International Journal of Pharmaceutical Research and Applications
Volume 3, Issue 2 July 2018, pp: 24-33 www.ijprajournal.com ISSN: 2456-4494

Formulation and evaluation of anti-blemish herbal cream containing curry leaves, lemon leaves and green tea leaves extract.

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Date of Submission: 20-07-2018 Date of Acceptance: 30-07-2018

ABSTRACT
Numerous chemical toxins, microorganisms, chemicals, infections present in atmosphere cause damage to skin. Cosmetics alone are not sufficient to take care of skin and body parts; it requires association of active ingredients to check the damage and ageing of the skin. Herbal cosmetics are now emerged as the appropriate solution to the current problem. Anti-blemishes creams are already available in market but the new thing is the incorporation of useful herbal extract into a cream which gives some extra beneficiary effect without any side effects. The main challenge lies in the selection of natural material which can be rationally justified and comparable to that of synthetic material. In present study our aim is to formulate and evaluate anti-blemish herbal cream containing curry leaves, lemon leaves and green tea leaves extract. The herbal cream was prepared by Trituration method and further Evaluated for various evaluation parameters such as Physical properties, Determination of pH, Spreadibility, Viscosity, Washability, after feel test, Greasiness, Phase separation, Irritancy test, Stability test. The creams are also evaluated for antimicrobial and anti-oxidant activity. The Herbal creams show the good physical appearance with light green Color, Smooth consistency, pleasant odor, and Semi-solid state. The pH of creams C1 and C2 were found to be 5.6 and 5.8 respectively. The Viscosity and Spreadibility of creams C1 and C2 were found to be 22968 cps and 21376 cps and 17.25 g.cm/s and 16.95 g.cm/s respectively. Both the cream not showed any phase separation and easily washable with tap water. After feel test for both creams were found to be good, not show any irritation, greasiness and no separation. The results of anti-microbial and anti-oxidant study revealed that herbal creams had anti-microbial and anti-oxidant activity.

KEYWORDS: Curry leaves, lemon leaves, green tea leaves, herbal cream, anti-blemish, antimicrobial and antioxidant.

I. INTRODUCTION

The cosmetics are the utility products used extensively throughout the world for maintaining and improving general appearance of face and other parts of body [1]e.g., mouth, hand finger, eye, hair, etc. It includes creams, powders, face pack, lotions, moisturizers, shampoo, hair oil, conditioners, nail polish, etc. Smooth, shinning, healthy skin and hair certainly count for a beautiful woman or handsome man. Numerous chemical toxins, microorganisms, chemicals, infections present in atmosphere cause damage to skin. Cosmetics alone are not sufficient to take care of skin and body parts, it requires association of active ingredients to check the damage and ageing of the skin. Herbal cosmetics are now emerged as the appropriate solution to the current problem.

Now-a-days, in the whole world there is turn to return towards the use of herbal products and to adopt more natural way of life. People prefer natural food, herbal medicines and natural curing practices for healthy life.[1,2,3] There is much craze for the vegetable products cultivated through biological/organic farming without using synthetic fertilizers and pesticides. The usage of herbal cosmetics has been increased to many folds in personal care system and there is a great demand for the herbal cosmetics. All this happened due to the excessive use of synthetic based products, synthetic chemicals, chemical dyes and their derived products in the last one and half century; their production and usage cause human health hazard with several side-effects leading to numerous diseases.

The beauty of skin and hair basically depends on individual's health, diet, habits, job routine, climatic conditions and maintenance. In summer, excessive heat exposure dehydrates the skin and increases melanin content. It causes freckles, wrinkles, blemishes, sunburns, pigmentation and even body pain. Extreme cold in winters also damage skin as cuts, cracks, maceration and infection are generally observed. Skin disease is common ailments of all age groups because of the infection of a variety of

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Volume 3, Issue 2 July 2018, pp: 24-33 www.ijprajournal.com ISSN: 2456-4494

microorganism, chemical agents and biological toxin present in the atmosphere and also due to physical factors, malnutrition and environmental pollution. There are immense opportunities to use phytochemicals ingredients in the cosmetics for the skin and hair care in accordance with the principles of both cosmetic preparation and traditional systems of medicine like Ayurveda, Siddha, Unani and Tibetan.

