World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Published by Atom and Cell Publishers
Available online at: http://www.wjpsonline.org/
Original Article

Evaluation of Babassu oil as skin moisturizer

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Received: 27-03-2014 / Revised: 01-05-2014 / Accepted: 19-05-2014

ABSTRACT

Moisturizers are among the most commonly used cosmetic product in everyday life. The characteristics of an ideal moisturizer are: hydrating the stratum coneum and decrease trans-epidermal water loss thus increases in smoothness and softness of skin. This helps for the restoration of the lipid barrier and enhances the skin's natural moisture retention mechanism. The natural ingredients are added to product to enhance the moisturizing activity of the cosmetic products as they are considered to be safe and popular too. In present study babassu oil (BBO) obtained from kernels of hard-shelled nuts of Orbingyaoleifera tree found in Brazil is used to formulate emulsions. Physical and chemical properties of babassu oil were evaluated like acid value, saponification value, iodine value, peroxide value etc. The emulsions were prepared with 2%,3%,4%,7% and 10% concentrations by weight of BBO. The stability parameters were assessed for shelf-life prediction of the formulations. Further instrumental analysis of the above emulsions was carried out by applying on the subjects and evaluating by Corneometer; comparing moisturizing property of various emulsions to placebo. Average and standard deviation of this set of data, (Av ± SD) was used to conclude the moisturizing activity of BBO in stipulated time.

Keywords: Moisturizer, Babassu oil, Emulsions, Corneometer

INTRODUCTION

Cosmetic science has a long history of discovery and innovation. Natural and bio-based ingredients are being obtained via extraction from vegetables for actives. These raw materials improve the product's feel and consequently, the well being of consumer while respecting both, biodiversity and sustainable development [1]. Skin is the largest organ of the body. It is not simply a protective wrap for the body; it is a busy frontier which mediates between the organism and the environment. The total area of the skin is about 25000 cm^2 in the adult and it proportionately weighs about 4.8 kg in men and 3.2 kg in women. It contains glands, hairs and nails. The skin is organized in three layers epidermis, dermis and subcutis. It contains several small organs of varying density depending on the location like hairs, sebaceous glands, eccrine glands, appocrine glands and neurosensory organs. The epidermis is non vascularised organ that continuously renew itself from the basal layer towards the horny layer. It harbors different cell types, keratinocytes, melanocytes, langerhans and merkel cells [2].

The aging of dermis is accelerated by UV radiations, particularly the deep penetrating UV-A rays. Physical or chemical changes lead to dry skin, redness, irritation and scaling characteristics of skin is a result of impaired skin barrier. Structured lipid/water bilayer system forms a barrier towards evaporation of water from within the skin and protects the viable epidermis from penetration of exogenous irritants [3]. "Moisturization" encompasses a wide range of biophysical changes in the uppermost layer of the skin, the stratum corneum. Kligman defines a moisturizer in operational terms as a topically applied substance or product that overcomes the sign and symptoms of dry skin [4]. Moisturizers contain emollients, together with the humectants (that increase the water content and attract water to the epidermis), and the occlusives (decreasing the evaporation of water from the skin surface) are considered as the three key structural components of moisturizers. The main characteristics of an ideal moisturizer are hydration of stratum corneum and decreases transepidermal water loss (TEWL), smoothens and softens skin (acts as an emollient), helps for the restoration of the lipid barrier and enhances the

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skin's natural moisture retention mechanism. Moisturizer should be cosmetically elegant and acceptable, rapid absorption providing immediate hydration and assuring long lasting effect, dermatologically hypoallergic, non-sensitizing and non-comedogenic [**5].** The most valuable approach for moisturization of skin is to restore the Natural Moisturizing factor (NMF) on our skin surface. The main component of the mixture of molecules that forms a matrix on skin is lactic acid, urea, various salts and amino acids derived from degradation of the protein fillagrin in the lower region of the stratum corneum. The major constituent apart from amino acids are sodium lactate, urea, pyrollidone carboxylic acid (PCA**)** [6].

