

Research Article

Received on: 19-06-2014
Accepted on: 19-08-2014
Published on: 15-10-2014

Corresponding Author:

Ambikar R. B.*

Department of Pharmaceutics,
Pad. Dr D Y Patil College of
Pharmacy,
D. Y. Patil Education Complex, Sec
No. 29,
Akurdi, Pune - 411 044.



*Email Id- rajashriwin@gmail.com

Formulation and Evaluation of Moisturizer Prepared from Natural Sources

Ambikar R. B.*¹, Singh C. K.¹, Powar P. V.¹, Sharma P. H.¹

ABSTRACT

Moisturizers are bland oleaginous substances that are used to replace natural skin oils, to cover tiny fissures in the skin, and to provide a soothing protective film. Moisturizers are used in various diseases like Psoriasis, Menopause and in skincare during chemotherapy. The aim of this study is to formulate moisturizer using natural sources and evaluation of in vitro moisture retention. As there are several disadvantages of chemical based moisturizer; so polymers, mineral oil, petroleum is replaced with Black sesame oil and Pure ghee as it has several benefits. Black sesame oil contains Vitamin E acts as excellent antioxidant which is useful as natural sunscreen moisturizer and Ghee has natural retinol (vitamin A) in it that helps in repairing skin. In-vitro moisture retention was compared between Black sesame oil, Pure ghee and glycerin. Both ingredients showed comparable moisture retention than the glycerin. Moisturizers are formulated using black sesame oil and pure ghee and; evaluated for various parameters. In-vitro comparison of moisture retention of natural moisturizers is done with marketed preparation and both preparations also showed moderate moisture.

Key-words: Black Sesame Oil, Pure Ghee, moisturizers and moisture retention.

Cite this article as:

Ambikar R. B., Powar P. V., Singh C. K., Sharma P. H., Formulation and Evaluation of Moisturizer Prepared from Natural Sources, Asian Journal of Pharmaceutical Technology & Innovation, 02 (08); 2014.

1. Padmashree Dr. D. Y. Patil College of Pharmacy, Akurdi, Pune-411044, India.

INTRODUCTION:

Moisturizers:

Moisturizers are bland of oleaginous substances that are applied to the skin by rubbing. They are used to replace natural skin oils, to cover tiny fissures in the skin, and to provide a soothing protective film. They may thus, slow evaporation of the skin's moisture, thereby maintaining hydration, and improving the appearance and tactile properties of dry and aging skin. Moisturizers are use for Skin care during Chemotherapy, Psoriasis, Menopause etc ^{1,2,3}

Side Effects of Chemical Based Moisturizers:

Many of today's commercial moisturizing manufacturers in their quest for increasingly inexpensive production and a long shelf life use synthetic ingredients that can damage and dry out skin, actually exacerbating skin problems.⁴

The following are common ingredients found in moisturizers. They are listed here with their side effects on the skin⁵:

1. Artificial colorings: Generally referred to on labels as "FD and C". Moisturizing products that contain artificial colorings pose harmful effects to the body. Many are suspected of causing cancer. Aside from being carcinogenic, some coal tar colored moisturizers also contains metal impurities such as lead and arsenic.

2. Petroleum (mineral oil jelly): A petroleum derivative that clogs skin from taking in oxygen and releasing toxins. The layer of petroleum jelly keep on adding over the skin. It protects the skin but also restricts the pours of the skin from letting the toxins and actual moisture out. This makes the secretion of all the toxins and unwanted substances to form a layer under the actual layer of petroleum jelly. The whole process results into several skin disorders and leads to dandruff, acne, dryness of the skin and hair and skin irritation.

3. Synthetic Fragrances: Can contain hundreds of chemicals, usually only identify themselves as "fragrance". Synthetic fragrances cause headaches, dizziness, rashes, coughing vomiting, and skin irritations. Many experts recommend the use of fragrance-free moisturizers to avoid allergies and irritation.

4. Propylene Glycol: The National Toxicology Program classifies Propylene Glycol as a skin and eye irritant, possible carcinogen and known to cause liver and kidney damage.

