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Research article *Clinical research*

Herbal cream is effective as the skin hyper pigmentation for Melisma

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ABSTRACT

Incidences of skin disorders are reported every year and the most common includes those disorders pertaining to skin pigmentation. It may affect between 7.5–63% of people depending on the population. Melasma can be found primarily in individuals with light brown skin to darker skin tones, especially in areas with high sun exposure and Diseases. A large sample study across four Indian cities revealed that more than 80% of the population present skin color heterogeneity on the face, irrespective of age and gender. This pigmentation makes people conscious of their image in the society and affects confidence and many people's attempt to suicide. Keeping this in mind, the present study was carried out to bring out a best herbal source for the treatment of skin pigmentation.

Keywords: Melasma, Herbal cream, Hyperpigmentation

INTRODUCTION

History of Use of Traditional Herbal Medicines

By definition, 'traditional' use of herbal medicines implies substantial historical use, and this is certainly true for many products that are available as 'traditional herbal medicines'. In many developing countries, a large proportion of the population relies on traditional practitioners and their armamentarium of medicinal plants in order to meet health care needs. Although modern medicine may exist side-by-side with such traditional practice, herbal medicines have often maintained their popularity for historical and cultural reasons. Such products have become more widely available commercially, especially in developed countries. In this modern setting, ingredients are sometimes marketed for uses that were never contemplated in the traditional healing systems from which they emerged. An example is the use of ephedra for weight loss or athletic performance enhancement. While in some countries, herbal medicines are subject to rigorous manufacturing standards, this is not so everywhere. In Germany, for example, where herbal products are sold as 'phytomedicines', they are subject to the same criteria for efficacy, safety and quality as are other drug products. In the USA, by contrast, most herbal products in the marketplace are marketed and regulated as dietary supplements, a product category that does not require pre-approval of products on the basis of any of these criteria. These matters are covered extensively in Section 3 below.

Pigmentation

Definition

Pigmentation means coloring. Skin pigmentation disorders affect the color of your skin. Your skin gets its color from a pigment called melanin. Special cells in the skin make melanin. When these cells become damaged or unhealthy, it affects melanin production. Some pigmentation disorders affect just patches of skin. Others affect your entire body. If your body makes too much melanin, your skin gets darker. Pregnancy, Addison's disease, and sun exposure all can make your skin darker. If your body makes too little melanin, your skin gets lighter. Vitiligo is a condition the cause patches of light skin.

Disorders of pigmentation

Types

1. Freckles
2. Melasama

3. Solar lentigines

4. Post inflammatory hyper pigmentation

Aim and objectives

The world is becoming a Global village where humans are completely Engrossed in their day to day activity giving less priority to their health and especially in terms of skincare. Incidences of skin disorders are reported every year and the most common includes those disorders pertaining to skin pigmentation. It may affect between 7.5–63% of people depending on the population. Melasma can be found primarily in individuals with light brown skin to darker skin tones, especially in areas with high sun exposure and Diseases. A large sample study across four Indian cities revealed that more than 80% of the population present skin color heterogeneity on the face, irrespective of age and gender. This pigmentation makes people conscious of their image in the society and affects confidence and many people's attempt to suicide. Keeping this in mind, the present study was carried out to bring out a best herbal source for the treatment of skin pigmentation. The literature enquiry was focused on a survey on specific remedies and medicinal plants which have been studied in cases of certain disorders.

METHODOLOGY

Since ages, the skin colour is an important issue for human race. Melanocyte abnormalities are mentioned during the fetal developmental stages in literature from ancient cultures. The deciding factor for the pigmentation is **Melanin.** An old notion of melanocyte producing melanin is now obsolete. It is the epidermal unit which is responsible for the process of melanogenesis, production and distribution of the melanin. Pigment cell melanocyte surrounded by keratinocytes constitutes the epidermal unit. On one hand when exposure to the sunlight increases skin melanin content, on other melanin imparts photoprotection with its ability to absorb ultraviolet radiations specially UVB. Melanocytes have specific distribution in the skin. In the basal layer of the epidermis at the junction of the dermis and epidermis melanocytes are located. Dendritic processes of these melanocytes help in the melanin distribution and cell signaling. Melanin pigment is also present in uvea of the eye, cochlea and vestibular region of the ear, leptomeninges of the brain, and ventricular septum and valves of the heart.

Melanocytes are derivative of the neural crest (NC) cells which are present on the dorsal surface of the neural fold. Both dorsolaterrally as well as ventromedially migrating part of the NC cells gives rise to melanoblasts – melanocyte precursors. Melanoblasts migrate from dermis to epidermis during the process of embryonic development and later start the melanin production. Melanin chemically is an insoluble compound 5, 6-dihydroxyindole.

Synthesized from an amino acid tyrosine. In melanocytes it is produced in the 'melanosomes' - cytoplasmic organnels. Melanin synthesis is under hormonal and neural regulation. Initial steps are catalyzed by tyrosinase, a copper-containing oxidase, which converts tyrosine to dopaquinone. Subsequent reactions occur through nonenzymatic auto- oxidation, in the presence of zinc, with formation of the black to brown pigment eumelanin. The yellow to reddish brown, high-molecular-weight polymer known as pheomelanin and the low-molecular-weight trichromes result from addition of cysteine to dopaquinone and further modification of the products (Figure 1).