The present study is humble approach towards formulating a moisturizer from babassu oil; obtained from nut Attalea speciosa, botanical name is Orbingyaoleifera which is native of Brazil. As the composition of babassu oil is a mixture of vitamins, acids, antioxidants, contains 72% lipids vitamin E is a highly nourishing nutrient of the oil and rich in antioxidants and anti-inflamatory properties. It contains fatty acids namely myristic acid 20%, oleic acid10% , lauric acid 50%, stearic acid 3.5%, palmitic acid 11% also contains plant sterols and phytosterols that magically restore skin cells [7]. The evaluation of formulation was carried out for assessing efficacy and shelf life of the product. The hydration of epidermis was assessed using the Corneometer which measures the electrical capacitance of the skin surface expressed in arbitrary units (A.U.) values displayed digitally.

MATERIALS AND METHODS

Evaluation of Babassu oil: The BBO was evaluated by determining Saponification value, Peroxide value and Acid value [8].

Formulation of suitable base and incorporation of Babassu oil: The base formulation was prepared by trial-and-error method to get the required characteristics in emulsion [9]. The ingredients that were used to prepare base are stearic acid (triple pressed Cosmetic grade)-8%, cetyl alcohol (Merck)1%, mineral oil (Merck) 5%, triethanolamine (Merck) 1% water to 100 % propyl paraben (Himedia) 0.15% and methyl paraben (Himedia) 0 .15%. The base was kept as placebo and then six emulsions were prepared by adding 2,3,4,5,7 and 10 % by weight of BBO. All the ingredients were weighed. Both the phases were heated from 75°C – 80°C.When the desired temperature was reached, both the phases were mixed subsequently for emulsification. Finally, the product was homogenized.

Stability assessment of prepared emulsion: The prediction of the life of the product may be made by accelerating the decomposition process and extrapolating the results to normal storage conditions [10]. The samples of the emulsion were subjected to accelerated test condition and were kept at room temperature (27±2ºC), in oven at (50±2ºC) and in refrigerator at (4±2ºC). Changes in parameters like odour, colour, pH, particle size or separation, if any, were observed at specific intervals of time and noted down as shown in graph number 1,2,3.

Evaluation of product as per Bureau of Indian Standards: The emulsions with different concentrations of BBO were evaluated according to Bureau of Indian standard [11].

Evaluation of moisturizing property of Babassu oil using Corneometer: The probe of Corneometer helps to determine the capacitence on the surface of skin before and after emulsion application. The emulsions were applied on the fore arms of human subjects and placed the probe vertically without moving. A spring inside the probe head provides constant pressure on the skin. The measurement is repeated on the neighbouring site or taken on the same site after a gap of five minutes so that the water does not accumulate under probe head.

RESULTS AND DISCUSSION

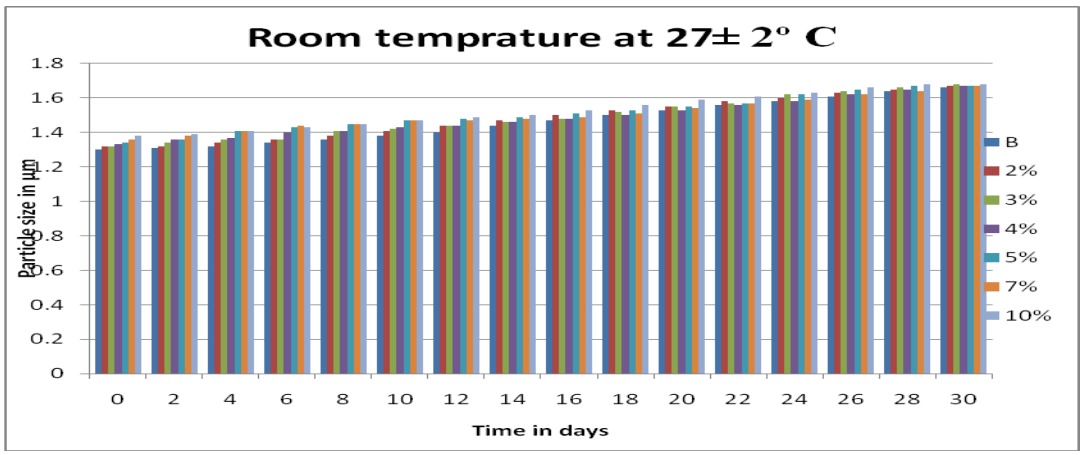
During evaluation of BBO the saponification value 246.84, acid value 0 .71, iodine value 14.253 and peroxide value 0.72 was observed. BBO was taken for formulation having saponification value 245-256, acid value maximum 1, iodine value 13-18, and peroxide value 1.0 miliequivalent /kg [12]. The base was formulated with stearic acid which is a fatty acid that melts at body temperature and provides an occlusive layer on skin. Cetyl alcohol is again a fatty acid that gives body to emulsion to improve viscosity of emulsion. Mineral oil forms white emulsion and softens skin. Triethanolamine is an alkaline emulsifier for the all the fatty acids. Propyl paraben and methyl paraben are preservatives to protect the emulsion by attack of fungus [13]. The observation made for changes in particle size, pH, colour in emulsions by accelerated test methods are shown in graph number 1-6. All the samples of emulsions at room temperature, fridge temperature remained stable but the samples at oven temperature show major increase in pH and particle size. The pH is the indicative of the chemical reactions taking place within the product it also provides information about the quality of the product or raw materials and about efficacy of the product. The rate of degradation of the emulsion kept at oven