Herbal Cosmetics [1,2]

Herbal cosmetics are the composition incorporating phytochemicals from various botanical sources, impacting the skin functions, and allocate nutrients which are beneficial for the healthy and glowing skin or hairs. These phytochemicals of various sources have dual functions, (i) they can be utilized as a cosmetic product for the skincare purpose, and (ii) the botanical components imparting biological activity to the skin and furnish nutrients beneficial for the nourished skin or hair. In general, botanicals provide different vitamins, antioxidants, various oils, essential oils, dyes, tannins, alkaloids, carbohydrates, proteins, terpenoids and other bioactive molecules.

These are also topically applied and considered more preferred with compare to cosmetics. Personal care industry is now more concentrated on herbal based cosmetics as it is a fast-growing segment with a vast scope of manifold expansion in coming years. Herbal cosmetics are not considered under the preview of Drugs and Regulations of Food and Drug Administrations. Like cosmetics, these are subjected for their safety according to the existing rules of the different countries. Generally, it is not mandatory for a manufacturer to claim that how bioactive ingredients penetrate the skin or that these ingredients cause drug-like or therapeutic effect.

There are sufficient quantities of plants and their bioactive concentrates having the potential for enhancing skin and hair conditions. Natural ingredients and their bioactivity can be utilized for the readiness of different formulations of herbal cosmetics. Herbal cosmetics are notable for their hostile to oxidant and defensive activity against pimples, rashes, dermatitis, scabies, warts, skin issues, and other issues. There are numerous spices and herbs that contain active ingredients and compounds, which help to protect the skin.

Polyherbal cream is a semisolid formulation intended for topical application. The cream formulation is prepared by using various herbal extracts. The present work is to developed herbal cream which can used for treatment of various types of blemishes, like hyper pigmentation, acne, Blackheads, Whiteheads, skin wrinkling, skin aging etc. Present polyherbal cream comprising drugs like curry, lemon and green tea leaves.Anti-Blemish cream is a Soothing cream designed to ease out the pigmentation of the skin & helps in restoring natural fairness and evenness of the skin.

Cream

Creams are defined as "viscous liquid or semi-solid emulsions of either the oil-in-water or water-in-oil type" dosage forms which consistency varies by oil and water. Creams are used for cosmetic purposes such as cleansing, beautifying, improving appearances, protective or for therapeutic function. These topical formulations are used for the localized effect for the delivery of the drug into the underlying layer of the skin or the mucous membrane.[4]

Cream is classified as oil in water and water in oil emulsion. It is applied on outer part or superficial part of the skin and its main ability is to remain for a longer period of time at the site of application. The function of a skin cream is to protect the skin against different environmental condition, weather and gives soothing effect to the skin. There are different types of creams like cleansing, cold, foundation, vanishing, night, massage, hand and body creams.

Classification of Creams

All the skin creams can be classified on different basis:

1. According to function, e.g. cleansing, foundation, massage, etc.
2. According to characteristics properties, e.g. cold creams, vanishing creams, etc.
3. According to the nature or type of emulsion.

Types of creams according to function, characteristic properties and type of emulsion:

1. Make-up cream (o/w emulsion): a) Vanishing creams. b) Foundation creams.
2. Cleansing cream, cleansing milk, cleansing lotion (w/o emulsion)
3. Winter cream (w/o emulsion): a) Cold cream or moisturizing creams.
4. All-purpose cream and general creams.
5. Night cream and massage creams.
6. Skin protective cream.
7. Hand and body creams.

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Blemishes [5]

Blemishes is the term for any type of mark, spot, discoloration, or flaw that appears on the skin. Blemishes on the face may be unsightly and emotionally upsetting, but most are benign and not life threatening. Blemishes is termed as yuvanpindika, or mukhdosha, which literally means 'face destroyer' in Ayurveda.