5. Formaldehyde: Widely used in cosmetics as a germicide, preservative and fungicide, formaldehyde is not listed as an ingredient. It's suspected as a powerful carcinogenic and mutagenic, damaging and inhibiting the repair of DNA.

6. DEA (Diethanolamine), MEA (Monoethanolamine), TEA (Triethanolamine): These three are hormone-disrupting chemicals and form cancer-causing agents. The skin easily absorbs them, and research indicates a strong link to liver and kidney cancer.

Table No. 1: There are currently several groupings of moisturizing substances that are based on their theoretical mechanism of action

Sr. No	Adverse Side Effects	Chemical Components
1.	Occlusive Folliculitis	Petrolatum; Mineral oil
2.	Sweat Retention	Miliara rubra, i.e., petrolatum and lanolin
3.	Irritation	Urea; Lactic acid; Propylene glycol; Solvents
4.	Allergic Contact Dermatitis	Fragrances; Preservatives, i.e, formaldehyde, Quaternium 15 and Imidazolidinyl urea; Lanolin; Additives, i.e., vitamin E.
5.	Photo Contact Dermatitis	Fragrances; UV filters
6.	Contact Urticaria	Preservatives, i.e., sorbic acid; Fragrances, i.e., Balsam of Peru

The solution is using an all-natural moisturizer.

So, it's better to use natural sources to make moisturizer and use natural moisturizer which have less adverse effects than the chemical based moisturizer. So, some natural sources are discussed below:

1. Black Sesame Oil ^{6,7}:

Black Sesame seed oil originates from the *Sesamum indicum* plant. The plant's seeds are pressed to obtain the yellow oil. It contains fatty acids like linoleic, palmitic, oleic and stearic acids, act as

emollients, help to moisturize the skin to keep it smooth and soft. It also contain vitamin Vit. A, Vit. D, Vit. C, Vit. E and Vit. K. It also contains mineral like zinc, magnesium, potassium etc. Black Sesame oil is almost unique in its ability to penetrate all seven layers of the skin with nutrients.

Benefits and Therapeutic Uses of Black Sesame oil:

1. Natural Sunscreen:

Vitamin E contained in Black sesame oil acts as excellent antioxidant thus it is useful as natural sunscreen lotion.

2. Moisturizes the Skin:

Black Sesame oil can act as both moisturizer and emollient for full-body skin. Besides vitamin E, Black sesame oil also contains linoleic acids, stearic acids, and palmitic acids.

3. Slowing down the skin aging:

Another excellent benefit of sesame oil for skin is that it slows down skin aging. The oil has an antioxidant called sesamol which effectively prevents the appearances of wrinkles and fine lines.

5. Helps repair damaged skin cells:

Although sesame oil is fairly thick and sticky, it is easily absorbed by the skin. Black sesame oil helps to repair damaged skin cells and improve blood circulation.

6. Reduces Antibacterial Infections:

It is totally safe to apply Black sesame oil to inflamed or wounded skin. The oil can help to prevent bacterial infections as it has anti-inflammatory properties. As the oil is extracted from Black sesame seeds, it is already an antibacterial substance. Black Sesame oil is possibly used for treating certain skin conditions such as eczema and psoriasis.

2. Pure Ghee/ Butter:

Ghee has the quality of snigda, oiliness, and unctuousness. It is smooth, lubricated and nurturing.

Health Benefits of Ghee:

The reason Ghee has the potential to work so well as a moisturizer is:

- 1) Ghee has natural retinol (vitamin A) in it that helps repair skin. Also has some Vitamin D in it too. Both of these are fat-soluble, so when the ghee gets absorbed, so does the vitamins.
- 2) Ghee from 100% organic, grass-fed cow butter is very balanced in omega fats.
- 3) Ghee is free from salicylate, amines or glutamates so it is safe for use by those who are chemical sensitive. These of course absorb into the skin and affect overall chemical load as well as aggravate tissues at the site.
- 4) It has a sweet, caramel-butter scent so it smells lovely and is not overpowering like some other oils like tea tree or neem. It does not need a carrier oil but can be used directly without diluting. Ghee is used in ayurvedic practices as a carrier oil or as a massage oil, so it's definitely been used for moisturizing purpose for a long time.
- 5) It contains triglycerides, diglycerides, monoglycerides, phospholipids, contains beta carotene 600 IU and Vitamin E which are known anti oxidants, Trace minerals, including manganese, chromium, zinc, copper and selenium (a powerful antioxidant). It also contains high levels of Conjugated Linoleic Acid (CLA).