temperature was noticed but it was very slow, and hence the product was considered to be stable during the study period [14]. Average particle size or the size distributions of the particle are important parameters for the evaluation of the emulsions. The change in the particle size affect the viscosity of the product directly and ultimately affects the stability of the product. During the accelerated analysis there was slight increase in the particle size but not showing any sign of conspicuous separation of oil phase hence emulsions were considered to be stable [15]. Further instrumental analysis of the above emulsions when carried out by applying on the subjects and evaluating them with the instrument: Corneometer to check moisturizing and emollient properties of emulsions. Initially at, 0hr, during Corneometer readings emulsions with 2% and 3% and 10% active showed increase in moisturization but with increase in time period, their moisturizing effect decreased, in comparison to emulsions with 4%,5%, 7% of active. So, further comparison of emulsions with 4%, 5% and 7% of active was made to determine which emulsion will give the best result. The calculation was made after obtaining corneometer readings of 9 days conducted at alternate days. The average of, readings of 5 subjects, done at specific time interval (minutes), for blank (emulsion without BBO), 4%, 5% & 7% for 1st day were calculated. Same procedure was followed for calculating average for rest of days. Then, with these averages, so obtained, standard deviations for each of them were also calculated. The results obtained, were graphically plotted and analyzed. It was found that, after the application of these samples the capacitance increased, means up to 120mins it will give better moisturizing effect with 7% active showed the best result. The averages of the corneometer readings of five subjects at specific time intervals (mins) for nine days for blank, 4%, 5% and 7% helped us to calculate standard deviations that showed variability between moisturizing activity of creams with time. For different concentrations, 9 days (study period) and of 5 subjects with different skin types. Standard deviation is a measure of spread, about the mean. Average and standard deviation of this set of data, written together (Av ± SD) explains the magnitude of efficacy of the product. The thinning and thickening of line between time intervals for different concentrations indicates moisturizing activity of emulsions which vary with time and concentration of active. Up to 120 minutes, emulsions showed increase with respect to their concentrations of active and by 150 minutes, the activity decreased and normalized. This varied for different subjects and different concentrations of active.

