Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

SYSTEMATIC ANALYSIS OF EMU OIL

[1] Rayi Ratna Manjula *,[2]Uppuluri Spandana*,[3]kattupalli sowjanya*, [4]sabbarapu Sharon Namitha,[5] Syed Salma

Nirmala college of pharmacy

Corresponding mail id: sharon.namita@gmail.com

ABSTRACT

Emu scientifically known as Dromaius novaehollandiae is the second largest living flightless bird of world belonging to order Ratite. Emu, the flightless bird native to Australia and found in many countries, is receiving much attention for its nutritional benefits as well as its medicinal value [1]. Emu's are nurtured in many parts of the world for their meat, oil, skin and feathers, which are of high economic value.The anatomical and physiological features of these birds appear to be suitable for temperate and tropical climatic conditions [2].

Emu oil is semi solid white mass, which is generally located all along back of bird, but when it is processed and refined it is a clear liquid [3]. It has high levels of polyunsaturated fatty acids and antioxidants in it. It also has a hypocholesterolaemia effect, transdermal penetration enhancing activity, cosmetic and insect repellent activity, and so on [1]. Emu oil will have a high permeability when applied to human skin due to its fatty acid content. It is also being used to treat various conditions including arthritis, skin treatments, burn injuries, hair loss, etc. It act as wound healing agent, reduces recent keloid scarring and excellent emulsifier [3].

INTRODUCTION

Emu is the second largest living flightless bird of world. These birds are scientifically known as Dromaius novaehollandiae, which belong to the world belonging to order Ratite. The other scientific information about this bird includes

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Struthioniformes
Family	Casuariidae
Genus	Dromaius
Species	D. novaehollandiae
Binomial name	Dromaius novaehollandiae(Latham, 1790)

Emu is widely distributed throughout the Australian continent. These are reared commercially in many parts of the world for their meat, oil, skin, and feathers, which are of high economic value. The anatomical and physiological features of these birds appear to be suitable for temperate and tropical climatic conditions. [2]

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Figure [41]

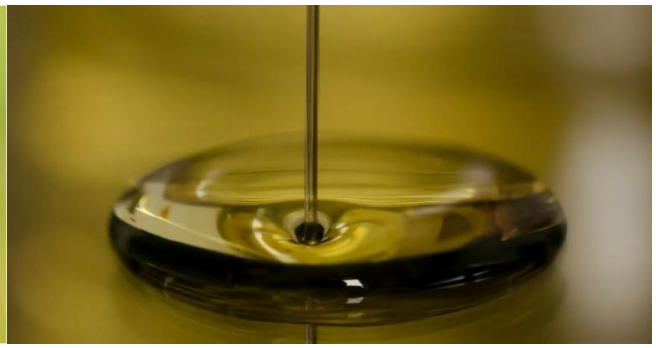

Figure [42]

Emu oil is a bright yellow liquid, made up of mostly fat, which is collected from the deposits below the skin of the bird. Emu oil is a bright yellow liquid, made up of mostly fat, which is collected from the deposits below the skin of the bird. [5] Emu oil is suitable for human skin because the fatty acid composition of the oil makes it to have high permeability when applied on the skin. This oil can be used for treating different kinds of conditions which includes arthritis, skin treatment, burn injuries, hair loss, etc. The reason why Emu oil gained interest was because of this property of high permeability which is made use for delivering specific drug molecules for treatment of skin conditions. The oil is extremely fine, making it exceptionally penetrating, moisturizing, cholesterol reducing and is used in treatments for muscular and joint ailments, as well as cosmetics and skin care products. Emu oil act as wound healing agent reduces recent keloid scarring and excellent emulsifier. This oil is also found to provide some solar protection and its penetrating effect appears to be related to its non-phosphorous composition. [3].

HISTORY

The Emu is the second largest flightless bird from Australia in the World. A fact that also should be noted, Emus won a war against Australia. Emus were first reported as having been seen by Europeans when Explorers visited the western coast of Australia in 1696. [7] In 1788 when the European settlers arrived, they observed there were four separate groups of emus.