In present study replacement of petroleum and polymer based material was done with Black Sesame oil and Pure Ghee. In-vitro Moisture retention between Black Sesame oil and Pure cow ghee was compared with Glycerine. Formulation of Moisturizer with Black sesame oil and Pure Ghee were prepared and evaluated. In-vitro Moisture retention of Marketed preparation, Black Sesame oil moisturizer and Pure Ghee moisturizer was compared.

MATERIAL AND EQUIPMENTS:

Black Sesame Oil was obtained from S.K Perfumes Workers. Pure Cow Ghee was obtained from ISO 9001 & HACCP Certified Company (Krishna). Beeswax, Borax, Methyl Paraben, Propyl Paraben, Rose Oil and Silica Gel were obtained from Research Lab Fine Chem Industries, Mumbai.

EXPERIMENTAL:

Comparison of in-vitro Moisture retention between Black Sesame oil, Pure Ghee and Glycerine.

The Black Sesame oil, Pure Ghee and Glycerine as an efficacious moisturizer was examined using an in

vitro goat skin. 4X1 centimetre pieces of hairless goat skin were rinsed, dried for 48 hours in desiccators and weighed. Pieces of skin were hydrated for 5 minutes in Distilled water. The skin samples were then patted dry. Then the black sesame oil, pure ghee and glycerine are applied on different piece of hydrated and dried skin. The skin samples were dehydrated for 12 hours in a desiccator and weighed (Product Residue %). The samples were rehydrated for 24 hours. The samples were allowed to dry. Sample weights were taken at 0 minutes (moisture pickup-%) and after 10, 20, 30 and 60 minutes (Moisture Retention 10, 20, 30 and 60-%). The samples were then rinsed for 5 minutes in distilled water, dried for 24 hours and weighed to determine skin adherence or substantivity under wash conditions (Substantivity-%).⁸

The **percent Residue values** were calculated as follows:

$$\frac{\text{Residue weight} - \text{dry skin weight}}{\text{dry skin weight}} \times 100$$

The **percent Moisture values** were calculated as follows:

$$\frac{\text{Weight of moisturized skin} - \text{residue weight}}{\text{residue weight}} \times 100$$

The **percent Substantivity values** were calculated as follows:

$$\frac{\text{Substantivity weight} - \text{dry weight}}{\text{dry weight}} \times 100$$

Formulation of Natural Moisturizers:

Procedure:

1) Black Sesame Oil Moisturizer:

Melt Bees Wax in a water bath (at 70 degree Celsius). Add Black Sesame Oil to it. In other beaker heat distilled water to about 70 degree Celsius and dissolve borax in it. Mix the aqueous phase to the oily phase with constant stirring, till a creamy emulsion is prepared. Add preservatives to it and at 40 degree Celsius add perfume in it.^{9, 10}

Table No. 2: Formulation of Black Sesame Oil Moisturizer:

Ingredients	Quantity given	Quantity taken (50gm)
Beeswax	20.0%	10 gm
Black Sesame Oil	50.0%	25 ml
Borax	0.7%	0.35 gm
Distilled Water	28.8%	14.4 ml
Perfume and Preservatives	0.5%	0.25gm

2) Pure Ghee Moisturizer:

Melt Bees Wax in a water bath (at 70 degree Celsius). Add Pure Ghee to it. In other beaker heat distilled water to about 70 degree Celsius and dissolve borax in it. Mix the aqueous phase to the oily phase with constant stirring, till a creamy emulsion is prepared. Add preservatives to it and at 40 degree Celsius add perfume in it.^{9, 10}

Table No. 3: Formulation of Pure Ghee Moisturizer:

Ingredients	Quantity given	Quantity taken (50gm)
Beeswax	20.0%	10 gm
Pure Ghee	50.0%	25 ml
Borax	0.7%	0.35 gm
Distilled Water	28.8%	14.4 ml
Perfume and Preservatives	0.5%	0.25 gm

Evaluation of Natural Moisturizer^{11, 12}:

1. Organoleptic characteristics/ Physical properties:

The physical properties of Black Sesame oil moisturizer and Pure Ghee moisturizer are evaluated like Colour, Odour, Spreadability, Texture and Consistency.