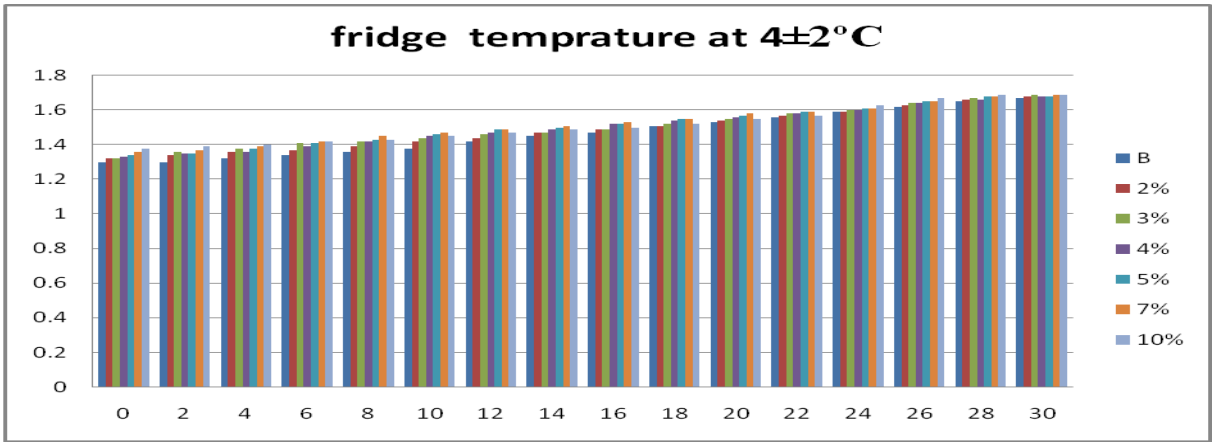
CONCLUSION

Skin forms the largest organ of the body and acts as a barrier between the outside world and the controlled environment within the body. Unbalanced diet, busy schedule, environment conditions, pollution may result in the problematic skin conditions. Dry, rough, irritated, and unhealthy skin is the common results of these conditions. To treat these conditions generally cosmetic products like moisturizers are used. Various natural ingredients are used in the cosmetic world for the reason they are safe to use. The present study, where emulsions were prepared by using different concentrations of Babassu oil, to evaluate, which concentration is most effective, stable and provided the best moisturizing and emollient properties. From all studies, on BBO emulsions, it was concluded that, all the emulsions were stable during study period and emulsion containing 7% BBO was found to be the most effective that provided necessary moisturizing and emollient properties to the rough skin caused by weather and environmental conditions in comparison to other oil concentrations under study.

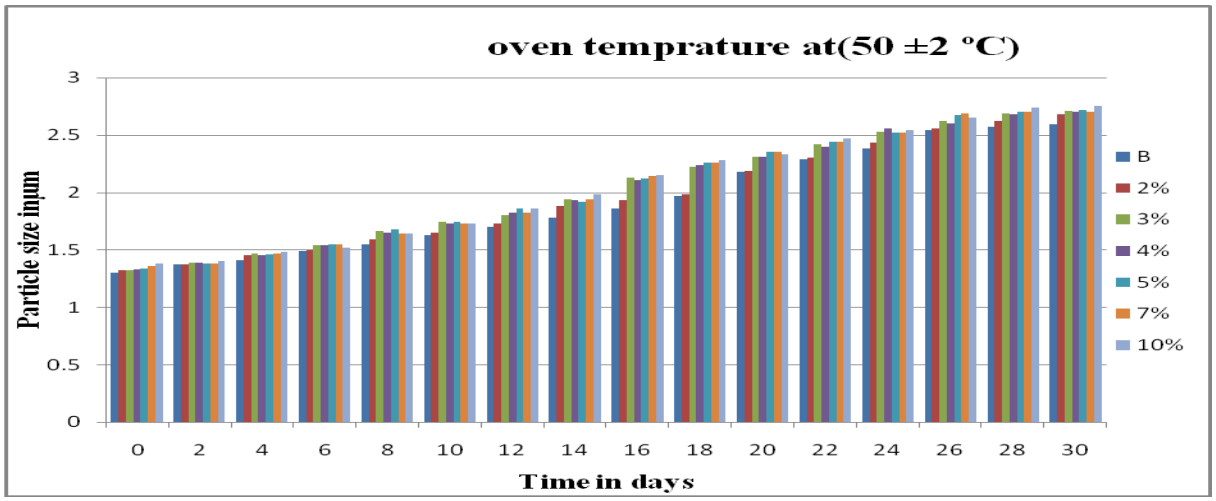
Graph no.1: Change in particle change of emulsions at room temprature



