

Moisturizing and Cosmetic Properties Of Emu Oil

A Double Blind Study

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Summary

Cosmetic and moisturizing properties of emu oil were assessed in a double blind clinical study. Emu oil in comparison to mineral oil was found overall to be more cosmetically acceptable (p less than 0.05). Furthermore, it appears that emu oil in comparison to mineral oil has better moisturizing properties, superior texture, and lower incidence of comedogenicity, but probably because of the small sample size these differences, were not found to be statistically significant (p less than 0.05). Neither of the oils were found to be irritating to the skin. Finally, emu oil fatty acid composition was studied by gas chromatography and was found to have high concentration of nonpolar monounsaturated fatty acids which may explain emu oil's ability to penetrate easily through the stratum corneum barrier.

Introduction

The emu, a large flightless bird, *Dromaius novaehollandiae*, is probably best known for being on Australia's coat of arms opposite the kangaroo. In the past few years commercial emu breeding has become a multi-million dollar industry in the United States, Australia, and other countries. Emu oil derived from emu fat was being used by the Aborigines for healing and pain control long before British ships landed on the eastern shores of Australia.

A number of Australian investigators (George Hobday, M.D., a dermatologist and Peter Ghosh, Ph.D., FRSC at the University of Sydney) claimed that emu oil has anti-inflammatory and skin penetrating properties. Recently the Australian Department of health classified emu oil as a pharmaceutical product¹ and registered emu oil in the Therapeutic Goods Registry². Finally an official Australian government publication stated "the oil (emu) will find uses in the pharmaceutical and cosmetic industries". We performed an extensive literature search (Medline, Index Medicus) and could not find a single report in scientific peer reviewed literature dealing with either emu oil and its cosmetic pharmaceutical properties of its composition¹. A pilot double blind study was conducted to assess cosmetic properties of emu oil – namely its moisturizing and skin penetrating properties, texture and odor, and irritancy and comedogenicity potential. The emu oil was compared in this study to mineral oil, a synthetic oil that is widely used in the United States as an emulsifier and lubricant in topical cosmetic and pharmaceutical preparations.

Methods

Human Subjects

11 subject were recruited and completed the study (9 women and 2 men). Mean age was 35

years (age range 25-52), 10 subjects were white Caucasian and one subject was Hispanic. All had Fitzpatrick skin type 2 or 3 based in history of response to UV radiation. All had healthy skin and people with eczema and acne were specifically excluded from this study. Since both emu and mineral oil can be purchased in the United States over the counter, no human subject research permit was required or issued by the Texas Tech Human Subject Institutional Review Board.

Oil:

Emu oil for clinical study was imported from Australia (Emu Vertica, Thalgo Holdings Pty. Ltd.). Both Australian emu and mineral oil were placed in dark, numbered bottles by a pharmacist (Caprock Drugs, Lubbock, TX). Neither human subjects or principal investigator knew which oil each subject was using at what particular time. The code was not broken until all volunteers completed the study and returned the questionnaire to the principal investigators.

Oil Composition:

Fatty acid analysis by gas chromatograph was performed by Dr. Margaret Craig-Schmidt's laboratory of Auburn University and the results were reported in the AEA News September, 1994.

Protocol:

Prior to entering the study each subject was examined by a university based dermatologist to make sure that none of the volunteers had eczema or acne. The volunteers were instructed to use the first oil on their face and trunk twice a day for 2 weeks. The human subjects were told to discontinue use of any other lubricants. After 2 weeks of oil use the human subjects were briefly examined by the principal investigator for signs of skin irritation or acne and at that time were given a second oil. The pharmacist made sure that each subject received both emu oil and mineral oil. At the end of the study each subject completed the questionnaire and ranked on a 0 to 5 scale (5 excellent; 0 poor) how much they liked each oil. There were also asked to rank its penetration/permeability, moisturizing properties, texture, and any side effects (comedogenicity, odor, irritancy, etc.)

Statistical Analysis:

The data generated was in a created ranking scale format [0 (poor); 5 (excellent)] and was analyzed by a biostatistician utilizing the Wilcoxon Signed ranking test.

Results

As shown in Table I, the emu oil overall ranking and permeability was found to be clearly superior to mineral oil. These differences in skin penetration/permeability and overall ranking were statistically significant (p less than 0.05). It also appears that emu oil texture and moisturizing properties as judged by the participants in the study were also superior to mineral oil, but the differences cannot be considered statistically significant (p greater than 0.05). The sample size was small ($n=11$) and it is very possible that if more people participated in the study the clear cut statistical differences in the oils texture and moisturizing properties would have been found.

When the participants in this study were asked which of the two oils they liked better, all 11 subjects (100%) stated that they liked emu oil better (Table II). Neither emu oil or mineral oil was found to be irritating to the skin (0%, Table II). Finally, when the oils were applied to the face, 6 people (55%) and 2 people (18%) reported the mineral and emu oil respectively caused “pimples”, (Table II).

Discussion

This pilot, a double blind crossover study, clearly indicated that emu oil may become widely used in cosmetic and pharmaceutical industries. We found emu oil to be totally non-irritating, having excellent moisturizing properties, cosmetically pleasing texture, and low incidence of comedogenicity. The most intriguing properties of emu oil as far as cosmetic and pharmaceutical industries are concerned is its apparent ability to penetrate the stratum corneum barrier. The study of penetration of various substances through the skin is an area of an active research and is obviously important from the therapeutical and toxicological viewpoints. Iontophoresis³, and liposome preparations^{4,5} are actively studied as a means to increase cutaneous bioavailability. Since most topical vehicles have an absorption rate of only a few percent⁶ the drugs and other active ingredients combine with more efficient drug carrier systems are of major interest to cosmetic and pharmaceutical industries. As a matter of fact, liposome preparations containing the anti-fungal agent econazole (econazole 1%; pearly; cilag; Schaffhausen, Switzerland) and cosmetics with liposene base are now available in the United States and Western Europe^{4,5}.

Unfortunately, because of high cost and other technical problems neither liposome or iontophoresis are now widely used in either cosmetic or dermatological topical preparations^{3,4}. If indeed, as we report in this paper, emu oil has superb skin penetrating properties, as judged subjectively by participants in this study, and because of relatively low cost, emu oil should be of major interest to dermatologists and cosmetic scientists as a transcutaneous carrier system. It would not be unreasonable to try to combine emu oil with topical antifungals, steroids, retinoids, antihistamines, anesthetics, antiangiogen, and immunosuppressive drugs to see if emu oil improves cutaneous bioavailability.

Even prior to completion of this study a number of investigators became aware of apparent penetrating properties emu oil. As was noted in the methods section of this article, the composition of emu oil was studied by Dr. Craig-Schmidt utilizing gas chromatography. The findings were that emu oil is predominately composed of short chain monounsaturated fatty acids allowing it to easily penetrate the stratum corneum. Another investigator utilizing thin layer chromatography (TLC) found that emu oil is essentially free of phospholipids thus enabling it to penetrate readily through skin (Allen Strickland, personal communication).

We believe that this apparently first scientifically conducted study addressing cosmetic and pharmaceutical properties of emu oil is very promising. We are in the process of organizing in the United States a much larger multicenter similar double blind study to confirm our findings. Furthermore, Dr. Craig-Schmidt's research group is in the process of conducting in-vitro transmembraneous skin penetration studies with emu oil to determine its transcutaneous permeability. We hope that this and the future study with emu oil to determine its transcutaneous permeability. We hope that this and the future study mentioned above will fully assess the cosmetic, moisturizing, and pharmaceutical properties of emu oil.