2. Viscosity:

Brookfield viscometer used to measure viscosity of moisturizer. In which Spindle No. 4 is used to determine viscosity.

3. pH measurement:

To measure the pH, 1 g of each formulation was diluted with 9 ml of distilled water and then pH was checked using pH meter. Each measurement was done thrice.

4. Grittiness:

Grittiness is generally tested by taking a small amount of moisturizer or cream on finger tip and by feeling it. If particles are felt then, the moisturizer is gritty and if there are no particles present then, the moisturizer is non-gritty in nature.

Comparison of in-vitro Moisture retention of Marketed preparation, Black Sesame oil moisturizer and Pure Ghee moisturizer:

The moisture retention of Marketed preparation, Black sesame oil moisturizer and Pure ghee moisturizer in-vitro is compared by using same procedure used for Comparison of in-vitro Moisture retention between Black Sesame oil, Pure Ghee and Glycerine and instead of oil, pure ghee and glycerine; natural moisturizers and marketed preparation are applied on skin.

RESULT AND DISCUSSION:

Comparison of in-vitro Moisture retention between Black Sesame oil, Pure Ghee and Glycerine:

Table No. 4: Comparison of in-vitro Moisture retention between Black Sesame oil, Pure Ghee and Glycerine:

Evaluation	Black Sesame Oil	Pure Ghee	Glycerine
Residue%	6.66 %	8.62%	10.29%
Moisture Pickup %	21.66%	22.41%	17.64%
Moisture Retention %			
At 30 min	11.66%	12.06%	11.76%
At 60 min	8.33%	8.62%	8.82%
At 90 min	3.33%	5.17%	7.35%
At 120 min	1.66%	1.72%	4.41%
Substantivity%	3.57%	3.77%	3.27%

n=3*

As it can be seen from the data, the Black Sesame Oil and Pure Ghee provides an comparable moisture pickup (Table No. 4). The moisture retention provided by Black Sesame Oil and Pure Ghee after 60 minutes is substantially equivalent to that provided by glycerine, i.e. 8.33%, 8.62% Vs 8.82%. The moisture retention after 120 minutes for Black Sesame oil and Pure Ghee has been relatively reduced as compared to glycerine.

Substantivity% describes ability to be retained after the skin is exposed to water and perspiration. Persistence of effect of a topically applied drug or cosmetic, determined by the degree of physical and chemical bonding to the surface; resistance to removal or inactivation by sweating, swimming, bathing, and friction, among other factors. Substantivity% of Black Sesame oil and Pure Ghee are relatively comparable 3.57%, 3.77%, 3.27% respectively.

Evaluation:

1. Organoleptic characteristics/ Physical properties: Organoleptic characteristics/ Physical properties of both Black Sesame oil and Ghee Moisturizer were found to be (Table No. 5);

Table No. 5: Organoleptic characteristics/ Physical properties of both Black Sesame oil and Ghee Moisturizer

Sr. No.	Parameter	Observation	
		Black Sesame oil Moisturizer	Ghee Moisturizer
1.	Colour	Light yellow	Light yellow
2.	Odour	Strong, slightly Bitter	Sweet buttery
3.	Spreadability	Easily spreadable	Easily spreadable
4.	Texture	Smooth	Smooth
5.	Consistency	Semi-solid	Semi-solid

2. Viscosity: The viscosity of Black Sesame Oil Moisturizer and Pure Ghee Moisturizer was found as (Table No. 6)

3. pH Measurement: The pH of the Black Sesame Oil Moisturizer and Pure Ghee Moisturizer was found to be 7.2 and 7.5.