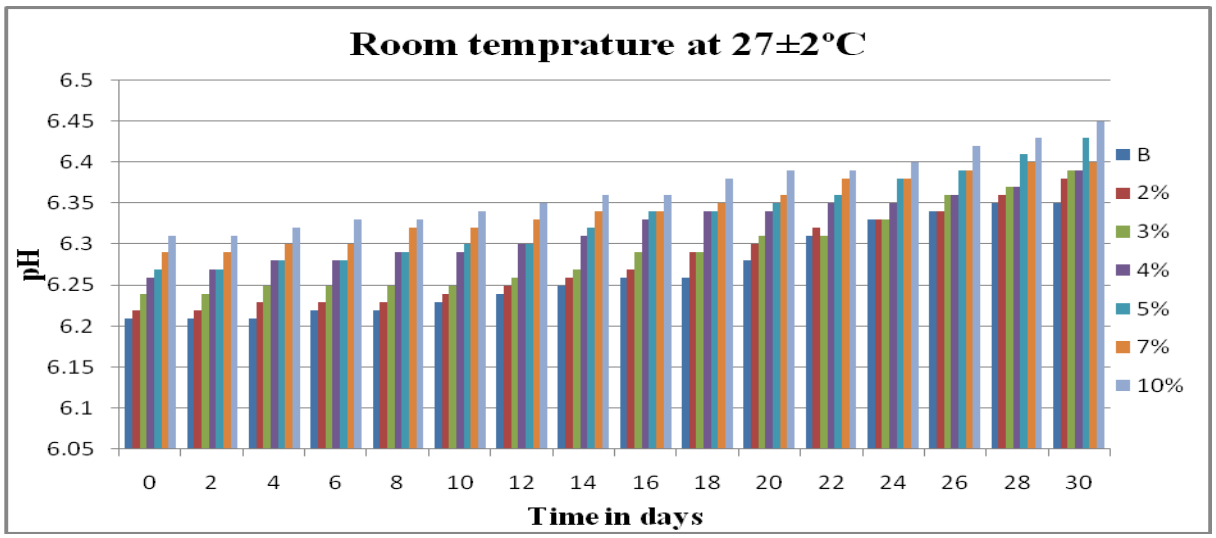
Graph no. 2: Particle size changes of emulsion



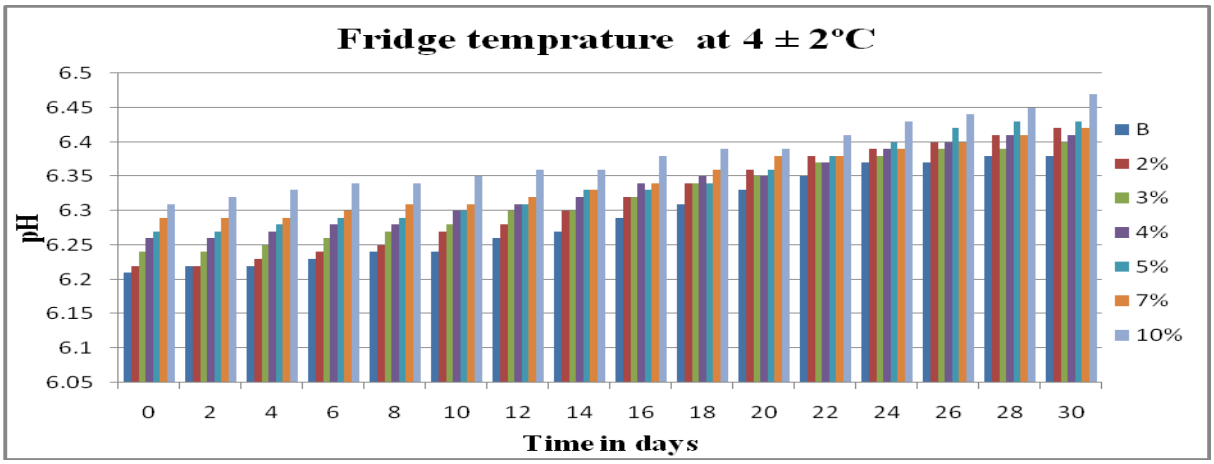
Graph no.3: particle size changes in emulsion sample kept in oven



