Most widely used cream: Brightening and Whitening Cream

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ABSTRACT

Skin whitening and skin whitening refer to the practice of using chemical substances in an attempt to lighten skin tone or provide an even skin complexion by lessening the concentration of melanin. Several chemicals have been shown to be effective in skin whitening, while some have proven to be toxic or have questionable safety profiles, adding to the controversy surrounding their use and impacts on certain ethnic groups. Most skin-lightening treatments, which can reduce or block some amount of melanin production, are aimed at inhibiting tyrosinase. Many treatments use a combination of topical lotions or gels containing melanin-inhibiting ingredients along with a sunscreen, and a prescription retinoid. New development using LED systems are also showing good results.

Research has shown that the use of tretinoin (also known as all-trans retinoic acid) can only be somewhat effective in treating skin discolorations. Users of tretinoin have to avoid sunlight, as the skin can tan. Using tretinoin always makes the skin more sensitive to UVA and UVB rays. Research has shown hydroquinone and tretinoin to prevent sun- or hormone-induced melasma. Hydroquinone is a strong inhibitor of melanin production, meaning that it prevents dark skin from making the substance responsible for skin color. Hydroquinone can only disrupt the synthesis and production of melanin hyperpigmentation.

Thus the content is all about the creams used in routine life and the mostly used creams by the people.

Keywords: LED system, UVB and UVA rays, Hydroquinone.

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INTRODUCTION:

According to D &C Act, Cosmetics mean any articles meant to be rubbed, poured, sprinkled or sprayed on or introduced into or otherwise applied to any part of the human body for cleansing,

beautifying, promoting attractiveness or altering appearance and include any article intended for use as a component of cosmetic. Soap is not covered under cosmetic product (1).

They are divided into two types:

Oil-in-water (O/W) creams which are composed of small droplets of oil dispersed in a continuous phase.

Water-in-oil (W/O) creams which are composed of small droplets of water dispersed in a continuous oily phase.

Day creams are usually designed to be worn under cosmetics, so they have light, nongreasy formulas that are absorbed quickly and allow pores to breathe. They provide a smooth, oil-free canvas for foundation to glide on smoothly. During the day, skin is subject to damaging UV rays, pollution, environmental stresses, and makeup, so creams designed for use during the day are primarily focused on protection and support.

Night creams have become an become an important addition in the skin care regimen because the skin goes through a lot of damage through the day where it loses moisture and hydration, undergoes sun damage and pollution, and by the end of the day becomes lifeless and dull. night creams come with the anti-ageing benefit helping in firming and tightening up the skin, replenishing collagen, and smoothing out fine lines.

All-Purpose Skin Cream "The People's Choice" is today's all-purpose skin cream of choice, recommended and used because of its all-natural pure super healing ingredients and its phenomenal results.

Cold cream is mainly used for skin treatment, due to its moisturizing properties, such as a facial mask, lip balm, etc. It can also be used to remove makeup and as shaving cream. The name "cold cream" derives from the cooling feeling that the cream leaves on the skin.

Skin whitening and skin lightenin refer to the practice of using chemical substances in an attempt to lighten skin tone or provide an even skin complexion by lessening the concentration of melanin. Several chemicals have been shown to be effective in skin whitening, while some have proven to be toxic or have questionable safety profiles, adding to the controversy surrounding their use and impacts on certain ethnic groups.

Lotions are applied to external skin with bare hands, a brush, a clean cloth, cotton wool, or gauze. Many lotions, especially hand lotions and body lotions are formulated not as a medicine delivery system, but simply to smooth, moisturize and soften the skin. A lotion is a low- to heavy-viscosity topical preparation intended for application to unbroken skin. By contrast, creams and gels have higher viscosity.

Advantages of creams: (2)

1) They gives prolong contact in their site of application than any other pharmaceutical dosage forms.
2) They are not stick in nature, so easily washable.
3) Injured area can be dried quickly by creams than other semi-solid preparations.
4) They have three dimensional thicksotropic properties. Applying pressure cause breakdown of this 3D structure.
5) Non-irritating when applied to the skin.
6) Not expensive.

Disadvantages of creams:

1) They are less hydrophobic than other semi-solid preparation, so risk of contamination is high than the others.
2) Less viscous then other semi-solid preparation.

Purposes of creams:

1) To dried the injured area as soon as possible
2) To prevent the irritation, inflammation and microbial growth of the skin.
3) To prevent infections in some sensitive organs.
4) To prolong the action in the injured site.
5) To prevent grittiness of the skin.

