Formulation And Evaluation of Moringa Oleifera Herbal Body Wash Gel Showing Antioxidant Activity

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Abstract—* Moringa oleifera Lam. (Moringaceae) or Moringa or miracle tree has been ulized in several forms in food and nutraceuticals. However, preparaon of the antioxidave, phenolic-rich fraction of Moringa leaves is sparsely reported as per its status as an innovative product. Aconcise and processable extract on yielding phenolic-rich fractions derived from Moringa leaves was developed. Maceration of mature Moringa leaves in 70% ethanolic water for 24 h at room temperature afforded a significant phenolic extract with anoxidant acvity (10.92 ±0.23 g GAE/100 g extract and IC50 = 50.22 ± 0.09 µg/ml) significantly greater (p < 0.05) than those resulting from other methods. The extract was applicable for topical products in terms of its physicochemical properties and compatibility, resulting in a stable water-in-silicone (W/Si) emulsion. This antioxidave, phenolic-rich Moringa emulsion can be used as a cosmeceutical product. The innovative Moringa product presented is meeting the consumers' preferences for natural/sustainable products that are continuing to increase year by year. In addition, successive integration between the agricultural crop and cosmetic industries are evidenced and significance to horticulture.

I. INTRODUCTION

Moringa oleifera Lamarck, originally from India, is widely distributed in many tropical regions; in the Pacific region (Aregheore 2002), in West Africa (Freiberger et al 1998; Lockett et al 2000), as well as Central America and the Caribbean (Ramachandran et al 1980; Foidl et al 1999).

It is a multi-purpose plant cultivated for medicinal applications and used as food and feed. Seeds of Moringa were extracted for oil and curry powder (Golh 1998) and have been used for cleaning water. In some places in Vietnam, Moringa leaves are used for food (Pham Hoang Ho 1970). Agronomic trials with Moringa (Manh et al 2003) show that the plant can grow well in hilly areas, in weathered soils of low fertility in Tinh Bien district, An Giang province. However, information about growth of Moringa in the acid soil regions of the Mekong Delta is almost absent.*In recent years, the cosmetic industry was one of the fastest growing industries in the world. Strong competition on thecosmetic market and high consumer expectations forcemanufacturers to look for innovative solutions in every aspect of the product life cycle. Until recently, cosmetic manufacturers obtained the innovative advantage of their products by incorporating new raw materials and ingredients that were less common and not used by the competition.*

Examples include substances such as hyaluronic acid, peptides, polysaccharides, exotic oils and plant extracts, and snail slime. With me, however, these raw materials became very popular in cosmetic manufacturing and the solutions became outdated. i.e innovativeness of cosmetics can also be generated through the form in which skincare and beauty products are offered. Increasingly, novel forms such as foams, jellies, creams, or essences are commercially available. In the last few years, there has been a new trend in the cosmetic market, involving the formulaon of innovative products on the basis of multifunctional ingredients. types of substances are characterized by muldireconal activity, combining biologically active properties with moisturizing effects and the ability to give cosmetics an appropriate form or improve their safety to people and the environment. .e last of the above mentioned properties are particularly sought a>er by present-day consumers. .e strong trend for "naturalness" in cosmetics has contributed to an increase in consumer awareness with regard to substances used in cosmetic production. Consumers are looking for products which—in addition to delivering the desired usually multifaceted activity—

are safe for people and the environment and are able to reduce adverse environmental Impacts on the skin (ansmog, anpolluon cosmetics). Examples of such ingredients include plant extracts that, as has been shown in many studies, can be used as multifunctional cosmetic raw materials with moisturizing, soothing, antiwrinkle, and antioxidant properties and minimizing the adverse effects of other ingredients of the cosmetic product on the skin. .e above characteristics result from the complex chemical composition of plant extracts that represent solutions of active substances derived from plants in a suitable solvent [6–13]. In the course of research in this area, much a Lenon has been focused on the Moringa tree (Moringa oleifera L.), also called the tree of life, as a source of active ingredients valuable for the cosmetic industry. Due to the presence of a broad spectrum of bioactive compounds, the plant has powerful antioxidant, antibacterial, toning, astringent, and anti-inflammatory properties [14–23]. Leaves of the Moringa tree have been found to contain flavonoids including myricetin, quercetin, kaempferol, isorhamnen, or rutin, as well as phenolic acids. Fresh leaves are a good source of carotenoids such as lutein, β-carotene, and zeaxanthin. In addition, the Moringa tree is characterized by a high content of vitamins C and A. .e active substances contained in the plant have shown to have beneficial effects on human skin and successfully replace the synthetic ingredients [20–27].