Acne, Blackheads, Whiteheads, Hyperpigmentation, Age spots and Melasma are different types of blemishes. Doctors refer to these skin blemishes as ingrown hairs. Hair removal techniques such as waxing, shaving or plucking can all cause ingrown hairs.[26]

They can be caused by various factors such as hormonal changes, genetics, poor diet, stress, or improper skin care, microbial infection and oxidative stress.

Theories of blemishes

Many theories have been proposed to explain the process of blemishing. Mordenbiological theories of blemish in humas fall into many categories.During childhood thesebaceous gland are small and non-functioning. These glands are under endocrinecontrol, especially by the androgens. Duringpuberty, androgens stimulate the sebaceous glands,causing them to enlarge and secrete a natural oil,sebum. Whichrises to the top of hair follicles & flows out onto the skin surface.

Important factors of blemish plugging of hair follicle, hyperactivity of the sebaceous glad, proliferation of Propionibacterium, acnes, inflammation, etc.…

Plant profiles:

Curry leaves:[6-10]

Figure1: Curry leaves

Synonym:Curry Leaf (English), Karepaku (Andhra Pradesh), Narasingha (Assam); Barsanga, Kartaphulli (Bengal); Gorenimb (Gujrat); Mitha Neem (Himachal Pradesh); Kathnim, MithaNeem, KurryPatta (Hindi); Karibeva (Karnataka); Kariveppilei (Kerala); Gandhela, Gandla, Gani (Kumaon); Bhursanga (Orissa); Mahanimb (Sanskrit); Karivempu (Tamilnadu)

Biological Source: It consists of fresh and dried leaves of tree of Murrayakoenigii(L)

Family:Rutaceae

Geographical source: Murrayakoenigii originates from east and south part of India, Pakistan, Sri Lanka, China and Hainan but widely cultivated in South-East Asia and some parts of the United States and Australia. It grows throughout India up to the height of 1500 to 1655m from sea level and in the Andaman Islands. It is also available in other part of Asian region like in moist forests of 500-1600mheight in Guangdong, Shainan, S Yunnan (Xishuangbanna), Bhutan, Laos, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam. Together with South Indian immigrants, curry leaves reached Malaysia,South Africa and Reunion Island. Out of the 14 global species that belong to the genus Murraya, only two are known to be found in India, which is Murrayakoenigii (Spreng) and Murrayapaniculata (Jack). It Can grow in full sun or light shade.Murrayakoenigii is distributed from south and East Asia to Australia.

Chemical constituents: Curry leaves contain proteins, carbohydrate, fiber, minerals, carotene, nicotinic acid, vitamin-A, vitamin-C, calcium and oxalic acid. It also contains crystalline glycoside, carbazole, alkaloids, koenine, koenidine and koenimbine. Triterpenoid alkaloids cyclomahanimbine are also present in a leaf.The bioactive parts in curry leaves are oxalic corrosive, sap, carbazole alkaloids and the major bioactive mixtures, for example, the Koenigin, Bicyclomahanimbicine, Cyclomahanimbine, Murrayastine, Coumarine, Koenidine, and pypayafolinecarbazole has significant pharmacological exercises and the significant part of unpredictable oil comprise bicyclomahanimbicine, mahanimbicine

Uses:Essential oil Murrayakoenigii is used as sun protection and erythema agent in formulation. Curry leaf oil used in your regular skin care cream or lotion helps by applying it on affected area to cure skin problem such as pimples, athlete's foot, ringworm, itches, acne, boils and septic of wounds and burns. Curry leaf extract help in pigmentation and reduces the white patches all over the body.

Curry leaves have a traditional use, either whole or in parts, as antidiarrheal, antifungal, blood purifying, anti-inflammatory, anti-microbial, anti-oxidant and anti-depressant agents.The leaves and

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Volume 3, Issue 2 July 2018, pp: 24-33 www.ijprajournal.com ISSN: 2456-4494

roots can be given as an anthelmintic, analgesic, cure for piles, body heat reducer, and thirst quencher and are also helpful in reducing inflammation and itching. They are also useful in managing leukoderma and blood disorders.