Figure. [7.1]

The emus on mainland of Australia and those on the island of Tasmania may have been different species of dwarf emu, Dromaius minor, one living king Island in Tasmania and the other on kangaroo Island. they are examples of island dwarfism. The group on king Island became extinct in 805, that on kangaroo island in 1827, and that in Tasmania in 1865 [8].

The use of emu oil originates from the Australian Aborigine culture. According to their oral history, emu oil has been used for over 40,000 years [9]. They used emu oil to gain relief from minor aches and pains, to help heal wounds quicker, and protect their skin from the harsh elements of wind and sun. Aborigines in Wilusan and

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elsewhere reveal that methods of treatment included hanging an emu skin on a tree to collect the oil, and wrapping sufferers in a fresh killed skin. In both cases the catalyst of the suns' heat was used to liquefy the emu fat and enhance its absorption qualities.

The Aborigines introduced Emu oil to the first Europeans as a natural sun screen and skin moisturizer. The use of emu oil among many natural remedies adopted by settlers from the original inhabitants of Australia [10].

REFINING PROCESS

While processing Emu a three-to-four-inch layer of its fat is separated and removed. The first and crucial step of the refining process is to melt (render) the fat and prepare the oil for final processing. After rendering the oil will undergo the refining process. Emu oil doesn't require harsh chemical refining process since it is low on soaps (formed by long chain free fatty acids). A process called physical refining is adopted for preserving the oil and purifying it with no odour. In physical refining clay is used to filter and absorb the impurities and this is known as the bleaching step. Being from an animal source, it is important that emu oil is brought to an acceptable temperature for a precise period of time, as this ensures any bacteria or contaminates are removed [4]. Final step ensures that a creamy product is produced using the finished emu oil.This process is completed under FDA defined HACCP and GMP (Good Manufacturing Practices) for food products [4].

Methods:

The oil can be extracted using three different methods namely hot water, oven heating and solvent extraction

- *Water extraction method*: Fatty meat pieces (50 g) were mashed or minced using a blender and were placed in a jacketed reactor and 100 ml of water was added and the mixture was mechanically stirred for 3hr at 90°C. After that the mixture was allowed to settle for the fatty layer separation from aqueous phase. The lower aqueous layer was discarded and the upper layer containing oil and the tissues were centrifuged to separate the oil. This was dried under vacuum to remove the moisture [6].
- *Oven heating method:* The fatty material (50 g) was placed on a funnel with a cotton plug and heated in a hot air oven at 90°C for 3 hr. The oil content was determined gravimetrically. Also, the fatty material remaining after oven extraction was further subjected for solvent extraction with hexane to ensure maximum oil extraction [6].
- *Solvent extraction method:* Two types of solvent extractions were conducted, one using hexane and the other using chloroform: methanol (2:1; v/v). The fatty material (50 g) was placed in Sox let and the oil was extracted using hexane (150 ml) as solvent for 6hr after which the material was separated and the solvent was evaporated to obtain the oil. For chloroform: methanol extraction, fatty material (50 g) was taken in 60 ml of chloroform: methanol (2:1; v/v) and the mixture was stirred for 3hr at ambient temperature (27°C) after which the material was separated by filtration and the solvent was evaporated to obtain the oil. Both the solvent extraction methods were repeated for the second time using the same material and for the same time to ensure maximum extraction of oil from the tissues [6].
- *Characterization of oil:* The extracted oil was characterized by thin layer chromatography (TLC) and later analysed for moisture content, fatty acid composition, free fatty acid content, peroxide value, phosphorous content, saponification number and unsaponifiable matter [6].
- *Chromatographic analysis:* TLC was performed on precoated silica gel plates with hexane: ethyl acetate (90:10; v/v) as mobile phase [6].
- *Column chromatography:* The extracted oil was purified by silica gel column chromatography to examine if there were any other components present apart from triglycerides. Briefly, 1 g of oil loaded on to the column packed with silica gel (30 g) and the column was eluted successively with hexane (300 ml), 2% ethyl acetate in hexane (1 litre) and finally with chloroform: methanol (1:1; v/v; 200 ml). The three fractions were concentrated and analysed by TLC and their content was determined gravimetrically [6].
- *Fatty acid composition of emu oil*: The extracted oil was converted to fatty acid methyl esters according to the reported method22. To 20-30 mg of oil, 20 ml of 2% sulphuric acid in methanol reagent was added and the contents were refluxed for 3hr after which January - March 2013 15 JLST Vol. 45 No. 1 methanol was

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evaporated and the esters were extracted into ethyl acetate (15 ml) and washed with water (4 x 20 ml) until neutral and dried over anhydrous sodium sulphate.

