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FORMULATION AND EVALUATION OF TOPICAL FAIRNESS FACE WASH OF TURMERIC, NEEM AND LEMON

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ABSTRATE
Most of the fairness enhances agent were originally derived from plants and herbal medicines, referee to the any extract of parts of plants fir medicinal purpose. Along with other doses form, herbal drug are also formulated in the form of gels. A gelis a jelly like semisolid preparation used on variety of body surfaces. The objective of the study was to formulate and evaluate the fairness inhance gel from the local herbal medicinal plants. The extract of the selected plants was taken in different ratio randomly to formulated gel. The topical formulations weredeveloped and tested for physical parameters, appearance, pH, spread ability was successfully studies.

KEYWORD: herbal drug, fairness face wash, Azadirachtaindica, curcuma longa, citrus limon.

1 INTRODUCTION OF GEL

The word "gel" is derived from "gelatin" & both "gel" & "jelly"' Can be traced back to the Latin gele for "frost" & gelare, meaning freeze or congeal. This origin indicates the essential idea of liquid setting to a solid like material that does not flow, but is elastic & retains liquid characteristics. The difference between gel & jelly remains somewhat arbitrary, with some differences based on the field of applications.

The gels as semisolid system consisting of either suspension made up of small inorganic particles or large molecules interpenetrated by a liquid.

Where the gel mass consists of a network of small discrete particles the gel is classified as two –phase system.

Single- phase gels consists of organic macromolecules uniformly distributed throughout a liquid in such a manner in that no apparent boundaries between the dispersed macromolecules and the liquid. Single phase gels and jellies can be described As three dimensional networks formed by adding macromolecules such as proteins, polysaccharides, and synthetic macro molecules to appropriate liquids. In pharmaceuticals applications, water and hydro alcoholic solutions are common many polymer gels exhibit reversibility between the gel state and sol, which is the fluid phase containing the dispersed or dissolved macromolecules.

However, formation of some polymer gels is irreversible because their chains are covalently bonded. The three dimensional networks formed in two phases gels in and jellies is formed by several inorganic colloidal clays. Formation of these in organic gels is reversible. Gels are generally considered to be more rigid than jellies because gels consists of more covalent cross links, a higher density of physical bonds, or simply less liquid gel – forming polymers procedure materials that span a range of rigidities, beginning with a sol and increasing in rigidity to a mucilage, jelly, gel and hydro gel.

The physicalproperties ofgels and jellies can be classified based on two groups. Transitional properties associated with gels and jellies can be classified based on two groups. Transitional properties and rheological properties, yield Point and rupture Spectrophotometric and thermal technique are used identify gel microstructures (physical junction zones) and their related transitional properties. For example, nuclear magnetic resonance (NMR) spectroscopy measures the structural and dynamic characteristics of the polymer just prior to aggregation and gel formation and circular dichroic (CD) spectroscopy Measures the conformational changes of the polymer during network formation. Mechanical techniques are used to determine rheological properties of gel. These techniques employ either small deformation measurements that yield viscoelastic parameters or large deformation measurements that generate complete stress strain profile, which include failure parameters.[1] The majority of gels are formed by the aggregation of colloidal sol properties, the solid or semisolid system so formed being interpenetrated by liquid.

Gelatin of lyophilic sols gels formed by lypholic sols can be divided into two group depending on the nature of the bond between the chain of the network of gel.

Type 1: Are irreversibly systems with a three dimensional network formed by covalent bond between the micromolicall.

Type 2: gel are heat reversibly, a transition from the sol to gel occurring on either heating or cooling. Polysolution, for example. Gel on cooling below a certain temperature referred to as the gel point because of their gelling properties poly are used as jellies for the application of drugs to the skin on the application gel dried rapidly leaving a plastic film with the drug in intimate contact with the skin.[2]

SOL-GEL TRANSITION (GEL POINT)

Sol-Gel transition may be dependent on polymer on polymer concentration or temperature Spectrophotometric methods, as mentioned previously are used to probe Sol-Gel transitions that depend on the critical gelling concentration. Thermal methods, including differential scanning.

Calorimetric are used to measure Sol transitions, or melting temperature, of thermo reversible gels. A relationship for estimating the heat of gelatin was derived by Aldridge and ferry in which the dependence of the Sol-Gel transition temperature on polymer concentration was considered.