Pigmentation disorders

1. Hyper pigmentation
2. Hypo pigmentation

Thus melanogenesis is a complex process. When gone awry, it results into various pigmentation disorders either hyper or

hypo pigmentation. These disorders may be congenital or acquired, permanent or temporary, ystemic or region restricted. Pharmaceutical and cosmetic industry are getting constant boost as such disorders have a significant negative impact on the lifestyle of the patients. In the present review Hyper pigmentation and Hypo pigmentation disorders are discussed in association with few of the important systemic diseases.

Hyperpigmentation

Systemic diseases causing hyperpigmentation can be differentiated into metabolic, autoimmune and endocrinopathies. In porphyria cutanea tarda the presentation is reticulate, spotty or diffuse patterns, especially localized on temporal regions, cheeks, V-shaped area and arms. The skin darkening is seen in sun-exposed areas and is a reflection of the photoreactive properties of porphyrins. There are various mediators like reactive oxygen species (ROS), mast cells and fibroblasts, ecosanoids, complements and matrix metalloproteinase. ROS damages cell membrane and causes tissue injury and release of inflammatory mediators. Complements too participate in the porphyrin mediated pigmentation through generation of ROS. Complements are found on the vessel walls and dermo-epidermal junction. Fibroblast proliferation with metaloproteinase like MMP1 or MMP2 has degenerating action.

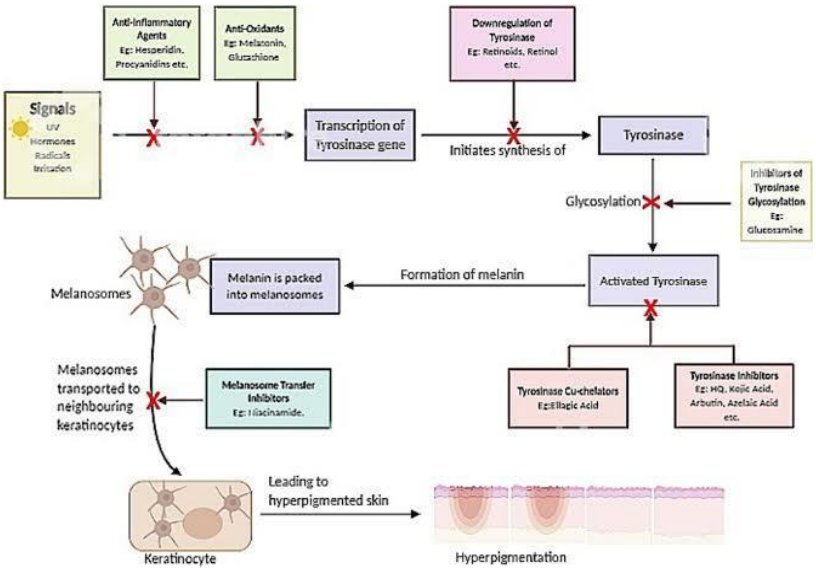
In hemochromatosis deposition of excess iron in the skin stimulates melanin production leading to the bronze like hyperpigmentation. Niacin deficiency is well known to cause pellagra in which area exposed to sunlight shows scaly hyperpigmented patches. Similar picture is reported in the vitamin B12 and folic acid deficiency but is described as reversible in nature. Generalized hyperpimentation is found in patients of whipple's disease along with other sign like diarrhea, weight loss, arthritis, and lymphadenopathy. Also seen in Peut-Jegher's syndrome, CronkhiteCanada syndrome. Skin pigmentation suggests the severe form of whipple's disease.

Melasma

Definition

Melasma is a common skin problem caused by brown to gray-brown patches on the face. Most people get it on their cheeks, chin, Nose Bridge, forehead, and above the upper lip. It is more common in women than men. Pregnancy is a common cause of melasma. It also affects woman taking oral contraceptives and hormones.

Mechnism of action



Causes of melasma

Formulation

1) Aloe Vera, Papaya Extract, and Mulberry Extracts with Orange Oil Cream:

1) Aloe Vera
2) Orange Oil
3) Papaya Extract
4) Mulberry Extract

2) Cucumber Extract, Safron, Sandalwood With Oil and Tamarind Cream:

1) Orange Oil
2) Tamarind
3) Cucumber Extract
4) Black Berry
5) Saffron
6) Sandalwood
7) Ginger
8) Aloe Vera
9) Lemon and Caster oil

3) Green tea With Turmeric and Extracts with Oil

Cream:
1) Ginger Root
2) Turmeric Root
3) Green Tea
4) Rosmery leaf
5) Orange Essential Oils

4) Sandalwood and Papaya Extract Cream:
1) Sandalwood
2) Papaya Extract

5) Indian Madder, Vetiver and Cool Cream:
1) Indian Madder
2) Aloe Vera
3) Vetiver
4) Lotus Cool
5) Liquorice

6) Turmeric with Essential oil Cream:
1) Avacado Oil
2) Wheat Gram Oil
3) Almond Oil
4) Turmeric

7) Papaya Extract with Apricot Oil and Almond Cream:
1) Papaya Extract
2) Apricot Oil
3) Almond Oil

8) Lemon Grass oil and Almond with Manjstha Extracts Cream:
1) Lemon Grass Oil
2) Manjstha Extract
3) Almond oil

9) Vitamin C Cream;
Vitamin C

10) Red Sandalwood Extract with Jojoba Oil and Turmeric Cream:
1) Jojoba Oil
2) Red Sandalwood Extract
3) Turmeric Oil

11) Turmeric and Holy Basil with Coconut Oil Cream:
1) Turmeric
2) Coconut Oil
3) Aloe Vera
4) Holy Basil