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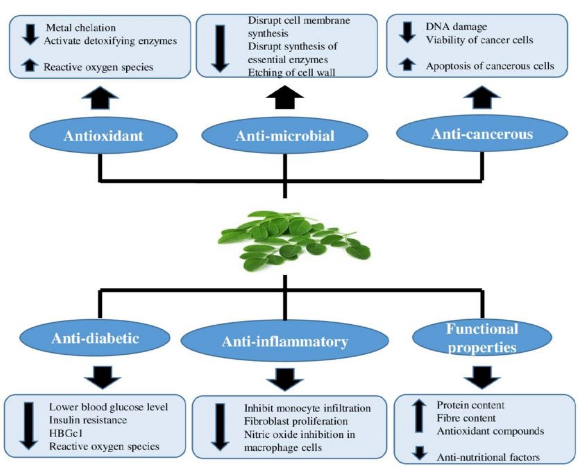

Fig 1: - Use of Moringa olifera leaves.

II. MATERIALS AND METHODS

The materials used are Moringa leaf extract, cetyl alcohol, stearic acid, lanolin, glycerol, triethanolamine, methyl paraben, lime perfume, distilled water.

Preparation of Moringa Leaf Extract: -

The extraction method used was maceration method with 90% ethanol solvent. As much as 25 grams of Moringa leaf simplicia powder was soaked in a glass container with 100 ml ofsolvent, then covered with aluminum foil, the soaking was left for 3 days while stirring occasionally. The soak was squeezed out using a croton cloth, the maserate that had been squeezed was allowed to stand and the simplicia powder drugs were soaked again with 100 ml of new solvent, then left for two days. The marinade is squeezed again and the maserate is evaporated using a cup over a saucepan over low heat.

Fig.2 Diagram of Moringa extract

III. EXPERIMENTAL WORK

Body Wash Formulation:

Body washes typically consist of the following:

Water (aqua) to 100%

Thickening Agents 0 — 4%

Primary Surfactants 8 — 20%

Opacifiers or Pearlizing Agents 0 — 2%

Secondary Surfactants 3 — 8%

Suspension Aids 0 — 1%

Fragrance (parfume) 0.4 — 2%

Chelants 0 — 0.2%

Preservatives 0.1 — 1%

Colorants q.s.
Conditioning Agents 0 — 25%
"Label-Copy" Ingredients q.s.

Fig .3 Diagram of ready Moringa Body wash gel

Body washes are compositionally very similar to shower gels and liquid soaps, and have higher surfactant loads than shampoos since hair has a much greater surface area upon which to generate foam. Primary surfactants are the ingredients that produce immediate and copious quantities of foam in body washes. The lauryl (linear C12) fatty chain length for anionic surfactants is optimal for foam generation in aqueous systems. Hence, the most commonly employed anionic surfactants are the salts of lauryl and lauryl ether sulfates, such as Ammonium Lauryl Sulfate and Sodium Laureth Sulfate. Laureth sulfates may be used to reduce the freezing point of clear body washes (so they don't become hazy until they become quite cold) and/or to reduce the irritancy of lauryl sulfates. Another way to reduce irritancy is to keep the longer chain length fatty alcohols derived from coconut oil and/or palm kernel oil (from which lauryl and laureth sulfates are typically made), while still stripping the shorter fatty alcohols, prior to sulfation. Doing so yields Sodium Coco-Sulfate, rather than Sodium Laureth Sulfate, at least on the package ingredient label! With ongoing vociferous, albeit unwarranted, attacks on sulfates (and on Sodium Lauryl Sulfate in particular), other surfactants, including alkyl glucosides, taurates, sulfosuccinates, and others, are finding wider application in body washes.

- Formula

Sr.no.	Ingredient	Quantity	Property
1.	Carbomer	1 gm	Gel forming Sub , binders
2.	Polyethylene Glycol (PEG)	1.3 gm	Polymere , Thickening agent
3.	Moringa extract	7.5 gm	Active Ingredient
4.	Water	9.5 -100 ml	Diluent
5.	Glycerine	10 ml	Active Ingredient
6.	Sodium lauryl Sulphate	1 gm	Foaming agent
7.	Propyl paraben	0.5 gm	Preservative
8.	NaOH Flakes	1 gm	Alkaliniser

- Phytochemical Screening of Moringa Leaf Extract

As much as 1 gram of Moringa leaf extract was put into a beaker glass, added 10 ml of 96% ethanol, stirred until dissolved, then filtered. Take 1 ml of the filtrate and put it in a test tube, add 10% NaOH reagent and change the color to orange or yellow if it is positive for flavonoid
compounds.