The Critical gelling concentration is the concentration below which no macroscopic gel is formed under the prevailing experimental condition; rather a sol is formed by the polymer and solvent. This concentration depends on polymer-polymer and polymer-solvent interactions, the hydrophilic –lipophilic character of the polymer, and the molecular weight and flexibility for the chain furthermore, polymers that require ions to from gels have crucial gelling concentration that depend on the concentration these additives and many other variables. Table 2 lists ranges of minimal concentration for substance to gel in water.[3]

There are two thermal gel points associated with thermo reversible gel. Shift in temp may cause gel formulation at the setting point or gel liquefaction at the melting point. In addition temp hysteresis may occur in some gel in which the gel setting point is lower than the melting point. The hysteresis behavior indicate that junction zone constitute a family of association that than set of identical cross linkages. Agars gels show temp hysteresis; the gel sets at about 40^0C and melts at about 90^oC.[4]

A. PHYSICAL AGING

Most gels have structures that have not attained equilibrium; different preparative method and condition influence the gel state. The gel physically ages as it moves toward equilibrium, making the history of gel sample an important consideration when measuring physical properties. Aging reflects in gel microstructure, where non covalent crosslink and breaking and reforming. Furthermore, instabilities caused by the non-equilibrium state arise in some polymer gels; two examples are retrograditation and sysnersis.

Retrograditation is the spontaneous reversion of a polymer solution to a gel on standing. Polyvinyl alcohol dissolved in water undergoes retrograditation. Where by the stereo regular chains form microcrystalline aggregates as the solution ages. Polyvinyl alcohol gels retrograde, forming crystalline domains. Amylase, which is the linear polysaccharide fraction of starch, underground retrogression, reducing the physical stability for solution and gels over time.[5]

Sysnersis is the process whereby liquid is liberated spontaneously from the gel matrix. This instability arises from the non-equilibrium state of the gel established as it was or because of a change in external condition. Equilibrium, elastic contraction forces of polymer chains are usually balance by solvent swelling forces, resulting from an osmotic pressure differential with change in temperature, for example, the osmotic pressure shifts, causing an elastic contraction of polymer chains. The contractive response squeezes excess liquid out of the matrix. Agar and carrageen an are example of gels the exhibit sysnersis.[6]

B. RHEOLOGICAL PROPERTIES

Like the transitional physical properties of gel are not easily characterized because they depend strongly on the attributes of the polymer, history of the gel sample, and experimental conditions. Most often, the apparent viscosity or gel strength increases with an increase in the effective crosslink density of the gel or in the concentration and average molecular weight of the polymer. However, a rise in temperature may increase or decrease the apparent viscosity, depending on the molecular interaction between the polymerand solvent. In addition the direction of change in apparent viscosity may not be readily predictable when additives such as ions, none-electrolytes, solvents or none solvents, and other compatible polymers are mixed with a gel depending on their rheological properties, physically bonded gels can be divided into three groups; entanglement networks, strong gels, and weak gels Entanglement networks behave as dilute solution when diluted below their critical gelling concentration, whereas strong gels have stress-strain profiles that include rupture points. Example polymers that from entanglement network are guar gum and hylauric acid; strong are formed by agar, calcium alginate, gelatin and pectinWeak gels are also entanglement network, but they undergo specific molecular interaction that increase their strength. Therefore, the rheological properties of weak gels are intermediate between those of entanglement network and strong gels. Xanthus gum and carbomer are examples of polymer that from weak gels. Hyaluronic acid generally forms an entanglement network, but under specific condition it forms a weak gel.[7]

C. RIGIDITY

The modules of rigidity, or shear modulus, is defined as the ratio of shear stress to strain. It is a measure of a gels ability to resist deformation. The minimum rigidity for a strong gel to resist deformation under its own weight is equal to about gpl which is the acceleration due to gravity(g), density(p), and a linear dimension(1) of the sample. Therefore, the minimum rigidity is about 100Pa (10^3 dyne/cm) for a gel sample 1cm long.[8]