12) Cullen Corylifolium with Nigella Sativa and Berberis Vulgaris Cream:
1) Cullen Corylifolium Whole Plant
2) Berberis Vulgaris Root Bark
3) Nigella Sativa
4) Coconut Oil

13) Solanum Nigrum with Psoralea Corylifolia and Garcinia Indica and Ricinus Communis Oil Cream:
1) Solanum Nigrum
2) Psoralea Corylifolia
3) Garcinia Indica
4) Calotropis Giganta
5) Aloe Barbadenis Miller
6) Brassica Juncea Oil
7) Ricinus Communis Oil

Melasma

Active ingredients
1) Aloe Vera
2) Turmeric
3) Orange oil
4) Lemon

S.no	Ingredients	Chemical Constituents	Uses
1.	Aloe Vera	Anthracene Glycosides, Barbaloin or Aloin, Glycoside C, Isobarbaloin, Aloinosides A and B, Aloe-emodin, Aloesone, Aloetic acid.	1) It may improve skin and prevent wrinkles 2) It has antioxidant and antibacterial properties 3)Cures acne and blemishes 4)It is used in Anti ageing
2.	Turmeric	Curcumin, Curcuminoids, Cymene, Tumeron, Isdemethoxycurcumin, Diaryl heptanoids	1) Cures dermatitis 2) Anti-aging 3) Lighten acne scares 4) Lighten the skin
3.	Orange Oil	Limonene, Monoterpenes hydrocarbons, (□□myrcene, □□pinene), Aldehydes, Alcohols	1) Combats blemishes 2) Even skin tone 3) Promotes glowing skin
4.	Lemon	Terpenes, Limonene, Citral, Citonellal,	1) Helps to fade scars 2) Remove wrinkles 3) It may improve skin color and remove Blackheads

Formulation 1
1) Aloe Vera
2) Papaya Extract
3) Mulberry Extract
4) Orange Oil
5) Turmeric

S.no	Ingredients	Chemical constituents	Uses
1.	Aloe Vera	Anthracene Glycosides, Barbaloin or Aloin, Glycoside C, Isobarbaloin, Aloinosides A and B, Aloe-emodin, Aloesone, Aloetic acid	1) It may improve skin and prevent wrinkles 2) It has antioxidant and antibacterial properties 3) Cures acne and blemishes 4) It is used in Anti ageing
2.	Papaya Exract	Saponins, Glycosides, Tannins, Flavonoids, Alkaloids.	1) Reduces wrinkles 2) controls acne 3) Removes dead skin cells 4) Soothes irritated skin 5) Improves skin tone
3.	Mulberry Extract	Valine, Lysine, Methionine, Cystine, Isoleucine, Leucine, Myristic acid, palmitic acid	1) clears out dark spots and Blemishes 2) Make skin soft and radiant 3) Anti-ageing properties 4) Treats dry and sensitive skin
4.	Orange Oil	Limonene, Monoterpenes Hydrocarbons, (□ □myrcene, □-pinene), Aldehydes, Alcohols.	1) Combats blemishes 2) Even skin tone 3) Promotes glowing skin
5.	Turmeric	Curcumin, Curcuminoids, Cymene, Tumeron, Isdemethoxycurcumin, Diaryl Heptanoids.	1) Cure dermatitis 2) Anti-ageing 3) Lighten acne scares 4) Lighten your skin

Formulation 2

1) Indian Madder
2) Aloe vera
3) Vetiver
4) Lotus cools
5) Liquorice
6) Turmeric

S.no	Ingredients	Chemical Constituents	Uses
1.	Indian Madder	Quinones, Iriduides, purpurin, Bicyclic hexapeptides, Alizarin, Anthraquinones, Oleananes triterpenoid.	1) Improves skin complexion 2) Skin –lightening 3) Natural cleanse 4) removes pimple and acne 5) Glowing skin
2.	Aloe Vera	Anthracene glycosides, Barbaloin (or) aloin, Alosone, Glycoside C, Isobarbaloin, Aloinosides A and C, Aloe- emodin.	1) It may improve skin and Prevent wrinkles 2) It has antioxidant and Antibacterial properties 3) Cure acne and blemishes
3.	Vetiver	Khusimene, Delta-selinene, Vetivenene, Vetiselinenol, Beta-vetivone, Khusimone, Alpha-vetivone, Khusimol.	1) Reduces skin inflammation 2) helps fade scar tissue 3) Cure acne and blemishes
4.	Lotus cool	Alkaloids, Flavonoids, Eudesmane Sesquiterpene, Nelumnucifoside A and B, Megastigmane.	1) Improves skin tone 2) Refines appearance of pores and texture of skin 3) Repairs skin barrier 4) reduces acne and fades

5.	Liquorice	Glucose, Sucrose, Asparagine, Flavone glycosides, resins, Glycyrrizic acid.	1) Brightening to skin 2) Reduces hyper pigmentation 3) Fade blemishes 4) Softness to skin
6.	Turmeric	Curcumin, Cymene, Tumeron, Diaryl heptanoids, Isdemethoxycurcumin, Curcuminoids.	1) Anti-aging 2) Lighten your skin 3) glowing to skin 4) Cure Dermatitis 5) Lighten acne scars

