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FORMULATION AND EVALUATION OF BLUSH PREPARATION USING BEETROOT POWDER

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1. INTRODUCTION

Cosmetics are any substance or unit doses intended to be applied on the entire exterior of the human body including teeth and mucous membrane around the mouth.

] As per section 3 of the Drugs and Cosmetics Act 1940 and Rules 1945, cosmetics means any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or other wise applied to, the human body or any part there of for cleaning , beauty flying , promoting attractiveness, or altering the appearance, and includes any article intended for use as a component of cosmetic.

How Herbal Cosmetics useful in skin cosmetics

- Safe for skin
- Natural Ingredients
- Suitable for all skin type
- No side effects
- Natural fragrance
- Cruelty-free

Classification of Skin Cosmetics

1. Powders–
   - Face powder
   - Compact Powder
   - Body powder
   - Prickly heat powder
   - Face pack

Structure of skin

Externally every part of body is covered with skin. It serves the body in so many ways that it is one of the largest organs of the body. In an adult the skin covers an area of about 2 square meters i.e., 22 square feet and width about 41/2 to 5 Kg. The thickness of the skin varies in different parts of the body. It is good to have a fine grained and smooth skin with fine pores. A healthy skin is slightly moist, soft, flexible and slightly acidic in reaction. The key to a better understanding of the skin functions is to take closer look at the structure.

The skin is composed of the 3 distinct layers.

1. The outer epidermis,
2. The inner dermis,
3. Finally, the hypodermis or subcutaneous layer Epidermis:

a) Stratum corneum
b) lucidum
c) Stratum granulosum
d) Stratums pinosum
e) Stratum basal or stratum germinative.

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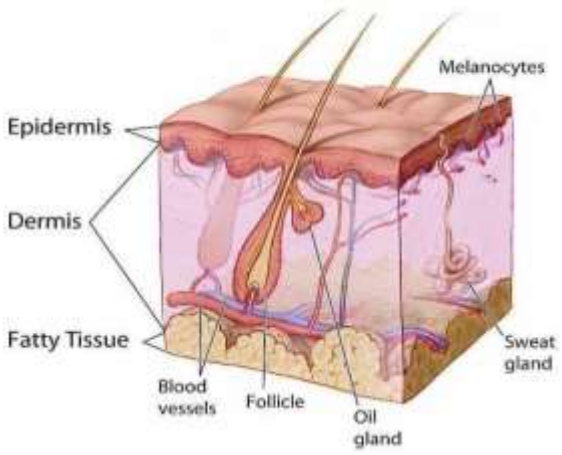


Figure1: CrossSection of Skin

There are 3 other types of cells in the epidermis.

i) The melanocytes or pigment cells – the melanocytes manufacture a pigment called melanin which is injected into keratinocytes during ketamination. Melanin is involved in protecting the skin from UV light, thus acting as the body's natural sunscreen.

ii) Langerhans cells, which are colorless and dendritic inform ,and

iii) Markel cells, which are concerned with sensation

Dermis

Dermis Is also referred to as corium .It is the sensitive highly vascular part of skin located just below the stratum basal or epidermis .Specialized nerve ending so fvarious types ,sweatgland s and the hair follicles rebounder. All these structures and the network of blood vessels and lymphatics held in a connective tissue matrix containing many elastic fibers and collagen bundles.

The lower layers of the dermis are held to the underlying tissue such as muscles by a subcutaneous layer of areolar connective tissue called fascia. The arteriolar network of the dermis provides nourishment to their dermal tissues as well as the stratum basal epidermis which does not receive direct blood supply.

A. Elastin and Reticulin

Collagen forms the major constituent of the fibrous protein which give the skin its tensile strength. Elastin fibers makeup only4% of the dry weight and1%ofthevolumeofthedermis. They are delicate, straight, freely branching fibers that prove very resilient. These fibers are thicker in the lower portion of the dermis and become thinner as they approach the epidermis.

B. Ground Substance

The amorphous ground substance in which the fibers and cells lie contains acidic GAGs. Inn dermis the major forms are hyaluronic acid, chondroit in sulfate, and dermatan sulphate.

C. Fibroblast

Fibroblast are derived from esenchyme.

D. Mast Cell

The second major cell type in the dermis can be found close to the small blood vessels.