Table No. 6: viscosity of Black Sesame Oil Moisturizer and Pure Ghee Moisturizer

	Speed (rpm)	Viscosity (Centipoise)	Torque (%)
A. Black Sesame Oil Moisturizer:			
1.	100	0.79 cp	2.1 %
2.	50	0.6 cp	0.8 %
3.	20	4.31 cp	2.3 %
4.	10	36.1 cp	8.2 %
B. Pure Ghee Moisturizer:			
1.	100	1.80 cp	4.7 %
2.	50	8.40 cp	12 %
3.	20	20.8 cp	18.1 %
4.	10	45.2 cp	19 %

n=3*

4. Grittiness: The grittiness of both Black Sesame Oil Moisturizer and Pure Ghee Moisturizer was found to be Non-gritty in nature.

Comparison of in-vitro Moisture retention of Marketed preparation, Black Sesame oil moisturizer and Pure Ghee moisturizer:

Table No. 7: Comparison of in-vitro Moisture retention of Marketed preparation, Black Sesame oil moisturizer and Pure Ghee moisturizer

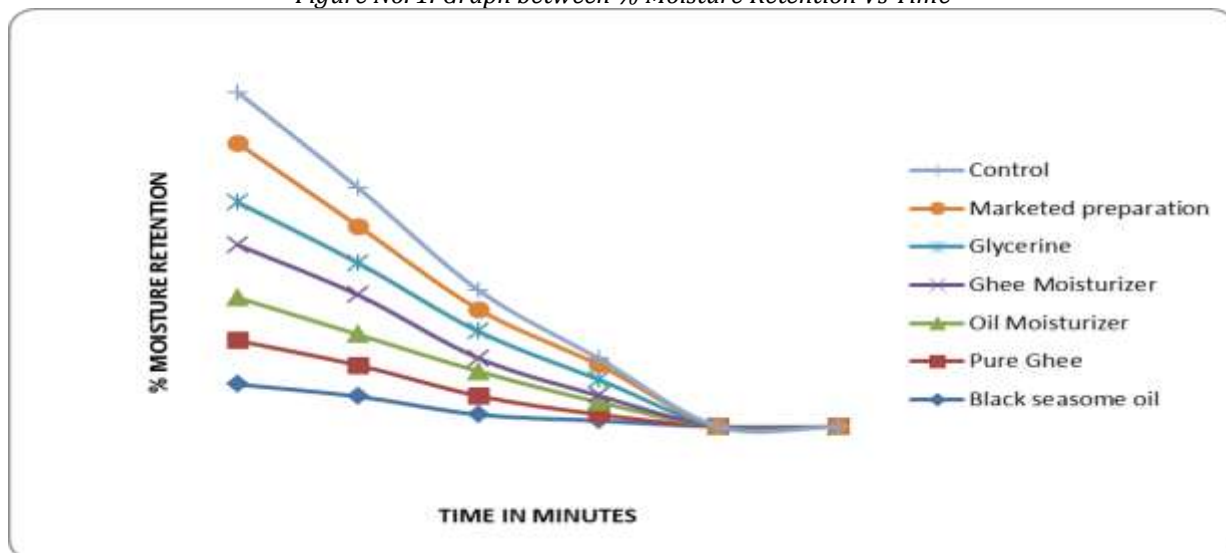
Evaluation	Black Sesame Oil Moisturizer	Ghee Moisturizer	Marketed Preparation
Residue%	8.47%	9.09%	8.16%
Moisture Pickup %	18.64%	18.18%	24.49%
Moisture Retention %			
At 30 min	11.86%	14.54%	16.32%
At 60 min	8.47%	10.90%	10.20%
At 90 min	6.78%	3.63%	6.12%
At 120 min	3.39%	1.81%	4.08%
Substantivity%	-1.85%	2%	4.44%

n=3*

At 60 min Black Sesame Oil Moisturizer, Ghee Moisturizer, Marketed Preparation showed comparable moisture retention %; 8.47%, 10.90%, 10.20% respectively (Table No. 7). Black Sesame Oil Moisturizer shows -1.85% (Substantivity%)

Substantivity% of Black Sesame Oil Moisturizer is below zero showing it's poor retention after the skin is exposed to water and perspiration. Substantivity% of Ghee Moisturizer is 2% showing moderate retention.