Graph no. 4: pH change of Emulsion Sample at Room Temperature



Graph no. 5: pH change of Emulsion Sample at Fridge Temperature



Graph no. 6: pH change of Emulsion Sample at Oven Temperature

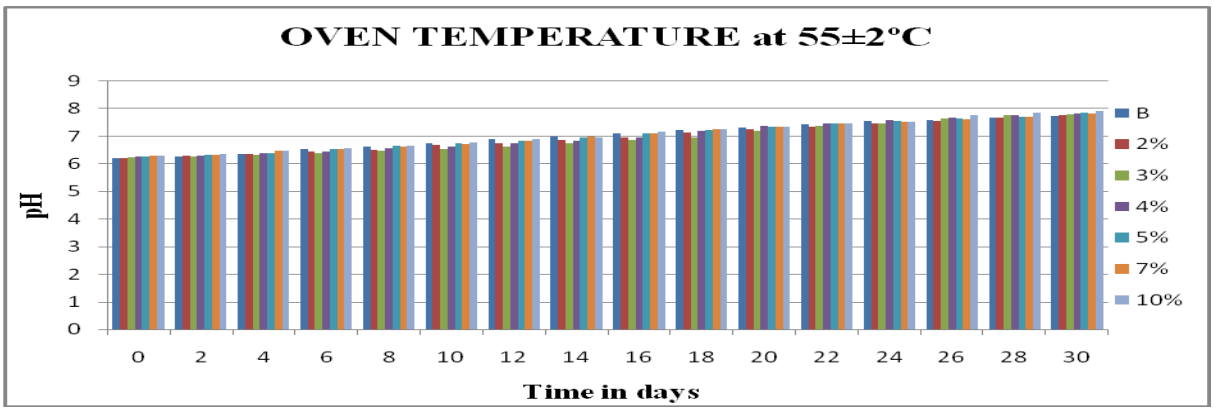
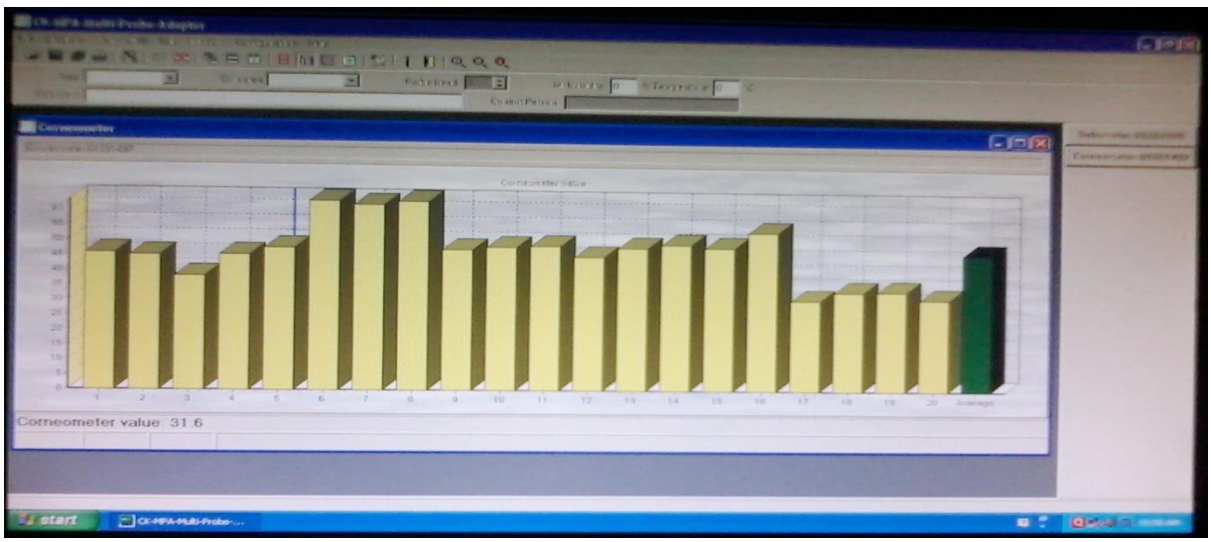


Figure no1: Image of a Corneometer reading of a sample on computer monitor



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