IV. EVALUATION PARAMETERS

1.Physical appearance/visual inspection:
Colour: Colour of the preparation was checked visually Fragrance: Herbal wash preparation was tested for good fragrance
Fragrance: Herbal wash preparation was tested for good fragrance
2.Determination of pH: The pH of 10% formulation in distilled water was determined at room temperature 25°C using standardized pH meter.
3.Determine percent of solids contents: A clean dry evaporating dish was weighed and added 4 grams of

formulation to the evaporating dish. The dish and formulation was weighed. The exact weight of the formulation was calculated only and put the evaporating dish with formulation was placed on the hot plate until the liquid portion was evaporated. The weight of the formulation only (solids) after drying was calculated.

4. Rheological evaluations: The viscosity of the formulations was determined by using Brook field viscometer.

5.Surface tension measurement: Measurements were carried out with a 10% formulation dilution in distilled water at room temperature. Thoroughly clean the stalagmometer using purified water.

6. Dirt dispersion: Two drops of formulation were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

7.Cleaning action: 5 grams of wool yarn were placed in grease, after that it was placed in 200 ml. of water containing 1 gram of formulation in a flask. The flask was shaked for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation.

$DP = 100(1-T/C)$

In which, DP is the percentage of detergency power,
C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

8.Foaming ability and foam stability: Cylinder shake method was used for determining foaming ability. 50 ml of the 1% formulation was put into a 500ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 5 minutes were recorded.

9. Anti- Oxidant Activity : The antioxidants are popular due to the fact as they fight against free radicals that cause oxidative stress, cell damage, and inflammation. In addition to this, Moringa contains antioxidants called flavonoids, polyphenols, and ascorbic acid in the leaves, flowers, and seeds which are beneficial in many ways. Aqueous, methanolic (70%), ethanolic extract (80%) of leaves of Moringa oleifera exhibit strong antioxidant and radical scavenging activity. This antioxidant activity of Moringa oleifera leaves is due to presence of Kaemferol. Conversion of $Fe3+$ to $Fe2+$ was measured by monitoring Prussian blue Pearl absorbance at 700 nm as part of the reducing power assay. Experiments were conducted at concentrations of 40, 80, 100, 120, 140, 160, 180 and 200 g/ml additive solution. One milliliter of each solution was given in a separate test tube Potassium fenicyanide was added in a volume equal to 2.5 ml of phosphate buffer (pH 6.6). The mixture was incubated at 50°C for 20 minutes After 20 min of incubation, 25 ml of 10% trichloroacetic acid was added and the mixture was centrifuged at 3000 rpm for 10 min. For 25 ml of supernatant, 2.5 ml of distilled water and 0.5 ml of freshly prepared 0.1% feric chloride solution were added. Absorbance at 700 mm was measured. Ascorbic acid solutions in concentrations of 5, 10, 20, 30, 40, 50, 60, 80

V. CHEMICAL PARAMETERS

a.pH : The pH of formulations has been shown to be important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. pH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling and promotes tightening of the scales, there by inducing shine. This pH also suitable for skin and it was non-irritating to the skin. Percent of Solids Contents If the formulation has too many solids it will be hard to work into the hair and too hard to wash out. The result of percent of solids contents is tabulated in table No.3. and was found between 8-10%. As a result, they were easy to wash out.

b.Viscosity : It has shown that the viscosity of all three formulations are same. The values are tabulated in table No. 3

c.Cleaning action : Cleaning action was tested on wool yarn in grease. Cleaning is the primary aim of any herbal wash preparation. Results shown that all three formulations have good cleaning ability against dirt and grease like materials.

d.FOAM ABILITY : Although foam generation has little to do with the cleansing ability of formulations, it is of paramount importance to the consumer and is therefore an important. Criterion in evaluating any herbal preparation used for cleaning purpose. All the three formulations showed similar foaming characteristics in distilled water. All three formulations showed comparable foaming properties. The foam stability of herbal formulations is listed.

e.FOAM RETENTION :

Foam retention time was checked for the different formulation and it was found to be unstable after 5 minutes