Lemon leaves[11-16]

Figure2: Lemon leaves

Synonym: Lemon, dehi ,Jambira, Mahajambira ,Nimbu, Bara nimbu, PakariNimbu ,Patienbu, Kagghinebu
Biological Source: It consists of fresh and dried leaves of tree of Citrous limon.
Family:Rutaceae

Geographical source: It is found in India, China, Southeast Asia, New Guinea, Australia, especially southern Italy and Spain. It grows throughout the hotter parts of India-Tamil Nadu.
Chemical constituents:Essential oil of lemon leaves contain Limonene, Sabinene, Citronellal, Linalool, Neral, Geranial, (E)-beta-Ocimene, Myrcene, Citronellol, beta-Caryophyllene, Terpne-4-ol, Geraniol, alpha-Pinene, alkaloids, tannins, flavonoids, and phenolic compounds. Citric acid, calcium, flavonoids, iron, phosphorus, vitamins A, B1, and vitamin C are found in lemon leaves. Along with this, nutrients like carbohydrates, proteins, and fats are also present in it.

Uses: Scientifically proven therapeutic activities of C. limon include anti-inflammatory, antimicrobial, antifungal, sedative, antidepressant, anticancer, antioxidant and antiparasitic activities. Skin-related problems can be kept away by the use of the lemon leaf. According to medical research published in this regard, lemon leaves have effective antimicrobial properties, which protect against many bacteria like E. coli. This bacterium causes dermatological infections. In this case, skin infection can be avoided by using lemon leaves.Lemon tree extract, especially lemon leaves extract, are beneficial for skin problems such as acne and pimples.

Green tea leaves[17,18,19]

Figure3: Green tea leaves

Biological Source: It consists of fresh and dried leaves of tree of Camellia sinensis.
Family: Theaceae.

Geographical source: Originally cultivated in East Asia, this plant grows as large as a shrub or tree. Today, Camellia sinensis grows throughout Asia and parts of the Middle East and Africa.

Chemical constituents: Tea leaves contain many compounds, such as polysaccharides, volatile oils, vitamins, minerals, purines, alkaloids e.g.caffeine and polyphenols e.g catechins, flavonoids.Polyphenols contained in teas are classified as catechins. Green tea contains six primary catechin compounds: catechin, gallaogatechin, epicatechin, epigallocatechin, epicatechin gallate, and epigallocatechin gallate. Green tea also contains alkaloids including caffeine, theobromine, and theophylline.

Uses: Green tea leaf is anti-bacterial, helps lower cholesterol, reduces inflammation, and lowers blood pressure. It also helps to prevent some forms of cancer including colon, pancreatic, and stomach cancer. Green tea extract stimulates the immune system, and also helps defend against dental plaque. Green tea extract also protects against liver damage. Some new research suggests green tea may help prevent liver transplant failure in patients. Green tea extract use in cosmetics as anti-inflammatory in skin inflammation.Many scientists believe that free radicals contribute to the aging process as well as the development of a number of health problems. Polyphenols present in green tea helps in anti-ageing. Makes your skin looks younger, better and give even skin tone.

II. MATERIALS AND METHODS

Procurement of raw materials

The plants were selected on the basis of their anti-microbial, anti-oxidant activities and their medicinal uses reported in the literatures. The herbs

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(curry leaves, lemon leaves and green tea leaves) were purchased from plant drug supplier Sanjivani Aushadhalay, Bhavnagar, Gujarat, India. All other chemicals were of analytical grade and used without further purification.

Preparation of Herbal Extract

Curry leaves, lemon leaves and green tea leaves were shadow dried for 72 hrs. Dried leaves were crushed separately in a mixer. Powder of all three leaves was passed through suitable mesh sieve to get fine powder of herbs. Each of 50gm powder was extracted with 250 ml water in Soxhlet apparatus for 3 hrs. Extracts were filtered and concentrated up to desired volume.

Formulation of herbal cream[20-24]

Stearic acid (emulsifier) and Cetyl alcohol and petroleum jelly (oil soluble components) were melted and heated up to 60 ^{o}C in a beaker (Part A). The preservatives and other water-soluble components(borax, glycerine) and extracts of Curry leaves, Lemon leavesand Green tea leaves were dissolved in aqueous phase and heated at 60 ^{o}C (Part B). Then aqueous phase added to the oil phase with continuous stirring until get a smooth cream.