E. Sweat Glands

Sweat glands are found only in mammals.Thereare2distincttypesofsweatglands,theeccrine and apocrine glands. [1]

F. Sebaceous Glands

They secrete sebum which forms the majority of the lipid which covers the skin and hair. Sebaceous gland activity is under hormonal control. It is stimulated by androgens. sebum composed of glycerides and free fatty acids, wax esters, squalene, cholesterol esters and cholesterol.[1]

Hypodermis

Below the epidermis is a layer of f t tyoradiposetiss e called the hypodermis,the cellsi this layer, synthesize and store at as an energy reserve. This is to help insulate the body from low external temperature and to act as a buffer against trauma.

Types of Skin

Thre are five types of healthy skin.

1. Normal skin
2. Oily skin
3. Dry skin
4. Combination skin (dry + oily)

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5. Sensitive skin

1. Normal skin: This skin is neither too dry nor too oily. It has regular texture ,no imperfections and a clean ,so t appear an ce and does not need special care. Loose powder blush is suitable for normal skin.

2. Oily skin: Oily skin has a porous, humid and bright appearance. It is caused by excessive fat production by sebaceous glands and usually determined by genetic or hormonal causes. Loose powder blush suitable for oily skin.

3. Dry skin: Dry skin is caused by external factors such as the weather, low air humidity, immersion in hot water and it usually temporary. Compact blush is more suitable than loose powder blush for dry skin.

4. Combination skin (dry + oily) : Based on its location , it presents characteristics of both dry and oily skin. Since distribution of sebaceous and sweat gland is not homogeneous. Both compact and loose powder blush are suitable for combination skin.

5. Sensitive skin : Sensitive skin is more prone to react to stimuli to which normal skin has no reaction. It is a fragile skin, usually accompanied by feelings of discomfort such as heat, tightness, redness or itching. It is a delicate skin that needs more care to fight dryness, roughness and usual appearance. Mineral based loose powder blush are suitable for sensitive skin.

Comparative study of natural and artificial ingredients effect on skin:

Natural/Herbal Cosmetics

Herbal cosmetics are generally referred as natural cosmetics in which herbs are beings used in crude or extract form to make them free from side effect, in addition to being to free from ill effect they also provide nutrient and other useful minerals to the body.

They contain natural antioxidant like vit. C many others benefits can be seen with the use of herbal product such as:
They are suitable for all skin types, more affordable than synthetic one's wide selection to choose from Blush powder of Beet Root.

Synthetic/Artificial Cosmetics

Cosmetics are formulated by a complex combination of chemical ingredients. Thereis a wide list of synthetic compounds present in them, such as sodium lauryl sulfate, phthalates, nitrosamines, parabens and formaldehyde releasers, heavy metals, hydroquinone, nanoparticles, benzophenone, mineral oil, color pigments, alcohol, ammonium lauryl sulfate and many others.

This might end up with exposure that is more Synthetic chemicals are mainly present in the form of preservatives and fragrance agents. It is true that not all of the synthetic chemicals present in the personal care products cause adverse health effects but these might have some dangerous ingredients that are being classified as carcinogen i.e. it might cause cancer in consumer's body.

Some of the ingredient ts can be neurotoxins ,reproductive toxins that have been proven to affect brain development and reproduction.

\Some ingredients can be cytotoxic that cause impairment to the cell existence which might result in immediate cell death by losing cell membrane integrity (necrosis) or the cell might undergo apoptosis.
With all benefits, cosmetics and personal care products come as a parcel of never-ending list of allergies. It can be skin allergy (permanent discoloration of skin),breathing allergy(damage to nose and nasal passage) and hair allergy (redness in scalp, hair fall, excessive dandruff, thinning of hair).

Loose Blush Powder

Properties of Loose Blush Powder:

- It should be homogenous.
- It should not cause local irritation.
- It should adhere easily and spread uniformly.
- It should cling to the skin on application.
- It should have adsorptive and absorptive capacity.
- It should be non-irritant.
- It should free from grittiness.

Advantages

- Good chemical stability compared with cream blush.
- Easy to carry.
- Suitable for most of all type skins.
- Easy to apply.
- Economical as compared to other formulations.
- Each dose can containa different amount of active