VI. RESULT

Formulated herbal wash preparations were evaluated for physical parameters like colour, fragrance and chemical parameters like pH, percent of solids contents, viscosity, surface tension, dirt dispersion, cleaning action, foaming ability and foam stability, antimicrobial activity, anti-fungal activity and results shown that all were in the accepted limits. Formulation & evaluation of moringa. oleifera. Herbal body wash gel showing antioxidant activity was found to be effective, easier to produce stable herbal wash formulation. It is having good foaming characters and anti-bacterial as well as anti-fungal activity. So it can be suitable for both skin and hair care compared to other synthetic preparations. In the present paper, an attempt was made to determine the properties and the applicability of extracts from Moringa oleifera leaves in model products. The tested extracts were characterized by a high content of phenolic compounds, flavonoids, and high antioxidant potential. In vitro toxicity studies showed that the tested extracts in concentrations up to 5% showed a positive effect on cell proliferation and metabolism. It has also been shown that the extracts may contribute to the reduction of oxidative stress in cells. It was noted that the tested model formu- lation of cosmetic (1% SCS) with the addition of different types of extracts in various concentrations does not negatively affect cell metabolism. Analyses defining the ROS level showed that model cosmetic formulation (1% SCS) with the presence of tested extracts does not cause an increase in the formation of intracellular reactive forms of oxygen. To summarize, the results of the research con- ducted show that application of extracts from the Moringa oleifera leaves to the model cosmetic formulation might contribute to the reduction of skin irritation and improve the safety of the product.

CONCLUSION

It is concluded that the above method for formulation and evaluation of moringa oleifera is appropriate and the body wash gel having proper consistency and showing antioxidant activity.

REFERENCES

[1] J. Falbe, Surfactants in Consumer Products: _Theory Technology and Application, Springer Science & Business Media, Berlin, Germany, 2012.

[2] A. O. Barel, M. Paye, and H. I. Maibach, Handbook of Cosmetic Science and Technology, Taylor & Francis Group, Boca Raton, FL, USA, 4th edition, 2014.

[3] M. S. Showell, Handbook of Detergents. Part D: Formulations, Taylor & Francis Group, Boca Raton, FL, USA, 2006.

[4] L. Rhein and M. Schlossman, Surfactants in Personal Care Products and Decorative Cosmetics, Taylor & Francis Group, Boca Raton, FL, USA, 3rd edition, 2006.

[5] G. Broze, Handbook of Detergents. Part A: Properes, Taylor & Francis Group, Boca Raton, FL, USA, 1999.

[6] T. Wasilewski, J. Arct, K. Pytkowska, A. Bocho-Janiszewska, M. Krajewski, and T. Bujak, "Technological and physicochemical aspects of the production of cleaning cosmetic concentrates," Przemysl Chemiczny, vol. 94, no. 5, pp. 741– 747, 2015.

[7] A. Seweryn, T. Wasilewski, and T. Bujak, "Effect of salt on the manufacturing and properties of hand dishwashing liquids in the coacervate form," Industrial & Engineering Chemistry Research, vol. 55, no. 4, pp. 1134–1141, 2016.

[8] T. Wasilewski, A. Seweryn, and T. Bujak, "Supercritical carbon dioxide blackcurrant seed extract as an anti-irritant addive for hand dishwashing liquids," Green Chemistry Le.ers and Reviews, vol. 9, no. 2, pp. 114–121, 2016.

[9] T. Wasilewski and T. Bujak, "Effect of the type of nonionic surfactant on the manufacture and properties of hand dishwashing liquids in the

coacervate form," Industrial & 12 Dermatology Research and Practice Engineering Chemistry Research, vol. 53, no. 34, pp. 13356– 13361, 2014.

[10] T. Bujak, Z. Nizioł-Łukaszewska, and T. Wasilewski, "Effect of molecular weight of polymers on the properes of delicate facial foams," Tenside Surfactants Detergents, vol. 55, no. 2, pp. 96–102, 2018.

[11] Z. Nizioł-Łukaszewska and T. Bujak, "Saponins as natural raw materials for increasing the safety of bodywash cosmetic use," Journal of Surfactants and Detergents, vol. 21, no. 6, pp. 767–776, 2018.

[12] T. Bujak, T. Wasilewski, and Z. Nizioł-Łukaszewska, "Role of macromolecules in the safety of use of body wash cosmetics," Colloids and Surfaces B: Biointerfaces, vol. 135, pp. 947–503, 2015.

[13] Z. Nizioł-Łukaszewska, P. Osika, T. Wasilewski, and T. Bujak, "Hydrophilic dogwood extracts as materials for reducing the skin irritation potential of body wash cosmetics," Molecules, vol. 22, no. 2, p. 320, 2017.