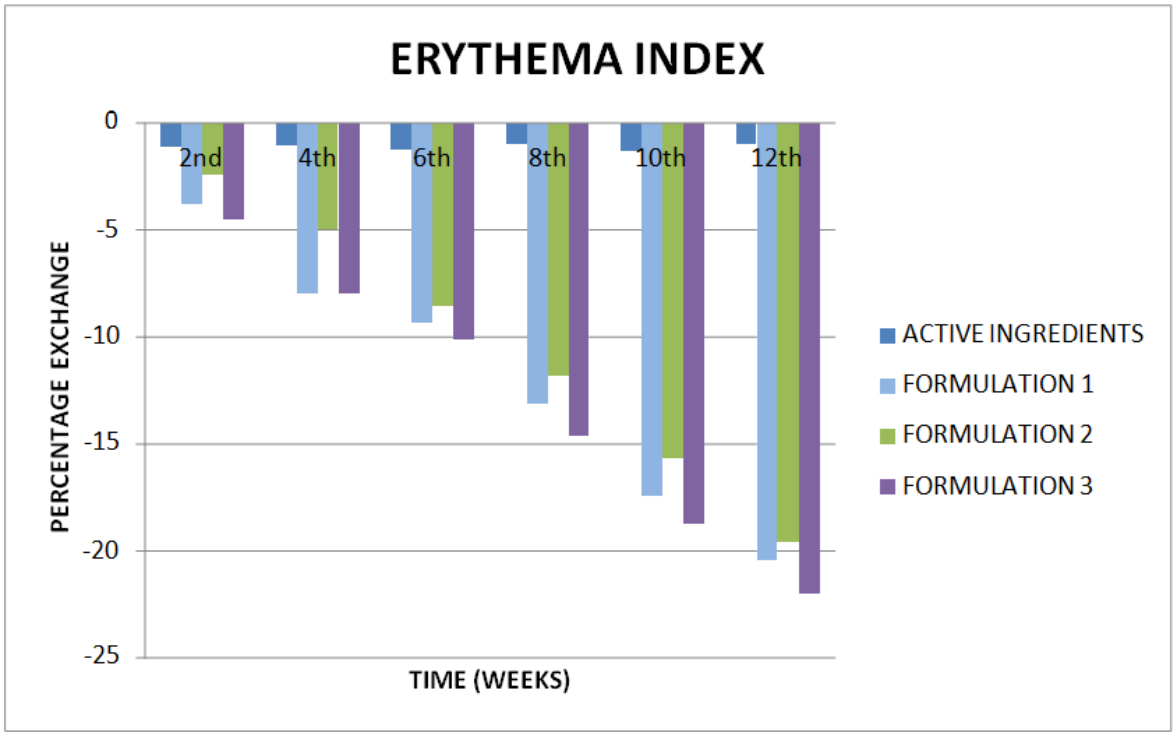
Formulation 3

1) Cucumber Extract
2) Black Berry
3) Safron
4) Tamarind
5) Sandalwood
6) Orange Oil
7) Lemon
8) Aloe Vera
9) Ginger
10) Castor Oil

S.no	Ingredients	Chemical Constituents	Uses
1.	Cucumber Extract	Niacin, Riboflavin, Thiamine, Iron, Proteins, Minerals, Vitamins, Chloride.	1) controls sebam 2) shrinks pores 3) hydrates skin 4) prevents acne 5) Fade freckles
2.	Black Berry	Anthocyanins, Phenols, Flavonols, Ellagitannins.	1) Anti-ageing 2) Maintaining skin elasticity 3) used in antioxidents 4) Cure to Acne
3.	Saffron	Crocin, Picracrocin, safranal, Zeaxanthin, Lycopene, □□and □□carotenes.	1) Skin whitening 2) treats to acne and scars 3) Promotes soft, smooth, and glowing skin 4) Evens skin tone and reduces dullness 5) Hydration to the skin
4.	Tamarind	Organic acids, Tartaric acid, Maleic acid, Citric acid, Sodium and potassium tartarate.	1) Anti ageing agent 2) Lightens to skin 3) Hydrating to the skin 4) Blemish free skin 5) Cures acne
5.	Sandalwood	Sesquiterpene alcohol, □□Santalol, □□santalol, Santene, Santenone, Aldehyde santalol.	1) Glowing skin 2) Slows down ageing 3) Removes tan 4) Cures acne 5) Heals prickly heat
6.	Orange Oil	Limenene, Aldehydes, Alcohols, Monoterpenes Hydrocarbons (□□pinene, □□myrcene).	1) Combates blemishes 2) Even skin tone 3) Promotes glowing skin
7.	Lemon	Terpenes, Limonene, Citral, Citonellal.	1) Help fade scars 2) Remove wrinkles 3) It may improve skin and remove blackheads.

8.	Aloe Vera	Anthraceneglycosides, Aloin (or) Barbaloin, Glycoside C, Isobarbaloin, Alinosides A and B, Aloe-emodin, Aloesone, Aloetic acid.	1) It may improve skin and prevent wrinkles 2) It has antioxidant and Antibacterial properties 3) Cures acne and blemishes 4) It is used in anti- ageing
9.	Ginger	Gingerol, Citral, Shogaol, Sesquiterpene, Zingiberene, Zingiberol, Borneol, Linalool.	1) Promote healthy skin 2) Rejuvenates the skin 3) Antibacterial properties, Helps reduce acne 4) Anti-ageing 5) Skin toning
10.	Castor Oil	Isoricinoleic acid, Linoleic acid, Stearic acid, Isostearic acid, Ricinoleic acid.	1) Glowing skin 2) Helps to treat acne 3) Better skin complexion