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2 .LITRATURE REVIEW

- **Sahishna S. Setal**(2022): studied an overview of blushing powder ,a cosmetic product used to highlight and add color to the cheeks. The authors describe the history of cosmetics and blushing, as well as the different types of blushing powder available, including loose powder, compact powder, and cream blush. They also have discussed consumer buying behavior and the importance of choosing cosmetics based on skin type.The article concludes with a description of he formulation and evaluation of loose blush powder.
- **Sari SW et al** (2021) :have formulated blush preparations using natural coloring from redbeetrootextract.Theresearchersadded2%,4%,or6%ofdryextracttocreateloose powder, compact powder, and cream, then tested for quality parameters. Results showed that all forms were homogeneous and easy to apply, with no fractures in the breakage test. The pH remained stable for all formulas after 28 days of storage. However, the cream was unstable in the color stability test at 30°C, while the other forms had fair stability at 8°C. The loose powder and cream showed significant discoloration,whilethecompactpowderwith6%concentrationwasthemostpreferred in the he donictest.Thearticle provides insight sinto the potential use of beetroot extract as a natural colorant in cosmetic product.
- **Chen MX et al** (2016): have formulated and evaluated antibacterial creams and gels containing metalions , specific allyzinc and copper sulfate, fortopical application.The researchers aimed to investigate the synergistic activity between these two metal ions as antimicrobial ingredients in topical formulations. The formulations were evaluated for their organoleptic characteristics, physicochemical properties, and in vitro antibacterial activity against Escherichia coli and Staphylococcus aureus. Results showed that zinc sulfate and copper sulfate had a strong synergistic antibacterial activity in the creams and gels, with a minimum effective concentration of 3w/w% for both active ingredients against the tested microorganisms. The study confirms the potential use of these metal ions in topical formulations for their antimicrobial properties.
- **Agrawal Setal** (2021) :have formulated and evaluated color cosmetics using beetroot as a natural coloring material. The article highlights the adverse effects of synthetic colorsontheuser's system and the increasing awareness of users towards the productstheyuse.Beetrootpowder,anaturalcoloringmaterial,providesnourishment,anatural glow,andhealingpowertotheskin.Thestudyaimstodevelopeco-friendlyandhealth- protective compositions containing natural ingredients and colors with multiple benefits.Thearticleconcludesthatusingbeetrootpowderasanaturalcoloringmaterial in cosmetics is a promising alternative to synthetic colors.
- **Sharma S et al** (2022) has discusses the evaluation parameter for powder flow ability using various methods, including compendial and non-compendial techniques. TheauthorsdescribetheuseofthepowderrheometerandtheFT4powderrheometer,which simulatesdifferentproductionenvironmentsandhasapplicationsinvariousindustries. The article highlights the importance of accurate powder characterization and multi- dimensional analysis for understanding powder behavior under different processing conditions. [8]
- **Chauhan L and Gupta S etal** (2020) have discusses the use of pharmaceutical creams for wound healing and their importance in cosmetic and pharmaceutical products. It providesa detailed overview of cream preparation methods, classification, characteristics, and evaluation parameters. The article emphasizes the potential of topical drugdeliverysystems to improve wound healing outcomes andhighlights their safety and effectiveness.

2. AIM AND OBJECTIVE

AIM: Formulation And Evaluation Of Blush Preparations Using Beetroot Powder. Beetroot (***Beta Vulgaris***) is natural colorant and beetroot have different benefits on a human skin and it has negligible or insignificant adverse effect but artificial colorant has various adverse effects such as skin allergy. Hence present work is aimed to develop blush preparations using beetroot powder as a natural colorant

OBJECTIVE

Objective of present investigation are as follows.

- To formulate and evaluate loose blush powder preparation using beetroot powder
- Oily skin
- High light of the cheeks
- Control the pigment
- Reduced acne
- Makes the skin glow
- Fight acne
- Provides the protection
- It provides nourishment
- It provides durt protection.

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3. PLAN OF WORK

1. Literature Survey
2. Collection of material. (Excipient sand Beetroot)
3. Extraction and processing of beetroot powder from beetroot
4. Formulation of blush creams using beetroot extract.
5. Formulation of loose blush powder using beetroot powder
6. Evaluation of formulated blush cream and loose blush powder.
7. Compilation of data.

4. MATERIAL AND EQUIPMENT

Loose Blushing Powder

Equipment:- Mortar and Pestle, pH meter, Weighing Balance, sieve shaker

Chemicals	ManufacturedBy	BatchNo.
Magnesium Stearate Precipitated Extrapure	Pallav Chemicals & Solvents Pvt. Ltd. N-226, Near Kumbhavali Naka, MIDC, Tarapur, Boisar – 401 506, INDIA.	PC/715/17-2
Methyl Paraben	RESEARCH - LAB FINE CHEM INDUSTRIES MUMBAI 400 002 (INDIA)	70180611
Ascorbic Acid	Central Drug House (P) Ltd. Corp House Office: 7/28 Vardaan, Daryaganj, New Delhi – 110002 (INDIA)	200718
Talcum Powder Pract	Central Drug House (P) Ltd. Corp House Office: 7/28 Vardaan, Daryaganj, New Delhi – 110002 (INDIA)	210319