Figure No. 1: Graph between % Moisture Retention Vs Time



CONCLUSION:

In-vitro moisture retention was compared between Black sesame oil, Pure ghee and glycerin which shows comparable moisture retention. Moisturizers are formulated using black sesame oil and pure ghee and; evaluated for various parameter. In-vitro comparison of moisture retention of natural moisturizers is done with marketed preparation. Both formulated moisturizers showed comparable moisture retention upto 60 minutes as marketed formulation. Moisture retention of ghee moisturizer decreased after 60 minutes while black sesame oil showed comparable moisture retention till 120 minutes. % Substantivity of both preparations was relatively less than marketed preparation showing its poor retention on skin, thus unable to moisturize skin for longer time. Prepared formulations evaluated for viscosity, grittiness, pH and found satisfactory results.

REFERENCES:

1. Draelos Z. D. Modern Moisturizer Myths, Misconception and Truths; Therapeutics For The Clinician. June: 2013; 91:308-314
2. Simion F. A., Arbutyn E. S. and Draelos Z. D. Ability of moisturizer to reduce dry skin and irritation and to prevent this return; Journal Of Cosmetic Science. 2005; 56: 427-444
3. Ersser S., Maguire S., Nicol N., Penzer R. and Peters J. A Best Practice Statement For Emollient Therapy; Dermatological Nursing best Practice. 2007; 4-19
4. Lynde C. W., Moisturizers: What They Are And How They Work. <http://www.skintherapyletter.com/2001/6.13/2.html>
5. Zhai H, Maibach HI. Moisturizers in preventing irritant contact dermatitis: an overview. Contact Dermatitis. 1998. 38(5):241-4.
6. Warra, A. A; SESAME (Sesame indicum) Seed Oil Methods of Extraction and its Prospects in Cosmetic Industry; Bayero Journal of Pure and Applied Sciences. 2011; 4(2): 164 – 168
7. Vishwanath H.S., Anilakumar K.R., Harsha S.N., Khanum F., Bawa A.S. In-vitro Antioxidant activity of Sesamum indicum seeds. Asian Journal of Pharmaceutical and Clinical Research. 2012; 5(1):1-5.
8. Bruce. J. Nelson; Glycerol and Diglycerol Mixtures For Skin Moisturizing; United States Patent; May 9, 1989; Patent No. 4,829,092.
9. Nanda S., Nanda A., Khar R. K. Cosmetic Technology; Birla Publication PVT. LTD; First Edition: 2006-2007; Page No. 238-241; 260-263.
10. Neema R., Rathore Y., Dubey B.; Textbook of Cosmetics; CBS Publishers and Distributors; First Edition: 2009; Page No. 16-17; 42-59.
11. P.P Sharma; Cosmetics-Formulation, Manufacturing and Quality Control; Vandana Publication PVT. LTD; Forth Edition: 2008; Page No. 93-96; 176-177.
12. Leon Lachamnn, Herbert A. Liebermann, Joseph L. Kanig. The Theory and practice of Industrial Pharmacy, Varghese Publishing House, Mumbai. Third Edition, 2009, 545-547.
13. Namita, Nimisha. Development and Evaluation of Herbal Cosmeceutical for Skin care International Journal of Pharma and Bio Sciences. 2013; 4(2): 86 – 92
14. Kapoor S., Saraf S. Assessment of viscoelasticity and hydration effect of herbal moisturizers using bioengineering techniques. Pharmacognosy Magazine. 2010; 6(24): 298–304.
15. Kaur C. D., Saraf S. Development of Photoprotective Creams with Antioxidant Polyphenolic Herbal Extracts. Research Journal of Medicinal Plant. 2012; 6(7): 83-91.
16. Loden M., Lindberg M. The influence of a single application of different moisturizers on the skin capacitance. Acta Dermato-venereologica. 1991; 71(1): 79-82.
17. Saraf S., Sahu S., Kaur C. D. , Saraf V.; Comparative measurement of hydration effects of herbal moisturizers; Pharmacognosy Research. 2010; 2(3): 146–151.