D. RUPTURE STRENGTH

Rupture strength is equal to the stress at which a strong gel ruptures or fails rather than undergoing further strain. The rupture strength is determined by large-deformation measurement on instruments such as the instron tester, where is the tensile stress is applied to the sample. however, strong gel samples can only be tested in tension if they can support their own weight (24), and most physically cross linked gels are relatively weak, making this type of test difficult.[9]

GEL-FORMING SUBSTANCES AND THEIR PHARMACEUTICAL USES

Gel-forming hydrophilic are typically used to prepare lipid-free semisolid dosage forms, including dental, dermatological, nasal, ophthalmic, rectal, and vaginal gels and jellies. Gel vehicles containing therapeutic agents are especially useful for application to mucous membranes and ulcerated or burned tissues because their high water content reduce irritancy. Furthermore, these hydrophilic gels are easily removed by gentle rinsing or natural flushing with body fluids, reducing the propensity for mechanical abrasion. The superior optical clarity of synthetic polymer gels, such as those composed of poloxamer and carbomer, has led to the current interest in developing therapeutic ophthalmic gels.

Unconventional routes of drug administration but using gels and jellies are also being explored. Thus, two nasal jellies were developed and marketed. The intranasal vitamin B-12 gel. Nascobal (Schwarz pharma),is used as a dietary supplement. The gel base is composed of a hydrophilic cellulose derivative, the exact nature of which is not disclosed. However, the gel is apparently odorless and nonirritating and adheres well to the mucous membrane.[10]

1.2 COMPOSITION OF GELS

Gels consist of a solid three-dimensional network that spans the volume of a liquid medium and ensures it through surface tension effects. This internal network structure may result from physical bonds (physical gels) or chemical bonds (chemical gels) as well as crystallites or other junctions that remain intact within the extending fluid. Virtually any fluids can be used as an extender including water (hydrogels), oil and air (aero gel). Both by weight and volume, gels are mostly fluid in composition and thus exhibit densities similar to those of their constituent liquids. Edible jelly is a common example of a hydro gel and has approximately the density of water.[11]

1.3 Types of Gels

Hydrogels

Hydrogel is a network of polymer chains that are hydrophilic found as a colloidal gel inwhich water is the dispersion medium. Hydro gels are highly absorbent (they can contain over 99.9% water) natural or synthetic polymers. Hydrogels also possess a degree of flexibility very similar to natural, due to significant water content. Common uses for hydro gels include: Currently a used as scaffolds in tissue engineering. When used as scaffolds, hydro gels may contain human cells to repair tissue. Hydro gels- coated walls have been used for cell cultureEnvironmentally sensitive hydro gels which are also known as a ‘Smart Gels’ or ‘Intelligent Gels’. These hydro gels have the ability to sense changes of pH, temperature or the concentration of metabolite and release their load as result of such a change’s sustained release drug delivery system.

Provide absorption, desloughing and debriding of necrotic and fibrotic tissue.

Hydrogels that are responsive to specific molecules, such as glucose or antigens, can be used as biosensors, as well as in DDS.Used in disposable diapers where they absorbs urine, or in sanitary napkins. Contact lenses (silicone hydro gels, polyacrylamides, polymacon). ECG and EEG medical electrodes using hydrogels composed of cross-linked polymers (polyethylene oxide polyAMPS and polyvinyl pyrrolidone) water gel explosives, rectal drug delivary and diagnosis, other less common uses include breast implants now used in glue. Granules for holding soil moisture in arid areas. Dressings for healing of burn or other hard-to-heal wounds. Wounds gels are for helping to create or maintain a moist environment. Reservoirs in excellent topical drug delivery; particularly ionic drugs, delivered by iontoporiasis (see ion exchange resin). Common ingredients are eg. polyvinyl alcohol, sodium polyacrylat , acrylate polymers and copolymers with an abundance of hydrophilic groups. Natural hydrogel materials are being investigated for tissue engineering these materials include agarose, methylcellulose, hyaluronan and other naturally derived polymers.[12]

B) XEROGELS

A xerogel is a solid formed from a gel by drying with unhindered shrinkage. Xerogels usually retain high porosity (15-50%) and enormous surface area (150-900 m^2/g), along with a very small pore size (1-10nm). When solvent removal occurs under hypercritical conditions, the network does not shrink and a highly porous, low – density material known as an is produced. Heat treatment of xerogel at elevated temperature produces viscous sinterintering (shrinkage of the xerogel due to viscous flow) and effectively transforms the porous gel into a dense glass.

