Mane AN, Kumbhar VM, Shaha KS. Formulation & Evaluation of Herbal Anti-Acne Face Wash. World J Pharm Pharm Sci. 2016; 5(6); 2001-2007.
- Tiwari M., Upadhyay M. The medicinal plant components and applications (Aloe vera), J. Med. Plants Stud. 6 (3); (2018); 89–95.
- Al-Samydai M J, Qrimea I.A., Yousif A. Al-Samydai, M.K. Aldin. The impact of social media on consumers' health behavior towards choosing herbal cosmetics. J. Crit. Rev. 7; (9) (2020); 1171–1176.

23. Somwanshi SB, Kudale KS, Dolas RT, Kotade KB. Formulation and evaluation of cosmetic herbal face pack for glowing skin. *Int.J.Red.Ayurveda Pharm.* 2017; 8(3);199-203.
24. Shinde AA, Hase DP. In-House preparation and standardisation of papaya face pack.
25. Himaja N, Ashok kumar A, Bhartkumar B. Preparation and Evaluation of Poly Herbal Fruit Face Mask. *J Res Pharm Sci.* 2015; 2(11); 07-13
26. Bhat KV, Balasundaran M, Balagopalan M. Identification of *Santalum album* and *osyrislancedata* through morphological and biochemical characteristics and molecular markers to check adulteration. (Final Report of the project KFRI 509/06)
27. Priya R, Anand K, Rasika D. Preparation and evaluation of herbal anti-acne face pack. *World J. Pharm. Res.* 2017 Mar 31; 6; 1000-10.
28. Farheen B, Mohammed I. Design and development of Unani face pack for skincare. *European J Pharm Med Red* 2016; 3(2); 627- 632.
29. Bhutkar MK, Shah MM. Formulation and evolution of herbal antibacterial face pack.
30. Ismail B.P. Ash content Determination. In: *Food Analysis Laboratory Manual. Food Science Text series.* Springer, Cham 21 June 2017; 978-3-319-44125-2.
31. Khandelwal K R, Vrunda Sethi. Practical pharmacognosy techniques and experiments practical, pharmacognosy, 2012edition, published by nirali prakashan ; 23.8-23.10, 25.5p.
32. Laxmi M, Vijayalakshmi S. Development and evaluation of Herbal face pack using various plant powders. *Indo Am.J.P.Sci.* 2017; 4(09).
33. Mukharjee P.K. Quality Control of Herbal Drug, An Approach to Evaluation of Botanicals Horizontes. Publication; New Delhi, 3; 2008; 184-291p.
34. Subrahmanyam C.V.S. Text Book of Physical Pharmacy. Vallabh Prakashan 2; 2000; 221-224p.
35. More H.N., and A.A. Hazare, Practical Physical Pharmacy 1; 114-119p.
36. Martin and Alfred. Physical Pharmacy London. Lea &Febigen Philadelphia; 4; 2007; 431-432.
37. Lachman L, Lieberman H.A, and Kanig J.L. The Theory and Practice of Industrial Pharmacy. Varghese Publishing House; Bombay; 3;1991, 67p.
38. Indian Pharmacopoeia. The Indian Pharmacopoeial Commission. Ghaziabad; 1; 2007; 134, 191p.
39. Delgado-Arias S, Zapata-Valencia S, Cano-Agudelo Y, Osorio-Arias J, Vega-Castro O. Evaluation of the antioxidant and physical properties of an exfoliating cream developed from coffee grounds. *Journal of Food Process Engineering.* 2020 May; 43(5); e13067.
40. Himaja N, Ashok kumar A, Bhart kumar B. Preparation and evaluation of poly herbal fruit face mask *Quest Journals.Journal of Research in Pharmaceutical Science.* 2015; 2(11); 07-13.
41. Valgas C, Machado de sonza S, Smania EFA, Smania A, Jr. Screening methods to determine antibacterial activity of natural products. *Braz J microbial.* 2007; 38; 369-380.
42. Choudhuri, RK. Emblica cascading antioxidants: Novel natural skin careingredients. *Skin Pharmacol. Applied Skin Physiol.* 2002; 15; 374-380,
43. Aglawe SB, Gayke AU, Mindhe SA, Rane VG. Formulation and Evaluation of Herbal Face Pack. *Int. J. Pharm. Biol. Sci.* 2018; 8(4); 49-52.
44. Sreeja M.K., Gourishanker N.L., Aswathi C.T, Dhanuja E.V., Habeeba F.N., Fathimi., J.S., Ali Y.A.K. Formulation and evaluation of herbal cream for acne Sciences. 7 (6); 2018; 2292–2295.