Solvent was removed using rotary evaporator to obtain the fatty acid methyl esters [6].

- *Gas chromatographic (GC) analysis*: Fatty acid composition of the emu oil was determined on Agilent 6890 gas chromatograph equipped with a flame ionization detector. The column used was a DB-225 column having a length of 30 m, 0.25 mm i.d and 25 µm film thickness. Carrier gas was nitrogen at a flow rate of 1 mL/min. The oven programming was as follows: 160°C for 2 min rose to 230°C at a rate of 5°C/min and held at 230°C for 20 min. The injector and detector temperatures were maintained at 220 and 250°C respectively [6].
- *High performance liquid chromatography (HPLC) analysis for TAG composition of emu oil*: The reversed phase high-performance liquid chromatography (RPHPLC) analysis was performed on an Agilent 1100 series HPLC chromatograph equipped with an evaporative light scattering detector (ELSD) 2000 (Alltech Associates Inc., United States). The extracted oil was solubilized in acetone (1 mg/ml) and about 25µL of this solution was injected in the RP-column (Merck RP18 (5µm) 250-4). The molecular species of TAGs were eluted within 35 min using an isocratic mobile phase of 80:20 (v/v) of acetone/acetonitrile at a flow rate of 1 ml/min and 0.5 mL/min. The molecular species of emu oil were identified tentatively by their equivalent carbon numbers (ECN). The operating conditions for ELSD are as follows: drift tube temperature, 50°C; flow of nitrogen, 1.5 litre/min with impactor "on" mode. It was observed that 0.5 ml/min flow rate resulted in a better separation than 1 ml/min flow rate. Also, the mobile phase of acetonitrile and acetone was optimized with respect to ratios of solvent [6].
- *Regiospecific analysis of emu oil*: This was done by porcine pancreatic lipase mediated hydrolysis of emu oil combined as described by Christie23. Briefly, buffer (1M; pH 8.0; 4 ml), calcium chloride solution (2.2%; 0.4 ml) and a solution of 0.05% bile salt (1 ml) were added to emu oil (20 mg) and the mixture was incubated for 1 min at 40°C with shaking. To this mixture, 10 mg of pancreatic lipase (porcine pancreatic lipase, crude type II) was added and the mixture was incubated in a water bath at 40°C for 3 min with magnetic stirring. After which, 1 mL of ethanol was added to stop the reaction followed by 1.5 ml of 6 N HCl. The hydrolysis products were extracted by diethyl ether (2 x 10 ml) and the organic layer was washed with until neutral and dried over anhydrous sodium sulphate. Solvent was evaporated and the hydrolysis products were separated on thin-layer chromatography (TLC) plate in a mobile phase consisting of hexane/ethyl acetate/acetic acid (70/30/1, v/v/v). The band corresponding to 2-monoglyceride was separately scraped and converted to methyl esters using 2% sulphuric acid in methanol reagent and analysed by GC. All analyses were conducted in duplicate and average value was calculated. The mean composition of each fatty acid in positions 1 and 3 is calculated from the intact triacylglycerol and in position 2 by following the equation [6].

Positions 1 and 3 = 3 *([TAG] – [sn-2]/ 2)

PROPERTIES

Emu oil garnered a lot of attention because of its properties. In addition to its two major benefits that include anti-inflammatory properties and its ability to penetrate the skin, emu oil is found to possess cosmetic properties that show synergistic increase when used in combination with phospholipids from vegetable oils [11]. Elaine Fein et al reported that regular usage of emu oil has positive effects on lowering cholesterol, triglyceride and low-density lipoproteins and increasing high-density lipoproteins [12].

Emu oil also has antioxidant properties and was shown to have a greater protection against oxidative damage when compared to ostrich or rhea oils [13]. Emu oil is a natural agent that helps in reducing the cholesterol. Although, it is not clinically proven, it was believed that the intake of this oil orally helps to reduce obesity and it also helps in weight loss [14].