Criteria of a good quality cream:

1) Their affectivity should be high.
2) They should give rapid onset action.
3) They should be biocompatible and bio-miscible.

4) Free from grittiness.

5) They should be smooth.

6) They should be readily washable.

7) They should be non-irritant.

8) They should be non-allergic.

9) They should be non-toxic.

10) They should be physically and chemically stable.

METHODS AND FORMULATION OF WHITENING AND BRIGHTENING CREAM: (4)

Basic ingredients used in the formulation of whitening and brightening cream are:

Tretinoin

Research has shown that the use of tretinoin (also known as all-trans retinoic acid) can only be somewhat effective in treating skin discolorations. Users of tretinoin have to avoid sunlight, as the skin can tan.

Hydroquinone

Hydroquinone does not bleach the skin but lightens it, and can only disrupt the synthesis and production of melanin hyperpigmentation. It has been banned in some countries (e.g. France) because of fears of a cancer risk

Arbutin

Some of alternative lighteners are natural sources of hydroquinone. They include Mitracarpusscaber extract, Uvaursi(bearberry) extract, Morusbombycis (mulberry), Morus alba (white mulberry) and Broussonetia Papyrifera (paper mulberry).

Kojic acid

Kojic acid is a by-product in the fermentation process of malting rice for use in the manufacturing of sake, the Japanese rice wine. Some research shows kojic acid to be effective for inhibiting melanin production.

Azelaic acid

Azelaic acid is a component of grains, such as wheat, rye, and barley. It is applied topically in a cream formulation at a 10-20% concentration. Azelaic acid is used to treat acne, but there also is research showing it to be effective for skin discolorations. Other research also indicates azelaic acid may be an option for inhibiting melanin production.

Vitamin C

Vitamin C and its various forms (ascorbic acid, magnesium ascorbyl phosphate, etc.) are considered an effective antioxidant for the skin and help to lighten skin.

Glutathione

Glutathione is a tripeptide molecule found in mammalian bodies. It is an antioxidant that plays an important role in preventing oxidative damage to the skin. In addition to its many recognized biological functions, glutathione has also been associated with skin lightening ability.

Alpha hydroxy acids

Alpha hydroxy acids (AHAs) — primarily in the form of lactic acid and glycolic acid — are the most researched forms of AHAs because they have a molecular size that allows effective penetration into the top layers of skin(4)

Niacinamide:

Niacinamide is claimed to be a much safer alternative when applied topically for skin or genitalia whitening. According to research by Procter & Gamble, a cosmetics company, niacinamide has no adverse side-effects. It also promotes acne reduction, increases skin moisture, and reduces fine wrinkles.

Depigmenting agents:

Most commonly, depigmentation of the skin is linked to people born with vitiligo, which produces differing areas of light and dark skin. These individuals, if they so decided to use a lightening process to even out their skin tone, could apply a topical cream containing the organic compound monobenzone to lessen the remaining pigment. Monobenzone may cause destruction of melanocytes and permanent depigmentation.

Example:

Production Method: Ion- exchanged Water Balance

Stearic acid.....5.0%

Stearyl alcohol.....4.0

Isopropyl myristate.....18.0

Glycerylmonostearate.....03.0

Propylene glycol.....10.0

Caustic potash.....0.2

Sodium bisulfite.....0.05

Preservative.....q.s.

Procedure:

1) Propylene glycol and caustic potash were dissolved in ion-exchanged water, and the resulting mixture was heated to and maintained at 70° C. (aqueous phase).
2) Other components were mixed and melted by heat, and maintained at 70° C. (oil phase).
3) The oil phase was gradually added to the aqueous phase, and after the complication of the addition, the resulting mixture was maintained at 70° C.
4) For some time to allow a reaction to proceed. Subsequently, the mixture was homogeneously emulsified by a homomixer, and cooled to 30° C.

EVALUATION OF CREAMS: (5)

1. Rheology

Rheology is very important as these creams are marketed in tubes or containers. The rheology or viscosity should remain constant. As these products are normally non-Newtonian in nature, the viscosity is measured by using viscometers for such liquids.

Rheologic measurements are utilized to characterize the ease of pouring from a bottle, squeezing from a tube or other deformable container, maintaining product shape in a jar or after extrusion

rubbing the product onto and into the skin and pumping the product from mixing and storage to filling equipment.

2. Sensitivity

As various types of ingredients are used with occasional use of antiseptics hormones etc. there is a possibility of sensitization or photosensitization of the skin. This should be tested before hand. This test is normally done by patch test on and can be either open or occlusive. The test sample is applied along with a standard market product at different places and effect is compared after a period of time (6).