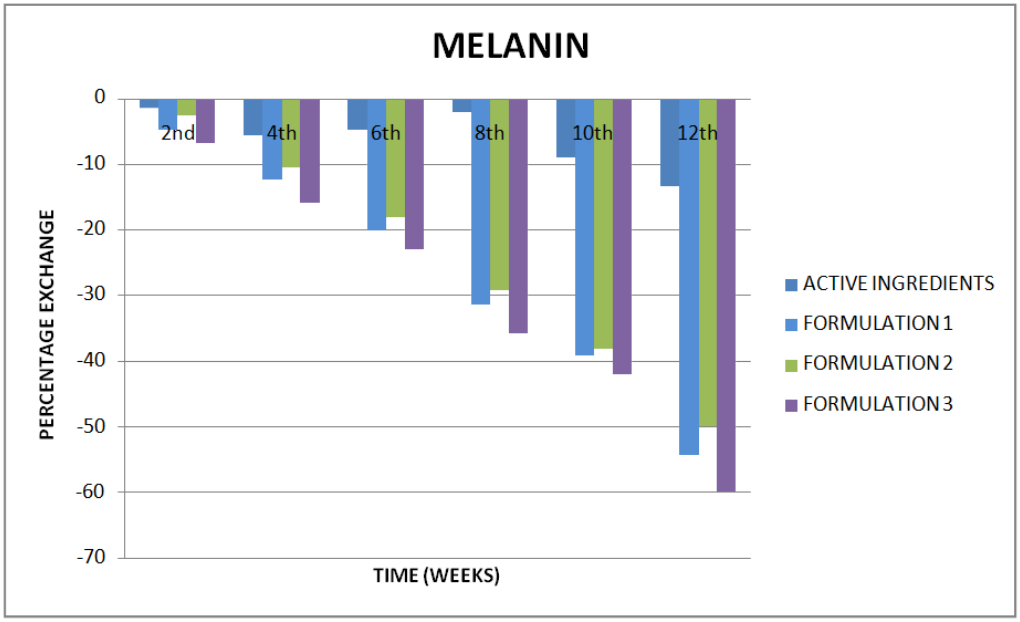
Erythema index



Values of Erythema Index Content

Time (weeks)	2nd	4th	6th	8th	10th	12th
Active ingredients	-1.11	-1.08	-1.23	-1.02	-1.34	-0.97
Formulation 1	-3.76	-7.95	-9.32	-13.11	-17.43	-20.45
Formulation 2	-2.45	-4.98	-8.56	-11.78	-15.65	-19.58
Formulation 3	-4.48	-7.99	-10.09	-14.65	-18.75	-21.98

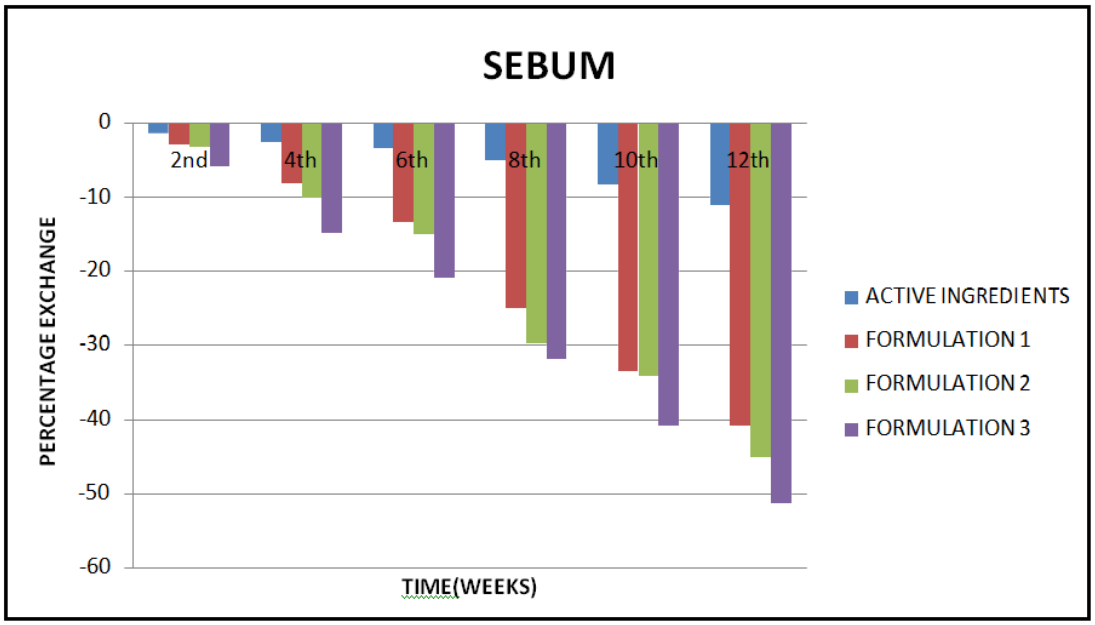
Melanin



Values of Melanin Index Content

Time (weeks)	2nd	4th	6th	8th	10th	12th
Active ingredients	-1.39	-5.58	-4.65	-2.05	-8.94	-13.42
Formulation1	-4.67	-12.36	-20.09	-31.32	-39.13	-54.2
Formulation 2	-2.56	-10.45	-18.03	-29.1	-38.11	-50
Formulation 3	-6.78	-15.78	-22.9	-35.78	-42	-59.9

Sebam



Values of Sebam Index Content

Time(weeks)	2nd	4th	6th	8th	10th	12th
Active ingredients	-1.39	-2.58	-3.35	-5.02	-8.4	-11.07