[14] F. Anwar, S. Laf, M. Ashraf, and A. H. Gilani, "Moringa oleifera: a food plant with multiple medicinal uses," Phytotherapy Research, vol. 21, no. 1, pp. 17–25, 2007.

[15] A. Leone, A. Spada, A. BaLezza, A. Schiraldi, J. Arisl, and S. Bertoli, "Cultivation, genetic, ethnopharmacology, phytochemistry and pharmacology of Moringa oleifera leaves: an overview," Internaonal Journal of Molecular Sciences, vol. 16, no. 12, pp. 12791–12835, 2015.

[16] A. F. A. Razis, M. D. Ibrahim, and S. B. Kntayya, "Health benefits of Moringa oleifera," Asian Pacific Journal of Cancer Prevention, vol. 15, no. 20, pp. 8571–8576, 2014.

[17] G. Mishra, P. Singh, and R. Verma, "Tradional uses, phytochemistry and pharmacological properes of Moringa oleifera plant: an overview," Der Pharmacia Le.re, vol. 3, no. 2, pp. 141–164, 2011.

[18] M. Zhang, N. S. Heearachchy, and R. Hora, "Phytochemicals, anoxidant and anmicrobial activity of Hibiscus sabdara, Centella asiac, Moringa oleifera and Murraya koenigii leaves," Journal of Medicinal Plants Research, vol. 5, no. 30, pp. 6672–6680, 2011.

[19] H. P. S. Makkar and K. Becker, "Nutrional value and annutrional components of whole and ethanol extracted Moringa oleifera leaves," Animal Feed Science and Technology, vol. 63, no. 1-4, pp. 211–228, 1996.

[20] F. AL Juhaimi, K. Ghafoor, I. A. M. Ahmed, E. E. Babiker, and M. M. ¨ Ozcan, "Comparave study of mineral and oxidave status of Sonchus oleraceus, Moringa oleifera and Moringa peregrina leaves," Journal of Food Measurement and Characterization, vol. 11, no. 4, pp. 1745–1751, 2017.

[21] F. Y. Al Juhaimi, E. E. Babiker, K. Ghafoor, and M. M. ¨ Ozcan, "FaLy acid composition of three different Moringa leave oils," Rivista Italiana Delle Sostanze Grasse, vol. 93, no. 2, pp. 111–113, 2016.

[22] F. Y. Al Juhaimi, K. Ghafoor, E. E. Babiker, B. MaLhaus, and M. M. ¨ Ozcan, ".e biochemical composition of the leaves and seeds meals of Moringa species as non-conventional sources of nutrients," Journal of Food Biochemistry, vol. 41, no. 1, Arcle ID e12322, 2016.

[23] M. M. ¨ Ozcan, "Moringa spp: composion and bioactive properties," South African Journal of Botany, vol. 129, pp. 25–31, 2020.

[24] R. K. Saini, N. P. SheLy, M. Prakash, and P. Giridhar, "Effect of dehydraon methods on retenon of carotenoids, tocopherols, ascorbic acid and antioxidant activity in Moringa oleifera leaves and preparation of a RTE product," Journal of Food Science and Technology, vol. 51, no. 9, pp. 2176–2182, 2014.

[25] B. Sultana and F. Anwar, "Flavonols (kaempeferol, quercen, myricen) contents of selected fruits, vegetables and medicinal plants," Food Chemistry, vol. 108, no. 3, pp. 879–884, 2008.

[26] M. Bajpai, A. Pande, S. K. Tewari, and D. Prakash, "Phenolic contents and anoxidant acvity of some food and medicinal plants," International Journal of Food Sciences and Nutrition, vol. 56, no. 4, pp. 287–291, 2005.

[27] L. Gopalakrishnan, K. Doriya, and D. S. Kumar, “Moringa oleifera: a review on nutritive importance and its medicinal application,” Food Science and Human Wellness, vol. 5, no. 2, pp. 49–56, 2016.

[28] V. L. Singleton, R. Orthofer, and R. M. Lamuela-Ravent´os, “[14] Analysis of total phenols and other oxidation substrates and antioxidants by means of folin-ciocalteu reagent,” Oxidants and Antioxidants Part A, vol. 299, pp. 152–178, 1999.

[29] J. S. Matejic, A. M. Dzamic, T. Mihajilov-Krstev, V. Randjelovic, Z. D. Krivosej, and P. D. Marin, “Total phenolic content, flavonoid concentration, antioxidant and antimicrobial activity of extracts from three Seseli L. taxa,” Central European Journal of Biology, vol. 7, no. 6, pp. 1116– 1122, 2012.