Table 1: Composition of herbal cream

Sr. No.	Ingredients	Quantity(%w/w)C1	Quantity(%w/w)C2
1	Stearic acid	12	12
2	Cetyl alcohol	4	4
3	Petroleum jelly	4	4
4	Borax	4	4
5	Glycerin	3	3
6	Methyl paraben	0.18	0.18
7	Water	q.s	q.s
8	Curry leaves Extract	1	2
9	Lemon leaves extract	1	2
10	Green tea leaves extract	1	2

Evaluation of cream [20-24]

Physical evaluation: In this test, the cream was observed for color, odor, state and consistency.

Irritancy: This is used to check the quality of materials as well as chemicals and whether it is harmful to skin / mucosal or not. First of all, we have to mark area on left hand (dorsal surface). After that we have to applied formulation of cream to that area and time was noted. Then we have to leave formulation for few minutes by this we can check for irritancy.

Washability: Wash ability test was carried out by applying a small amount of cream on the hand and then washing it with help of tap water.

Determination of pH:Take 0.5 g of cream and dispersed it in 50 ml distilled water. Then check its pH by using digital pH meter.

Viscosity: Viscosity of cream was done by using Brooke field viscometer at a temperature of 25 ℃ using spindle No. 63 at 2.5 RPM.

Phase separation: Prepared cream is kept in tightly closed container at room temperature away from sunlight and observed for 24 hours for phase.

After feel: Emollience, slipperiness and amount of residue left after the application of fixed amount of cream was checked

Greasiness:This test is basically used to check nature of cream either oily or greased.

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Stability test:In the mechanical test, cream samples were inserted into centrifuge tube at a speed of 3750 RPM for half an hour or 5000 to 10000 RPM for 15 Minutes then observed whether a separation exist or not.

Spreadibility: Spreadibility of formulated cream was measured by placing sample in between two slides then compressed to uniform thickness by placing a definite weight for a definite time. The specified time required to separate the two slides was measured as spreadibility. The value should be in between 9.0 to 31.02 g.cm/s. Spreadibility was calculated by the following formula:

S= (M× L)/T

Where, S= Spreadibility M= Weight tide to the upper slide L= Length of glass slide T= Time taken to separate the slides.

Antimicrobial activity [25] : The anti-microbial activity of creams containing different concentration of extracts (1% and 2% of all three herb) was assessed by cup and plate method. The zone of inhibition was measured in nutrient agar medium, employing Bacillus subtilis, Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa as test organisms. The sterile nutrient agar medium at a temperature between 40° to 50° was immediately poured into the sterile Petri plates to give a depth of 3 to 4 mm, by placing the plates on a level surface. The plates were then allowed to solidify. Each plate was then inoculated with 0.1ml of the solution of test organisms prepared in water for injection. The wells in each plate were bored in the centre that was filled with 500mg of cream. The plates were then incubated at 37° for 24h. After incubation, diameter of zonal inhibition (inhibition around each well) was measured. These value of zone of inhibition were taken as an indicator for the antimicrobial activity.

Anti-oxidant activity[26,27]:

Hydrogen peroxide scavenging activity of creams containing different concentration of extracts (1% and 2% of all three herb).A solution of hydrogen peroxide (40 mM) was prepared in phosphate buffer (pH 7.4). Cream (0.1-10mg/mL) dispersed in distilled water were added to a hydrogen peroxide solution (0.6 ml, 40mM). Absorbance of hydrogen peroxide at 230 nm was determined 10 minutes later against a blank solution containing the phosphate buffer without hydrogen peroxide. The percentage of hydrogen peroxide scavenging of both creams and standard cream containing 1% ascorbic acid were calculated. The hydrogen peroxide percentage scavenging activity was then calculated using the following equation:

$$\% \text{ Inhibition} = \frac{(\text{Absorbance}^{\text{control}} - \text{Absorbance}^{\text{Sample}})}{\text{Absorbance}^{\text{Control}}} \times 100$$

III. RESULTS AND DISCUSSION:

Physical evaluation: The prepared herbal cream was evaluated for the Colour, Odour and Consistency. The Colour of each cream was observed by visual examination which is light green in Colour. The Odour of each cream was found to be pleasant. The State of creamswere examined visually. Each cream was semisolid in nature. The formulations were examined by rubbing cream on hand manually. Both the cream having smooth Consistency.(Table 2)

Irritancy test: Herbal Creams were evaluated for the non-irritancy. They show no redness, edema, inflammation and irritancy. Observation of the state was done for 24 h. (Table 2).