C) ORGANOGELS

An Organogel is a non-crystalline, non-glassy thermoreversible (thermoplastic) solid material composed of a liquid organic phase entrapped in a three-dimensionally cross-linked network. The liquid can be, for example., an orgnic solvent, mineral oil or vegetable oil. The solubility and particle dimensions of the structuring characteristics for the elastic properties and firmness of the Organogel. Often these systems are based on self-assembly of the structurant molecules.

Organogel have potential for use in a number of applications, such as in pharmaceuticals, cosmetics, art conversation and food. An example of formation of an undesired thermoreversible network is the occurrence of wax crystallization in petroleum.[13]

1.4 APPLICATIONS

Many substances can from gels when a suitable thickener or gelling agent is added to their formula. This approach is common in manufacture of wide range of products, from foods to paints and adhesives.

In fiber optics communication, a soft gels resembling hair gel in viscosity is used to fill the plastic tubes containing the fibers. The main purpose of the gel is to prevent water intrusion if the buffer tube is breached, but the gel also buffers the fibers against mechanical damage when the tube is bent around corners during installation, or flexed. Additionally, the gel acts as processing aid when the cable is being constructed, keeping the fiber central whilst the tube material is extruded it

2 MATERIALS AND METHODS

A) TURMERIC PLANT

Fig. 1: Turmeric.

CLASSIFICATION

KINGDOM : PLANTAE
DIVISION : MAGNOLIOPHYTA
CLASS : LILIOPSIDA
SUBCLASS : ZINGIBERIDAE
ORDER : ZINGIBERALES
FAMILY : ZINGIBERACEAE
GENUS : CURCUMA
SPECIES : C.LONGA
SCIENTIFIC NAME: CURCUMA LONGA

SYNONIMES

Kunyit, haridra haldi,halada,manjal, zirsood,terremerit, holdi,curcum,pasapu,arishina.

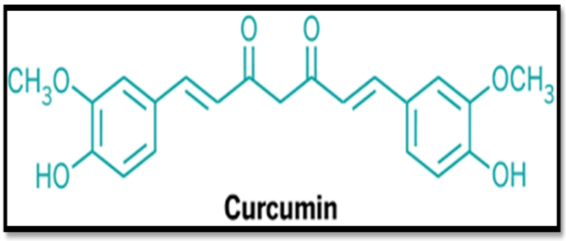
DESCRIPTION: The plant of turmeric is a herbaceous perennial which is 60 – 90cm high It has large leaves oblong up to one meter long . Flowers of the turmeric appear on a spike like the stalk. Its flowers are yellow white in color. They are sterile and do not produce viable seed. The lamina is green above and pale green bellow, and is 30 -40 cm long and 8-12 cm wide Approximately 30 flowers are produce in a spike inflorescence is a central spike of 10-15 in length .Its pant looks like the ginger plant.

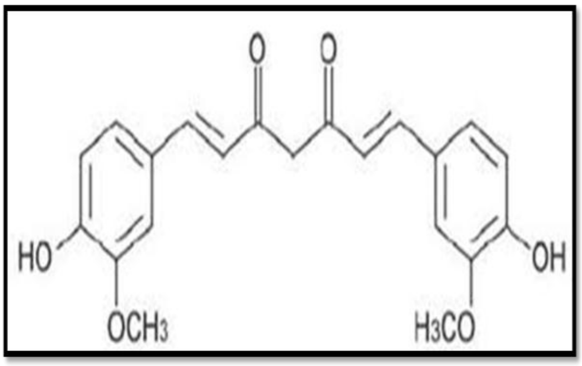
Location: It is the widely cultivated tropical plant of india which , which is grow from sea level to 1200 meter MSL IT is widely grow in the sanjay Gandhi national park of india .

Cultivation method: Turmeric plant is planted in the month of September to October. It grows in light black, black clayey loams, and red soils in deep. This crop is planted by the small rhizomes with 1-2 buds. It is harvested after 9-10 month of planting. The lower leaves turn yellow and fall with age.