3. Determination of Spreadability (10)

One of the criteria for a cream, ointment or gel is that it should possess good spreadability. Spreadability is a term expressed to denote the extent of area to which the cream readily spreads on application to skin or affected part.

The therapeutic efficacy of a formulation also depends on its spreading value. Hence determination of spreadability is very important in evaluating ointment characteristics. Special apparatus was designed to study the spreadability of ointment formulations. The spreadability is expressed in terms of time in seconds taken by two slides to slip off from ointment, placed in between the slides under the direction of certain load. Lesser the time taken for separation of twoslides, better the spreadability of Cream.

4. Microscopic evaluation (8)

Microscopic evaluation of all formulated batches was done by using Compound microscope with the help of MOTIC software. Evaluation of the sample was carried initially and after each stability condition.

Procedure:

1. Clean and dry glass slide and cover slip were taken.
2. Very small quantity of sample was taken on glass slide
3. Sample was covered by placing cover slip on it. Precaution was taken that there was no entrapment of air
4. Cover slip was slightly pressed to spread the sample uniformly to prepare the thin film

5. It was observed under microscope with different power of lenses like 10x, 40x and 100x.

5. Stability of creams (12)

Stability of creams (base and formulation) was evaluated on different storage conditions that is, 8, 25, 40 and 40°C + 75% RH for 28 days. Centrifugation and accelerated temperature conditions are very important parameters for stability of creams. No phase separation was observed during the stability study of creams. As elevated temperature cause change in viscosity, partition and solubility of molecules between two phase.

But it has found that lipophilic surfactant is more stable at elevated temperature. No liquefaction is observed through out the study period of 28 days (9).

6. P^H Test (13)

pH values of base and formulation of fresh creams and samples kept at different storage conditions up to 28 days was determined. In this study, the pH of freshly prepared base and formulation was 5.44 and 5.96 respectively, which is within the range of skin pH. The pH values of the samples of base kept at 8°C increased up to 14th day and then started decreasing with some variations. At 25°C, the values continued to increase with some variations. At 40 and 40°C+ 75% RH it was found to be increasing gradually in the 1st week and then it started to decline continuously till 28th day with some variations.

Whereas pH of the samples of formulation kept at 25, 40 and 40°C + 75% RH showed an initial increase and then gradual reduction in pH values with slight variations with time. At 8°C the pH gradually increased. The pH values of samples of formulation kept at 8, 25, 40 and 40°C+ 75% RH were 6.33, 5.95, 5.76 and 5.85 at the 28th day respectively.

By using two-way analysis of variance (ANOVA) technique, it was found that the change in pH of different samples of base and formulation were significant at different levels of time and temperature. When least significant difference (LSD) test was applied to check the individual average effects of the pH of the samples of base at different temperatures with the passage of time by taking average pH values of zero hour at different temperatures as standard, it gave insignificant changes at 25°C and significant at 40 and 40°C + RH. Again when LSD test was applied to check the individual average effect of the pH of the samples of formulation at different temperatures with the passage of time by taking average pH values of zero hour at different temperatures as standard, it gave significant changes at temperature 40°C + RH 75%.

From LSD test it was concluded that there was insignificant change in pH of the samples of base at different storage conditions but significant changes were observed in pH of the samples of formulation at 24 and 36 h, 7day and 14day, while insignificant changes at other times. The decrease in pH of the formulation at different storage conditions might be due to the production of any acidic metabolite or decomposition of any ingredient during the heating process, especially paraffin oil.

7. Dermatological test

a. Melanin:

The effect of the base and the formulation on the production of skin melanin was performed in this study. The amount of melanin was measured for 8 weeks at different time intervals in each individual after application of base and formulation. The formulation decreased the melanin contents throughout the study period. With the help of ANOVA test it was found that the base and formulation produced significant effects on skin melanin content in volunteers.

LSD test showed that base produced significant effects at 7th and 8th week while formulation showed significant effects throughout the study.

With the help of paired sample ttest it is evident that a significant difference was produced between the melanin effects of base and the formulation from 2nd week and it lasts up to the 8th week of study period. It has been established by a number of studies that flavonoids especially quercetin is a potent tyrosinase inhibitor so the formulation reduced the skin melanin content. The main flavonoids in C. officinalisare isorhamnetein, quercetin, myricetin and kaempferol.

b. Skin moisture content:

In this study, it was observed that there was an increase in moisture values from 1st to 5th week after the application of the base and then gradually decreased up to the 8^{th} week.