Wash ability: Both the cream was found to be easily washable.

Determination of pH: According to the results, the PH of creamsC1 and C2 were found to be 5.6 and 5.8 respectively which was nearer to skin PH. So, it can be safely used on the skin.

Viscosity: Viscosity has an important role in explaining and controlling many attributes like shelf-life ability and product aesthetics such as clarity, ease of flow, on removal from packing. The viscosity of formulated creams C1 and C2was found to be 22968 Cps and 21376 cps respectively. According to the results creams showed adequate viscosity.

Phase separation: The prepared creams were transferred in a suitable wide mouth container. Set aside for storage, the oil phase and aqueous phase separation were visualizing after 24h. There was no phase separation in prepared creams.

After feel: Emollience, slipperiness and amount of residue left after the application of the fixed amount of creams were found to be good.

Greasiness: The creams were applied on skin surface in the form of smear and checked if the smear was oily or grease like according to the results, we can say that herbal creams were non-greasy.

Stability test: To assess the cream stability, the stability studies were done. No separation occurs so both the creams were found to be stable.

Spreadibility: The spreadibility of the cream was carried out and the time taken by the 2 slides to

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separate was less so as said in the description of evaluation test lesser the time taken for separation of the two slides better the spreadibility. So, according to this statement creams showed better spreadibility. The calculated spreadibility of cream C1 was17.25 g.cm/s and cream C2 was 16.95 g.cm/s.

Table 2 Results of evaluation of formulated creams

Sr. no.	Test parameter	C1	C2
1	Colour	Light Green	Light Green
2	Odour	Pleasant	Pleasant
3	State	Semisolid	Semisolid
4	Consistency	Smooth	Smooth
5	Irritancy test	Non irritant	Non irritant
6	Wash ability	Easily washable	Easily washable
7	pH	5.6	5.8
8	Viscosity	22968 Cps	21376 Cps
9	Phase separation	No phase separation	No phase separation
10	After feel	Good	Good
11	Greasiness	Non greasy	Non greasy
12	Stability test	No separation occurs	No separation occurs
13	Spreadibility	17.25 g.cm/s. (Better spreadibility)	16.95 g.cm/s. (Better spreadibility)

Antimicrobial activity: The results of the antimicrobial activity of formulated creams are illustrated in Table 3. The cream base without the herbal extracts did not show any zone of inhibition while in case of creams containing extracts (1% and 2% of all three herb), the zone of inhibitions was found to increase on increasing the concentration of extracts both the creams were shown the better activity against Bacillus subtilis, Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa. Hence the results of this study confirm that the herbs possess anti- microbial activity and this will help to treat skin blemishes due to skin infection.

Table 3 Results of antimicrobial activity

TestOrganisms	Zoneofinhibition(mm)		
	C1* (Mean ± SD)	C2*(Mean ± SD)	Soframycin Cream(Mean ± SD)
Bacillussubtilis	24 ±0.8	27 ±0.9	31±0.2
Staphylococcusaureus	21±0.7	26±0.2	28±0.6
Escherichiacoli	15±0.5	20±0.2	23±0.5
Pseudomonasaeruginosa	20±0.3	24±0.7	30±0.1

* C1- Cream containing 1% extract
C2- Cream containing 2% extract

The above result justified the antimicrobial properties of prepared herbal cream which was comparable with soframycin cream.

Anti-oxidant activity: Hydrogen peroxide scavenging activity was performed to evaluate anti-oxidant activity of creams containing different concentration of extracts (1% C1and 2%C2 of all three herb).Sample ofcreams C1 and C2Inhibited the production of hydroxyl radical by 62.15% and 70.68% respectively showing strong scavenging activity. However, the activity was comparable to cream containing 1% ascorbic acid.