Chemical Constituents

Curcumin Curcuminoid,Desmethoxy curcumin, Bisdemethoxi curcumin.





Medicinal uses

It is taken as the blood and very useful is the common cold, leprosy, intermittent, affections of the liver, dropsy, inflammation and wound healing. The rhizomes of the turmeric plant is highly aromatic and antiseptic. It is even used for contraception, swelling, insect sting, wound, whooping cough, inflammation, internal injuries, pimple, injuries as a skin tonic. Sweeted milk boiled with the turmeric is the popular remedy for cold and cough. It is given in liver ailments and jaundice. It is improve the fairness on the skin

B. AZADIRACHTA INDICA (NEEM)

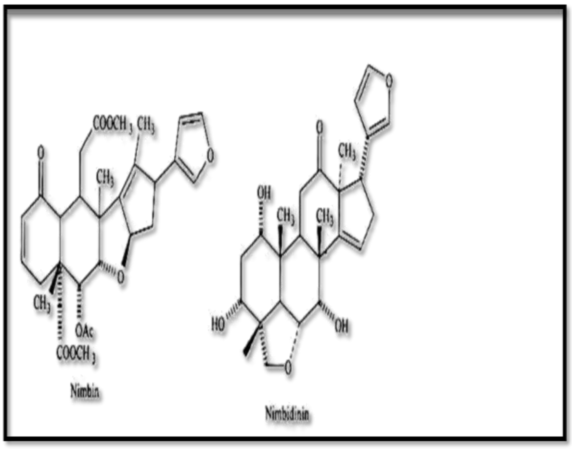
Fig. 2: Azadirachta Indica (Neem).

Classification

Common name	NEEM
Botonical name	Azadirachta Indica
Kongdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Sapindales
Genus	Azadirachta
Species	Indica
Family	Meliaceae

Chemical Constituents

i. Nimbin, 6- desacetylnimbinene.
ii. Nimbinene, Nimbandiol, nimbolide.
iii. Quercetin, β-sitosterol.
iv. Ascorbic acid, n-hexacosanol, nonacosane and amino acid. Nimbin&Nimbidinin



Uses

a. Poultice, applied to boils.
b. In worm, jaundice and in skin disease.
1. Ulceration of cow-pox.
2. Insect-repellent.
3. Antiviral and antifungal.

Pharmacological Actions

Abortifacient, anthelminthic, antiyeast, antiulcer, antifertility, antifilarial, antifungal, antiviral, diuretic**,** antihyperglycemic, antiinflammatory, ant malarial, antinematodal, antipyretic, antispermatogenic**,** hypercholesteremic, antispasmodic, insecticidal, antitumor, hypoglycaemic, immunomodulator.[14]

C) Lemon

Fig. 3: Lemon.

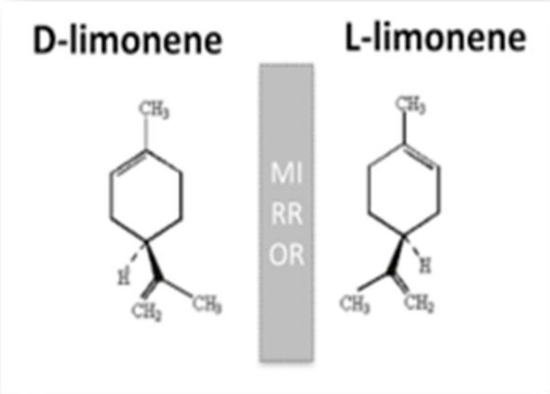
Synonyms: - Citrus, Limon, Lemon peel.

Biological Source:-It is a dried ripe froot of citrus Limon, Family Rutaceae.

classification	
Kingdom:	**Plantae**
***Clade*:**	**Angiosperms**
***Clade*:**	**Eudicots**
***Clade*:**	**Rosids**
Order:	**Sapindales**
Family:	**Rutaceae**

Chemical Constituents

Limonene Citrul, Citric acid.