However after the application of formulation the increase in skin moisture content is more pronounced from 1st to 5th week and then showed little change onwards from 6th to 8th week. With the help of ANOVA test it was found that the base and formulation showed a significant effect on the skin moisture content. By LSD test for formulation, it was found that significant change in moisture content was observed at 2nd, 3rd and 5th week after application of base and at 2nd, 3rd, 4th, 5th, 6th, 7th and 8th week after application of formulation. With the help of paired

sample t-test it was evident that a significant difference in the moisture values was produced at the 2nd week when base was compared with formulation. The moisturizing treatment involves repairing the skin barrier, retaining/increasing water content, reducing TEWL, restoring the lipid barrier's ability to attract, hold and redistribute water, and maintaining skin integrity and appearance (10).

1. Skin sebum content:

Sebaceous glands, located in each hair follicle, produce an oily substance to lubricate and protect the skin called sebum. Sebum production is measured using a special opalescent plastic film, which becomes transparent when it is in contact with sebum lipids. The device relies on a probe, which presses a piece of special film on the skin for a measured length of time. The sebum is adsorbed on this film like ink on the blotting paper and the film becomes transparent. The probe is then placed into the device which radiates a light beam onto the film. A metal mirror behind the film reflects the beam back again through the film and then into an instrument called a photomultiplier, which measures the amount of light in the beam.

The more sebum on the skin, the more transparent is the film and greater is the amount of light reflected. In this study, the effects of the base and formulation on the sebum contents of human cheeks were investigated. Sebum was measured every week in all the individuals.

With the help of ANOVA test it was evident that there was a significant effect of base and formulation on skin sebum throughout the study at volunteer level but insignificant at time level. By applying LSD test it was evident that significant changes in sebum contents were observed at 2nd, 5th and 8th week after application of base and 8th week with formulation. With paired sample t-test it was found that the base and formulation showed insignificant variations regarding the skin sebum content. It was concluded that increase in sebum contents after the application of base and formulation may be attributed to the oily nature of W/O emulsion having a thick viscous oily liquid that is, the paraffin oil.

CONCLUSION

Most commonly, depigmentation of the skin is linked to people born with vitiligo, which produces differing areas of light and dark skin. These individuals, if they so decided to use a lightening process to even out their skin tone, could apply a topical cream containing the organiccompound monobenzone to lessen the remaining pigment. Monobenzone may cause

destruction of melanocytes and permanent depigmentation. An alternate method of lightening is to use the chemical mequinol over an extended period of time.

According to a research it has been found that lowest levels of reduced glutathione to be associated with eumelanin type pigmentation, whereas the highest ones were associated with the pheomelanin. As a result, it is reasonable to assume that depletion of glutathione would result in eumelanin formation. Decreased glutathione concentration lead to in the conversation of L-dopaqunione to L-dopachrome increasing the formation of brown-black pigment (eumelanin).

There is also a small amount of research showing oral supplements of pomegranate extract, ellagic acid, vitamin E, and ferulic acid can inhibit melanin production.

REFERENCES

1. Remington, Joseph Price, Beringer, Paul, ed., "Remington: The Science and Practice of Pharmacy", 21st edition year-2008, Lippincott Williams & Wilkins, p. 772, ISBN 0781746736.
2. Calvert, James B., "Zinc and Cadmium", Physics. Retrieved 21 January 2013.
3. ScienceLab.com, Inc., "Calamine, Powder, USP, Alphabetical Listing of Chemicals", ScienceLab.com, Inc. Retrieved 21 January 2013.
4. Martin (ed), Elizabeth A. Concise Medical Dictionary. Year-2012 Oxford: Oxford University Press. pp. "calamine", ISBN 9780191727016.
5. Richards, Alan W. "Zinc processing", Encyclopaedia Britannica. Encyclopædia Britannica, Inc. Retrieved 12 March 2014.
6. "Cream and Lotion" netdoctor. Retrieved 14 Aug. 2014.
7. The Medicines Formulary: Antipruritics and Topical Anaesthetics
8. Medline Plus Medical Encyclopedia: Poison oak - sumac rash
9. Saija A, Tomaino A, Trombetta D, Giacchi M, De Pasquale A, Int J Pharm. 1998, 175, 85-94.
10. Mehta P, Chand K, Narayanswamy D, Beetner DG, Zoughi R and Stoecker W. M IEEE. T. Instru. Meas. 2006,
11. Saraf S, Ashawat M. Plantaindica; 2005, 1, 26.
12. Lu H, Edwards C, Gaskell S, Pearse A, Br J Dermatol.1996, 135, 263.
13. F'guyer S, Afaq F, Mukhtar H. Photodermatol Photoimmunol Photomed, 2003, 19, 56.