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Table 4 Effect of formulated creams in hydrogen peroxide scavenging activity.

Concentration(mg/ml)	% Inhibition of Hydrogen peroxide scavenging		
	C1*	C2*	S1*
0.2	60.57	66.49	72.35
0.4	61.33	68.30	76.67
0.6	62.12	71.10	79.99
0.8	62.99	71.89	84.46
1.0	63.75	75.64	90.28

*C1- Cream containing 1% extract,C2- Cream containing 2% extract, S1- Cream containing 1% ascorbic acid

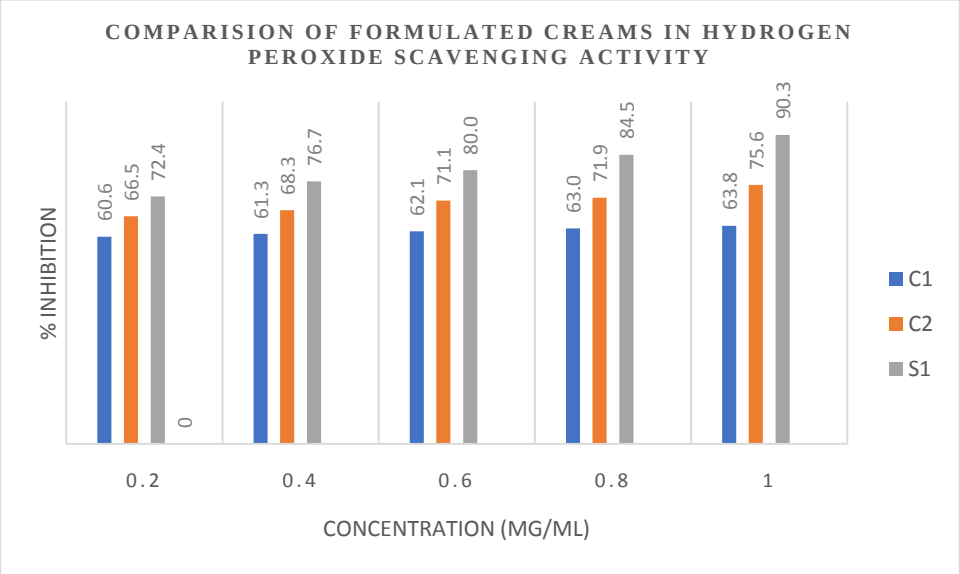

Figure 6 Comparison of formulated creams in hydrogen peroxide scavenging activity.

IV. CONCLUSION:

A blemish is any type of spots, discoloration, mark or flaw on the skin. An over production of oil by the sebaceous glands can cause blemishes. It is also cause by various factors such as oxidative stress due to free radical, microbial infection, hormonal changes, genetics, poor diet, stress, or improper skin care.

The Herbal creams show the good physical appearance with faint green Color, Smooth consistency, pleasant odor, and Semi-solid state. The pH of creams C1 and C2 were found to be 5.6 and 5.8 respectively. The Viscosity and Spreadibility of creams C1 and C2 were found to be 22968 cps and 21376 cps and 17.25 g.cm/s and 16.95 g.cm/s respectively. Both the cream not showed any phase separation and easily washable with tap water. After feel test for both creams were found to be good, not show any irritation, greasiness and no separation.

The results of anti-microbial study, the zone of inhibitions was found to increase on increasing the concentration of extracts both the creams were shown the better activity against Bacillus subtilis, Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa. Hence the results of this study confirm that the herbs possess anti- microbial activity and this will help to treat skin blemishes due to skin infection.

The results of anti-oxidant study revealed that both creams showed desirable anti-oxidant activity when compared with ascorbic acid standard cream. Hence it is efficient to produce anti-blemishes effect to prevent skin blemishes.

ACKNOWLEDGMENT

Authors are highly thankful to authorities of M.N. College of pharmacy, khambhat for providing necessary facilities for carried out this research work.

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