The in-depth study about these properties revealed that the topical application of emu oil is reported to significantly reduce the severity of acute auricular inflammation induced by croton oil in mice and was also reported to reduce the levels of tumour necrosis factor-±, and other pro inflammatory cytokines [13,15]. Emu oil

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

was also shown to decrease acute ilea inflammation and improve mucosal architecture in the intestine during recovery from chemotherapy in rats [16].

Recently it is reported that nanofibrous membrane scaffolds prepared with emu oil and polyurethane were able to support long-term cell growth, from three dimensional networks of the nanofibrous structure and provide good antibacterial activity. These results suggested that the composite material prepared from emu oil could be of use in biomedical fields, including wound dressing, treatment of skin disease, etc. [17]. These studies show the potential of emu oil for applications in biomedical and cosmetic fields.

PHYSICO-CHEMICAL PROERTIES:

Several tests are used for this characterization: specific gravity, viscosity, refractive index, iodine value and saponification value. All measures have a certain degree of uniqueness for individual oils [30].

Color: There are 3 types' desirable colors.

1. The pearl-white is the normal color. (Properly processed product)
2. Yellow color (less than satisfactory)
3. Brown color (rolling blackout by power-company)

Clear (rendered oil) produced by refinery by "winterizing" process.
So again, there are many factors that can affect the color of emu oil. The color of the emu oil is due to processing errors. 100% pure emu oil - AEA certified
Odour: None to very slight oil smell
Flavour: No taste to Bland
Yield: More than three fourth (80%) of the emu farmers processed emu oil manually and 60% of the farmers reported 4 litres of emu oil yield from one emu having body weight of 40kg [31].
Viscosity @ 40 °C: 31 - 43 (Specification)
Refraction Index @ 40 °C: 1.456 - 1.467 (specification)
Specific gravity @40°C: 0.897 - 0.920 (specification)
Saponification Value: 190 – 200
Iodine Value: 65 – 75
Stability: Appropriate refrigeration reduces the negative effect of all conditions.
Shelf Life: Around 8 months to 2 yrs.

Physico-chemical Characteristics of Extracted Emu Oil

Characteristic	Value
FFA (%)	0.2
Moisture (%)	0.04
Unsaponifiable matter (%)	0.4
Saponification value	194.3
Iodine value	67.5
Peroxide value (ppm)	44.0
Density at 40°C (g/cm^3)	0.8986

Figure [32.1]

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FATTY ACID COMPOSITION:

The fatty acid composition was determined for the extracted oil which showed oleic acid as major fatty acid and the overall composition was similar to the emu oil fatty acid composition reported for oil from Australia and USA. The oil was also analysed for triacylglycerol (TAG) Composition and the major molecular species was found to be with effective carbon number (ECN) of C48 and C46. the positional distribution of fatty acids on the triacylglycerol back bone was determined which showed that unsaturated fatty acids located in sn-2 position and the saturated fatty acids were present mostly in sn-1,3 positions of the triacylglycerol molecule.[32]

Fatty Acid Composition (wt %) of Oil from Different Parts of Emu Bird

Fatty Acid	Male				Female			
	Front	Back	Neck	Internal	Front	Back	Neck	Internal
14:0	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
16:0	22.8	21.9	22.9	21.6	24.0	24.2	24	23.1
16:1	3.1	2.9	3.1	2.5	5.3	4.8	4.1	3.7
18:0	10.9	11.6	10.9	10.9	8.7	9.2	10.6	10.8
18:1	51.5	52.6	52.3	52.9	51.0	51	51.3	51.7
18:2	10.7	10.1	10.0	10.8	9.9	9.9	9.5	9.8
18:3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3

Figure [32.2]

EMU OIL FATTY ACID COMPOSITION COMPARED WITH HUMAN SKIN OILS:

Approximately 70% of the fatty acids in Emu fat are unsaturated - Omega 3,6,7 and 9.

Fatty Acid	Emu Oil	Human Skin
Myrisitic	.4	2.1
Palmetic	22	20.2
Stearic	9.6	11.2
Palmitoleic	3.5	3.8
Oleic	47.4	30.8
Linoleic	15.2	15.1
Linolenic	.9	.3

Figure [33.1]

Studies and testimonial have also shown these Omega Fatty Acids to lower bad cholesterol and triglyceride levels while increasing good cholesterol; reduce inflammation in body tissue and joints; improve the immune system and assist the body with many functions.