Medicinel Uses

- It promotes hydration.
- It's a good source of vitamin C.
- It supports weight loss.
- It improves your skin quality.
- It aids digestion.
- It freshens breath.
- It helps prevent kidney stones.[14]

Synthetic Polymers

Carbopol® polymers are polymers of acrylic acid cross-linked with polyalkenyl ethers or divinyl glycol. They are produced from primary polymer particles of about 0.2 to 6 micron average diameter. The flocculated agglomerates cannot be broken down into the ultimate particle when produced. Each primary particle can be viewed as a network structure of polymer chains interconnected by cross-links. Without the cross-links, the primary particle would be a collection of linear polymer chains intertwined but not chemically bonded.

Carbopol polymers, along with Pemulen® and Noveon® polymers are all cross-linked. They swell in water up to 1000 times their original volume (and 10 times their original diameter) to form a gel when exposed to a pH environment above 4.0 to 6.0. Because the pKa of these polymers is 6.0 to 0.5, the carboxylate groups on the polymer backbone ionize, resulting in repulsion between the negative charges, which adds to the swelling of the polymer. The glass transition temperature of Carbopol polymers is 105°C (221°F) in powder form. However, the glass transition temperature decreases significantly as the polymer comes into contact with water. The polymer chains start gyrating, and the radius of gyration becomes increasingly larger. Macroscopically, this phenomenon manifests itself as swelling.[15]

Preparation and Extraction of Turmeric and Neem

- Weight accurately of neem powder and turmeric fruit place into the thimble containing filter paper, which is located into the main chamber of soxhlet apparatus.
- The soxhlet extractor placed into the RBF containing extraction solvent i.e. alcohol and water in the ratio of 1:1
- Take extraction solvent i.e. water and alcohol in the ratio 1:1 and pass atleast 3 cycle from thimble containing drug.
- Place reflux condenser on top of soxhlet apparatus which close with cotton plug from to and allow to pass water from top to bottom into the condenser.
- Then switch ON the assembly and allow to pass at least 5 to 6 cycles into soxhlet apparatus.
- After complete extraction remove the soxhlet apparatus and collect the extract from RBF.
- After collection of extract allow to evapourate on water bath to get concentrated extract.

Fig. 4: Soxhlet apparatus.

Development of formulation

Various formulation batches were prepared according to the Table 1. The desired concentration of gelling agents was weighed accurately and dispersed in hot purified water (not more than 60°C; 50 % weight of the batch size) with moderate stirring, avoiding air entrapment and allowed to soak overnight. Desired quantity of methyl paraben was dissolved in the remaining amount of water by gentle heating. Desired quantity of polyethylene glycol 4000, propylene glycol and herbal extracts were added to the above mixture. This was finally mixed with previously soaked gel formulation. Triethanolamine was added at last to adjust the pH. Prepared formulations were filled in a suitable containerandlabeled.[16]

Table 2: Composition and formulation of turmeric neem and lemon.

Nameof ingrident	Role
PEG 400	Solvent and Co-solvent
Glycerin	Density agent
Methyl paraben	Antimicrobial preservative
Propyl paraben	Antimicrobial preservative
Triethynolamine	Thicking Agent
Carbapol 940	Gelling Agent

Table 1: Roll of Ingredient.

Ingredient	F1	F2
Turmeric	1.2	1.2
Neem	1.2	-
Lemon	0.2	0.2
Carbapol	0.3	0.3
PEG 400	2.5	2.5
SLS	1	1
Methyl paraben	0.2	0.2
Propyl paraben	0.2	0.2
Glycerin	3	3
Triethanolamine	0.5	0.5
Purified water	q.s	q.s

Evaluation and parameters

1) Physical parameters

Physical parameters such as color, consistency were checked manually.

2) Washability

The product was applied on hand was observed under running water.

3) pH

pH of 1% aqueous solution of the formulation was measured by using a calibrated digital pH meter at constant temperature.

4) Spreadability

It indicates the extent of the area to which gel readity spreads on application to the skin or affected part. The therapeutic potency also depends upon spreading value. The time in sec taken by two slides to slip off from gel which is placed in between the slides under the direction of certain load is expressed as spreadability. Leser the time taken for the separation of two slides, better the spreadability.

5) Extrudability

The formulation are fill in the collapsible tubes, after it was set in the container. Extrudability is determine in terms of wight in gm required to extrude a 0.5 cm ribbon of gel in 10 second.

6) Foamability

Small amount of gel was taken in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and final volume was noted.