Formulation 1	-2.96	-8.15	-13.43	-25.01	-33.43	-40.71
Formulation 2	-3.21	-10.11	-15.03	-29.7	-34.11	-45
Formulation 3	-5.78	-14.8	-20.9	-31.78	-40.78	-51.19

Vitiligo

Active ingredients

1) Dried Ginger
2) Turmeric
3) Nigella Sativa
4) Coconut

S.no	Ingredients	Chemical Constituents	Uses
1.	Dried Ginger	Gingerol, Citral, Shogaol, Sesquiterpene, Zingiberene,Zingiberol, Borneol, Linalool.	1) promotes healthy skin 2) It has antioxidant and Antibacterial properties 3) Cures acne and blemishes 4) It is used in anti –ageing
2.	Turmeric	Curcumin, Curcuminoids, Cymene, Tumeron, Isdemethoxycurcumin, Diaryl Heptanoids.	1) Anti-ageing 2) Brighten your skin 3) Lighten acne scars 4) Cure dermatitis
3.	Nigella Sativa	Thymoquinone, Thymol, Thymohydroquinone, Dithymoquinone.	1) Fades hypopigmentation 2) Diminished fine lines and Wrinkles 3) Unclogs pores
4.	Coconut Oil	Palmitic acid, Stearic acid, Capric acid, Caprylic acid, Myristic acid, Linoleic acid.	1) Reduces wrinkles 2) Lighten to skin 3) Nourishes the skin 4) Moisturizes the skin

Formulation 1

Ingredients

1) Turmeric
2) Coconut Oil
3) Aloe vera
4) Holy Basil

S.no	Ingredients	Chemical Constituents	Uses
1.	Turmeric	Curcumin, Curcuminoids, Cymene, Tumeron, Isdemethoxycurcumin, Diaryl Heptanoids.	1) Anti-ageing 2) Brighten your skin 3) Lighten acne scars 4) Cure dermatitis
2.	Coconut Oil	Palmitic acid, Stearic acid, Capric acid, Caprylic acid, Myristic acid, Linoleic acid.	1) Reduce wrinkles 2) Lighten to skin 3) Nourishes the skin 4) Moisturizes the skin
3.	Aloe Vera	Anthraceneglycosides, Aloin (or) Barbaloin, Glygoside C, Isobarbaloin, Alinosides A, And B, Aloe-emodin, Aloesone, Aloetic acid.	1) It may improve skin and Prevent wrinkles 2) It has antioxidant and Antibacterial properties 3) Cures acne and blemishes 4) It is used in Anti-ageing

4.	Holy Basil	Oleanolic acid, Ursolic acid, Eugenol, Carvacrol, L inalool, Cineole.	1) Nourishes the skin 2) Reduce skin inflammation 3) Treats acne 4) It is anti bacterial properties

Formulation 2

Ingredients

1) Cullen Corylifolium Whole Plant
2) Berberis Vulgaris Root bark
3) Nigella Sativa
4) Coconut Oil

S.no	Ingredients	Chemical constituens	Uses
1.	Cullen Corylifolium Whole Plant	Bakuchiol, Isopsoralen, Psoralen, Corylifolin, Corylin, Psoralidin	1) Used in vitiligo 2) It has antibacterial and antiseptic effect on the skin. 3) It is effective for leukoderma
2.	Berberis Vulgaris Root Bark	Berberine, Jatrorrhizine, Columbamine, almatine, Berberubine, Berbamine.	1) It is antibacterial properties 2) It is anti-inflammatory agent 3) treats to acne 4) P roduce healthier and Nourished skin.
3.	Nigella Sativa	Thymoquinone, Thymol, Thymohydroquinone, Dithymoquinone.	1) Fades hypopigmentation 2) Diminished finelines and wrinkles 3) Unclogs pores
4.	Coconut Oil	Palmitic acid, Stearic acid, Capric acid, linoleic acid, Myristic acid, Caprylic acid.	1) Reduces Wrinkles 2) Lighten to skin 3) Nourishes the skin 4) Moisturizes the skin