TableNo:1

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Fig:1(BEETROOT)

SYNANYMS: Sugar root
BIOLOGICAL SOURCE : It consist of root of Betavulgaris
FAMILY: Amaranthaceae

CHEMICAL CONSTITUENT

- ES:Beta cyanins
- Beta xanthins
- Poly phenols
- Saponins ,
- Inorganic nitrate
- Calcium ,magnesium, copper

USES

- Fightsacne
- Juice benefits our skin,
- Reduced acne
- Makes the skin glow
- Prevent hair loss,
- Keep the nourished,
- Treat dandruff promotes hair growth.

5. EXPERIMENTAL WORK

Extraction of colour from beetroot:

Due to the highest extraction yield, the aqueous extraction method was used to carry out the extraction process using the finest beetroot root powder. Under various aqueous extraction conditions, distilled water was used as a solvent in the aqueous extraction process. About 150 ml volumetric flasks were used for the extraction, which was carried out at various extraction temperatures (40, 50, 60 ^{o}C), times (20, 60, and 100 min), and solid-liquid ratios (1:5 g/ml) [7]

Different time intervals (20,60,and 100min) were used to take the extracts . The mixture was centrifuged for 15–20 minutes after extraction for a predetermined period of time and temperature. using filter paper, the obtained extracts were purified (What man n No.1). Then this extract was used in different dosage formulation.

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Fig:2Beetroot



Fig:3Sliced beetroot

Sun Drying



Fig:4Driedbeetrootfraction



Fig:5Beetrootpowder

Formula for Loose Powder

Material	LP8%	LP10%	LP12%
Beetrootpowder (Colouring Agent)	8	10	12
Magnesium Stearate (Adhesive Etoskin)	5	5	5
Methylparaben (Antimicrobial)	1	1	1
Ascorbicacid (Antioxidant)	2	2	2
Talcum(Q.S.)	upto100	upto 100	upto100

TableNo:2

LP8% = Loose powder with beetroot extract 8% LP10% = Loose powder with beetroot extract10% LP12%=Loose powder with beetroot extract 12%. **Procedure:**

- Adosageof10gofblush was prepared.
- WeighedingredientsincludedtalcumLP8%, LP10%,
- LP12%(8.65;8.45;8.25g),ascorbicacid(0.2g),magnesiumstearate(0.5g),methyl paraben(0.1 g),dry extract of beetroot(0.8;1;1.2g)
- A portion of talcum was added to the weighed extract, which was then blended andground until it was homogeneous and dry in a clean mortar.
- The next step involved combining the remaining ingredients ,grinding the maga in until they were homogeneous and soft for 15 to 20 minutes to completely disperse them, and then sieving the mixture through a sieve (85 mesh). A container with a tight fitting lid was then filled with the powder. [8]

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Fig:6

Mixed



Fig:7



Fig:8processtoFormulateLooseBlushPowder

Evaluation Parameter of powder

Bulk Density

The mass of an untapped powder sample plus its mass, which includes the contribution of the inter-particulate non-viable mass, is what is referred to as the bulk density of powder. In light of this ,it is dependent upon both the density of the powder particles and the irnon-linear positioning within the powder bed. Although the international unit is kilogrammes per cubic centimetre (kg/cm3), the bulk density is displayed in grams per millilitre (g/ml).

The design, handling, and storage of the sample all affect the bulking properties of the powder.Thebulkdensitycanbechosenbyfillingthegranules.Additionally,theslight disturbance in the powder bed could influence how the bulk density changes.

The following formula is used to determine the bulk density; Bulk density (ρb) = weight of dry powder (M) / Bulk volume(Vb)

Where M = weight of powder

V b =Bulk volume of powder.

Bulk density (beetroot powder) =10/17=0.5882 Bulk density (loose powder) =10/16=0.625

- **Tap Density**

  The increased bulk density obtained after mechanically tapping the container containing the powder sample is known as the tap density .When the initial powder has been measured for volume or mass, mechanically tap the measuring cylinder or container to take the reading until almost no further volume or mass change is visible. The following equation is used to calculate the tap density:

  Weight of dry powder (M)/Tapped volume (Vt) =Tapped density(t). where M is the powder's weight

  Vt is the least volume that was used after tapping. Tapped Density (beetroot powder) =10/25=0.666 Tapped Density (loose powder) =10/14=0.714