7) Irritancy Test

The gel was applied on left hand dorsal side surface of 1 sq.cm. and observed in equal interval upto 2 hrs for irritancy, redness, edema.

Table 3: Evaluation and parameter.

Formulation batch	Colour	Consistency	Washability	pH	Extrudability	Spreadability	foamability	Skin Irritation
Marketed	Yellowish	Semisolid	Easily washable	6.15	Good	Good	Good	No sign.
F1	Yellowish green	Semisolid	Easily washable	6.50	Good	Not in avg	Good	No sign
F2	Yellowish	Semisolid	Easily washable	6.80	Good	Good	Good	No sign

RESULT

The result of evaluation are displayed in Formulation was yellowish in colour where as marketed formulation was yellowish in colour formulation F1, F2 was found to have semisolid consistency. But in F1 the spread ability is not in average. All formulations were found homogenous easily washable. All the formulation has slightly alkaline pH which was compatible with skin physiology.

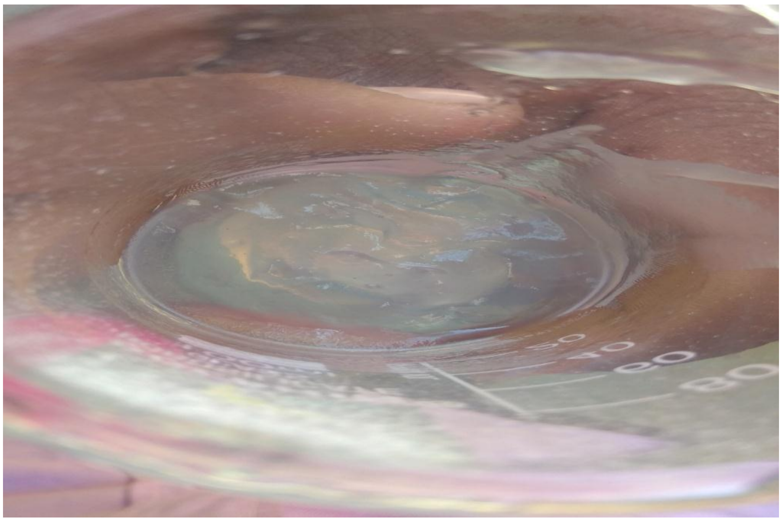


Fig No. 5:

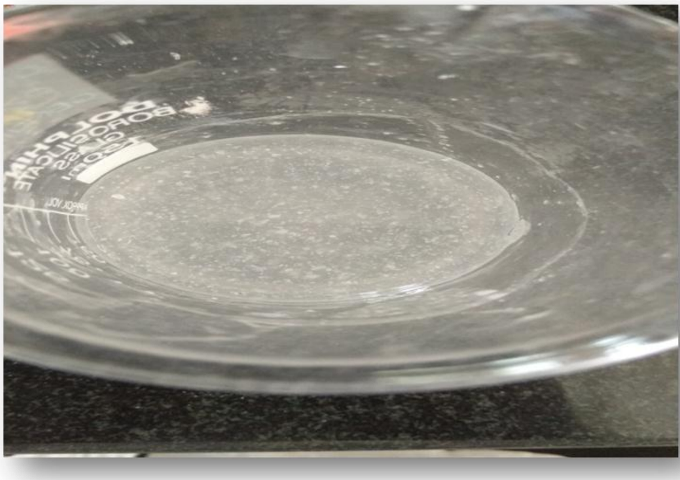


Fig No. 6:

Fig No. 7:

CONCLUSION

Herbal formulation share growing demand in the world market. It is very good attempt to establish the herbal face wash containing aqueous extracts of turmeric rhizomes, The plant have been reported in literature having good antimicrobial, anti-inflammatory, refreshing activity, cleansing agent, dirtabsorbentandanti-oxidant. F1andF2 formulation are prepared by using varied concentration of extract prepared formulation (F1 and F2) where evaluated for various parameters like colour, appearance, consistency, wash ability, pH and Spreadability, Extrudabilty, skin irritation and compared with marketed formulation. After evaluation study it shows that both formulation gives good affect as marketed formulation and neither show any side effect or skin irritation. But as per the evaluation test for pH it was found that formulation F1 is more compatible with skin pH value.

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