Formulation 3

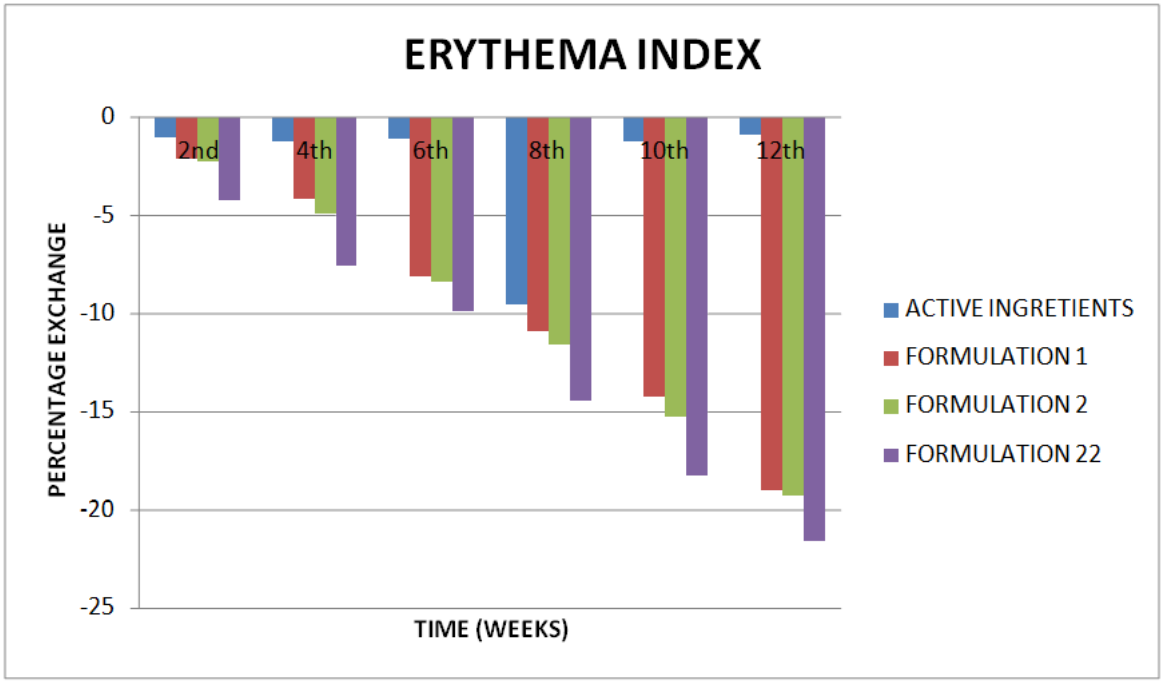
Ingredients

1) Solanum Nigrum
2) Psoralea Corylifolia
3) Nigella Sattiva
4) Garcinia Indica
5) Calotropis Gigantea
6) Aloe Barbadenis Miller
7) Brassica Juncea Oil
8) Ricinus Communis Oil

S.no	Ingredients	Chemical Constituents	Uses
1.	Solanum Nigrum	Pinoresinol, Syringaresinol, Medioresinol, Scopoletin, Tetracosanoic acid,	1) Anti –ageing 2) Used to vitiligo 3) Treating Skin diseases 4) Used in antiseptic
2.	Psoralea Corylifolia	Bakuchiol, Isopsoralen, Psoralen, Corylifolin, Corylin, Psoralidin	1) Use to vitiligo 2) It has antibacterial and Antiseptic effect on theskin 3) Effective for Leukoderma
3.	Nigella Sattiva	Thymoquinone, Thymol, Thymohydroquinone, Dithymoquinone	1) Fades Hypo pigmentation 2) Diminished finelines and Wrinkles 3) Unclogs pores

4.	Garcinia Indica	Garcinol, Hydroxycitric acid,Cyanidin-3-nglucoside, Cyanidin-3-sambubioside.	1) Treat skin infections 2) Treat dead skin cells 3) Anti –ageing agent
5.	Calotropis Gigantea	Uzarigenin, Gomphoside, Coroglaucigenin,Calotropin, Corotoxigenin.	1) Treat skin diseases 2) Rid blemishes of the skin 3) Anti bacterial activity
6.	Aloe Barbadenis Miller	Anthraceneglycosides,Aloin, (or) Barbaloin,Glycoside C, Isobarbaloin, Alinosides A And B, Aloe-emodin, Aloesone, Aloetic acid.	1) It may improve skin and Prevent wrinkles 2) It has antioxidant and Antibacterial properties 3) Cures acne and blemishes 4) It is used in Anti-ageing
7.	Brassica Juncea Oil	Allyl Isothicyanate,Diallyl Trisulfide, Diallyl sulfide.	1) Glowing to skin 2) Removing Tan and dark spots 3) Antibacterial activity
8.	Ricinus Communis Oil	Isoricinoleic acid, Linoleic Acid, Stearic acid, Isostearic Acid, Ricinoleic acid.	1) Glowing skin 2) Helps to treat acne 3) Better skin complexion