The monounsaturated fatty acid, Oleic acid (Omega 9) is the major fatty acid in emu oil. This fatty acid is a known enhancer for transport of bio-active compounds into the skin, and thus the ability to be absorbed quickly and penetrate deeply when applied topically. The overall composition of emu oil is very similar to our skin's own fatty acid composition [33]

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Emus fed the two different diets grew at similar rates, but the male emus had a higher percentage of carcass fat. The adipose tissue cells from males were larger than those from females. All six meat cuts averaged 2.2%fat. Cholesterol concentration of all sizes of meat cuts averaged 32.2mg/100 g meat. [34]

Unaltered emu oil can vary widely in color and viscosity anywhere from an off- white creamy texture to a thin yellow liquid, depending on the diet of the emu and the refining method(s) used [35].

Industrially refined emu oil is composed of a minimum of 70% unsaturated fatty acids. The largest component is Oleic Acid, a monosaturated omega-9 fatty acid. Emu oil also contains roughly 20% linoleic acid (an omega-6 fatty acid) and 1-2% linoleic acid (an omega -3 fatty acid) [36]. Variety of terpenes, sponginess and flavones are known to be present [37].

Also, different amounts of compositions, such as carotenoids, flavones, polyphenols, and tocopherols, are present in the no triglyceride part of emu oil, which can result in favourable antioxidant effects [38] the remaining 1 to 2 % of emu oil is composed of antioxidants, vitamins, and other organic compounds [39].

- Carotenoids are antioxidants associated with a reduced likelihood of cancer and eye disease
- Flavonoids are antioxidants that reduce inflammation, specifically promoting brain and gut health.
- Sesquiterpenes are a type of terpene (organic compounds that are building blocks in most living creatures) with potential anti-inflammatory, antimicrobial, and even anticancer properties.
- Vitamin A is necessary for maintain a healthy metabolism, immune system, and hormone production, among other bodily functions.
- Vitamin E is necessary for maintain healthy cell membranes. Preliminary research suggests it may help with Alzheimer's disease and some types of cancer [40].

RESEARCH:

- As of 2015 there have been two small human studies, one for use skin moisturizer and the other as an insect repellent [18]. Commercial emu oil supplements are not standardized and vary widely in their potency [19].
- The U.S. Food and Drug administrated highlighted emu oils in 2009 article on "How to Spot Health Fraud", pointing out that many "Pure emu oil" products are un-approved drugs [20].

There have been various studies performed over the past 15+ years throughout the world. The most profound finding is that Emu oil is a multiuse substance that works in harmony with various functions of the body to help humans become healthier [21]. According to one publication in 2013, a single emu yields 250 ounces of oil [22].

Emu oil is not an FDA-Approved medication [23]. There is no identifiable database of diagnoses for which emu oil most commonly prescribed to date, the most thorough review of evidence for emu oil benefit was published in 2014 and cited is potential application to mitigate the following conditions: Mucositis, inflammatory bowel disease, auricular inflammation, cancer chemotherapy-induced bone loss, adjuvant induced arthritis, hypercholesterolemia effects, skin and hair growth, moisturizing and cosmetic properties, wound cure and pain [23].

By using Google Trends data from 2016-2020 to compare each of these conditions, taking worldwide internet searches as a surrogate for product usage amongst the general public. Results suggested that emu oil might use most commonly for pain [24].

Using PRISMA guidelines, thirteen studies were identified, none of which we removed due to duplication. Five articles were excluded on the basis of title or abstract. The remaining eight

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articles were assessed for eligibility -four were excluded because pain was not an outcome measure, and one was excluded due to lack of peer review. The final three studies were accepted for qualitative review [25, 26, 27].