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- **Carr'sindex :** Tomeasuretheflowcharacteristicsandcompressibilityofpowders,Carr'scompressibility index was calculated using the bulk and tapped densities.
  Carr'sindex=Tap density– bulk density/ tap density*100 Carr'sindex(beetrootpowder)=0.66-0.58/0.66*100=0.1212*100=12.12(Good) Carr's index (Loose powder) =0.714-0.625/0.714*100=12.46 (Good)
- **Hausner ratio**
  It reveals flowcharacteristics.Itisapropertythatisderivablefrombulkandtapped density. Better flow is indicated by alower Hausner ratio, while poorer flow is indicated by a higher ratio. This formula is used to calculate the Hausner ratio;
  Hausner ratio=Tap density/ Bulk density
  Hauser ratio (beetroot powder)=0.66/0.58=1.14(Good)
- **Angle OF repose**

Inferred from the formed one, the angle of repose a permanent 3D angle(asopposedtoa straightbottom).When the particles that normally form the surface at an angle wear out and balance with gravity, the material will slide down ifit is placed on the pile.

Standard value for estimation of flow properties :

Flow	Angle of repose	Carr' sindex	Hausner ratio
Excellent	25-30	<10	1.0-1.11
Good	31-35	11-15	1.12-1.18
Fair	36-40	16-20	1.19-1.25
Passable	41-45	21-25	1.26-1.34
Poor	46-55	26-31	1.35-1.45
Very poor	56-65	32-37	1.46-1.59
Very very poor	>66	>38	>1.60

TableNo:3

- **Physicalappearance**:The powders colour,degree of roughness ,and grade can be used to determine its physical characteristics.
- **Irritancy study:** On the left hand dorsal surface, draw a 1-square-centimeter mark. It took time to apply the powder to the designated area. At regular intervals upto 24 hours, irritation, erythema, and edoema were assessed and reported, if any. No irritation to skin.
- **Removal:** By washing the area where the powder had been applied with tap water, the powder' ease of removal was evaluated. ease removal of powder after water wash.
- **Spreadability:**Asufficientamountofsampleisdividedbetweentwoglassslides,andth e slides are then subjected to a 100g weight for five minutes
- **Determination of pH**: Ona typical digital pH metre, the powder pH can be determined. PH:5.5.5

6. RESULTS AND DISCUSSION

- In a study we found out that beetroot was only soluble in water, hence for formulation we use water as solvent, but it causes increase in growth of microbes, therefore we use zinc sulphate and copper sulphate as an antimicrobial agent.
- For loose blush powder we use methyl paraben as preservative
- The result shows that the appearance of loose blush powder of formulation had a smooth texture.
- Loose powder both are homogeneous with no signs of phase separation .All formulations were pink in colour due to presence of beetroot powder in them.
- .As for the loose powder there is no change in colour.
- At low temperature, the formulation shows the stability in colour as temperature increase the colour of formulation change, hence it could be concluded that the colour stability was affected by the storage temperature.
- While performing the homogeneity test we found out that the loose powder were homogeneous and there was no coarse particle in the preparation or in the
- Loose powder also has no coarse particles in
- While performing the evaluation parameters of loose powder ,t he result of the evaluation was that It have 0.625 bulk density and 0.714 tapped density.
- Thecarr'sindex(C.I.)ofloosepowderwas12.46whichis**good**flowability,andcarr's index of beetroot powder was found to be 12.12 which is **good** flow ability.
- Hauser ratio of beetroot powder was found to be 1.14 means it has **good** flow character, and for the loose powder hausner ratio was 1.1 means that it has good flow character.
- Angle of repose of the loose powder shows that it has **fair** flow property, as for the beetroot powder it shows that it has **good** flow property.

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- Overall results of evaluation parameter rsareas follows:

Evaluation Parameter	Beetroot Powder	Loose Blush Powder
Bulk Density	0.589	0.625
Tap Density	0.66	0.71
Carr's Index	12.12	12.46
Hauser Ratio	1.14	1.14
Angle of Repose	34.74	39.55

Table:4

7. CONCLUSION

In the study ,loose powders were formulated using different ingredients. loose blush powder (LP 12%) were formulated by using natural colorant which is beetroot powder. All dosage forms i.e. loose powder were homogeneous and could be easily applied. The colour stability of dosage form was decreased as time passed.
loose powder have no coarse particles as it was passed through sieve. Metal ion like zinc and copper shows symbiotic relationship with each other which helps the formulation to be microbes free because they were act as antimicrobial agent.
The prepared formula was evaluated which passed all evaluation parameters.

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