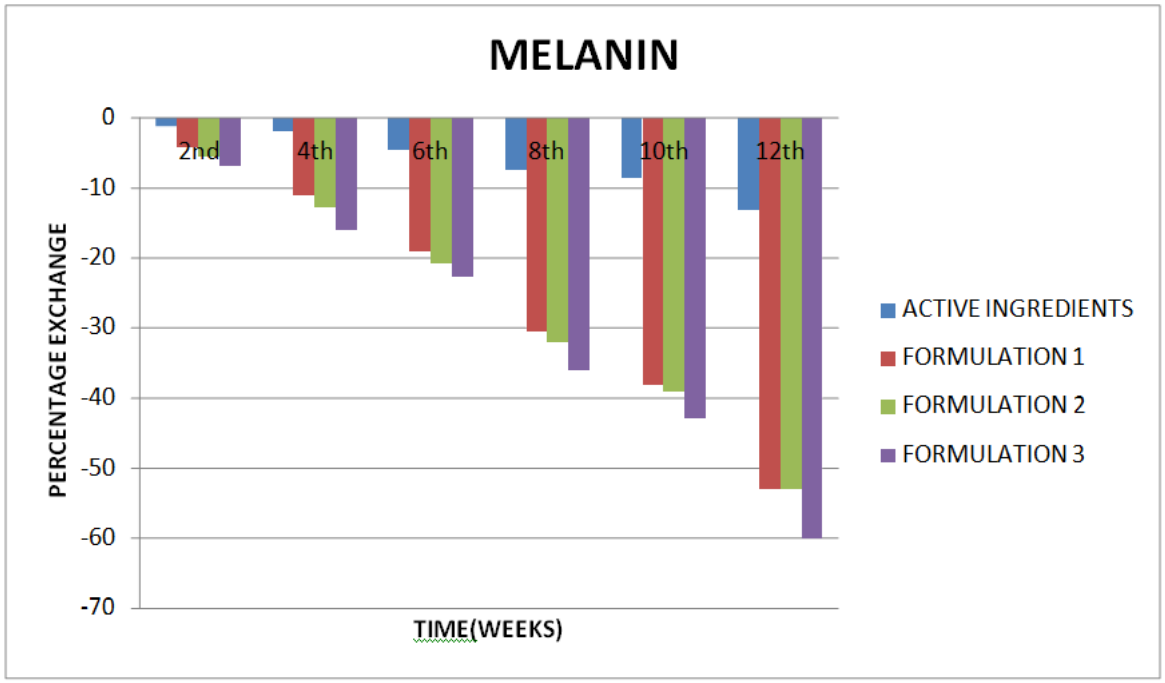
Erythema index



Values of Erythema Index Content

Time(weeks)	2^{nd}	4^{th}	6th	8th	10th	12^{th}
Active ingredients	-1.01	-1.23	-1.13	-9.56	-1.24	-0.87
Formulation 1	-2.15	4.13	-8.11	-10.88	-14.21	-19.01
Formulation 2	-2.22	-4.88	-8.36	-11.58	-15.25	-19.28
Formulation 3	-4.24	-7.55	-9.89	-14.45	-18.25	-21.58

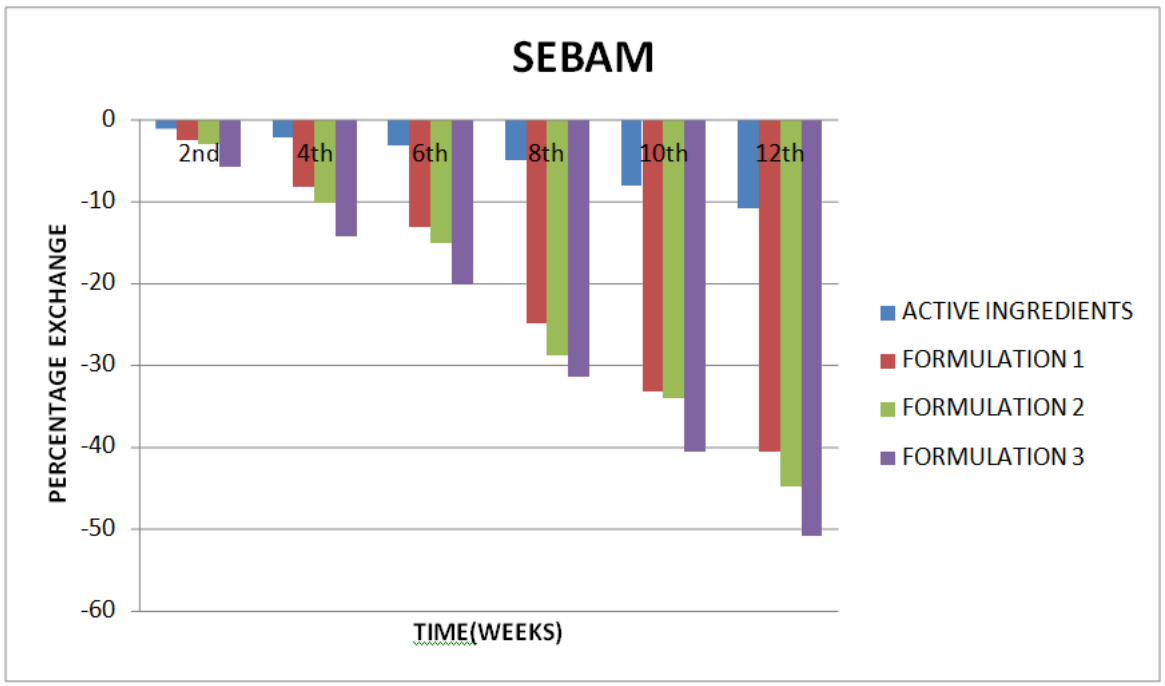
Melanin



Value of Melanin Index Content

Time(weeks)	2nd	4th	6th	8th	10th	12th
Active ingredients	-1.15	-1.88	-4.54	-7.43	-8.65	-13.12
Formulation 1	-4.17	-11.6	-19.11	-30.44	-38.09	-52.98
Formulation 2	-5.56	-12.87	-20.74	-31.98	-39.06	-53.03
Formulation 3	-6.87	-15.98	-22.78	-36.01	-43	-59.96

Sebam



Value of Sebam Index Content

Time(weeks)	2nd	4th	6th	8th	10th	12th
Active ingredients	-1.09	-2.1	-3.09	-4.88	-7.99	-10.85
Formulation 1	-2.55	-8.1	-13.11	-24.87	-33.15	-40.54
Formulation 2	-3.03	-10.05	-15	-28.77	-34.02	-44.77
Formulation 3	-5.65	-14.3	-20.2	-31.35	-40.56	-50.79

RESULT AND DISCUSSION

Out of best 10 formulations taken from the market, 3 formulations has been selected and reviewed for having efficient Pharmacological activity against Hypo and Hyper pigmentation. Comparisons between the selected 3 formulations have been done. (Refer Graph)

SUMMARY AND CONCLUSION

Compared to Formulation 1 and 2, Formulation 3 has more activity with reference to reducing Hyper pigmentation and Hypo pigmentation in the patients with skin diseases. Hence, we conclude that formulation 3 is more efficient than other Formulations available in the market.

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