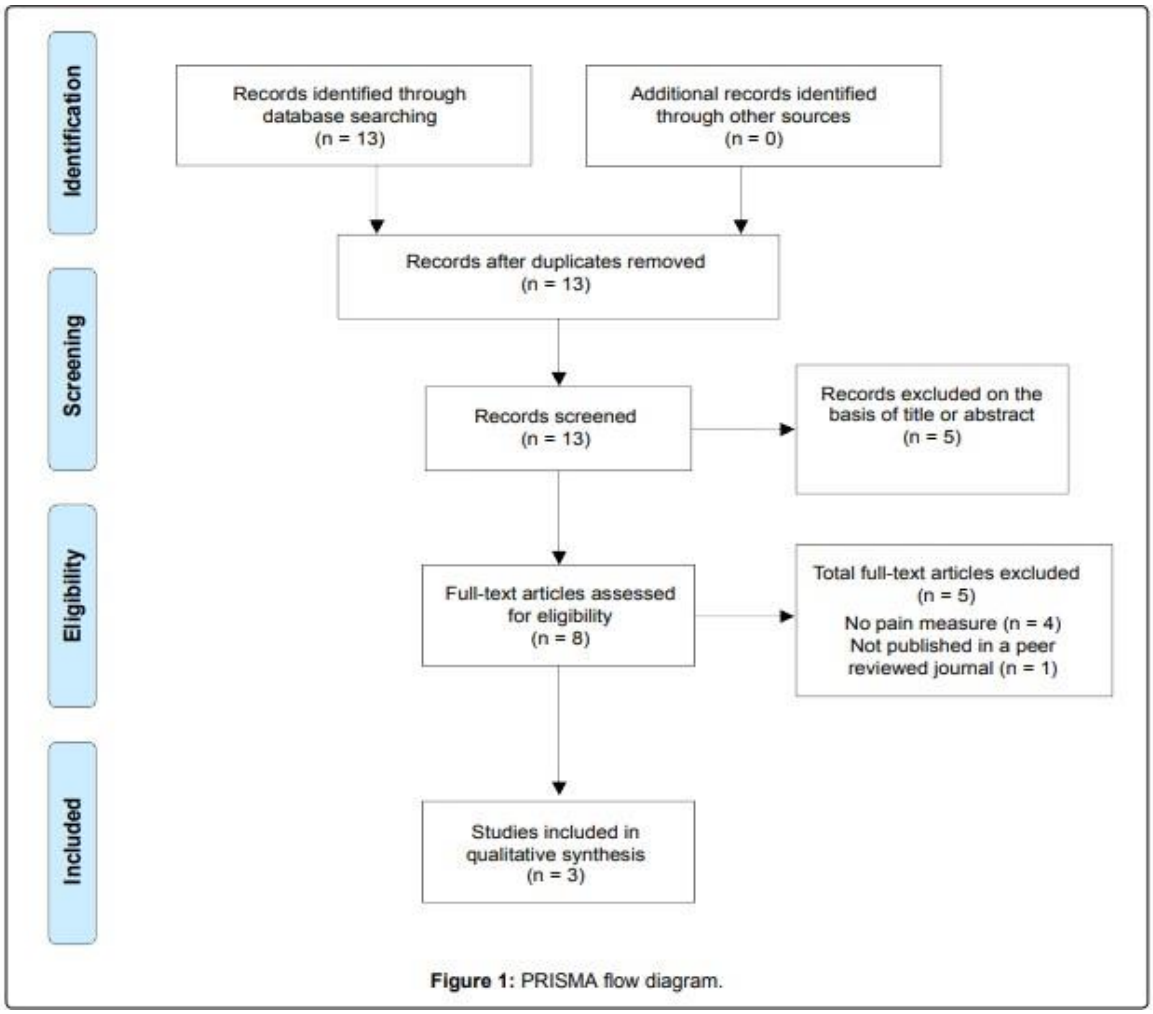

Figure 1: PRISMA flow diagram.

Figure [25, 26, 27].1

- RANDOMIZED CONTROL TRIALS:

The first study was a double-blind, placebo-controlled trial that evaluated emu oil's effect on decreasing joint pain [24] related to adjuvant aromatase inhibitor treatment for women with postmenopausal with stage I to III breast cancer will have one to three joint pains for who are receiving Aromatase Inhibitor (AI). It's a side effect of AI therapy. Eighty-Seven women were met the inclusion criteria and they were randomized to receive placebo or emu oil. Selected joints were treated with emu oil three times daily in specified amounts using measuring device. Of the eighty-seven enrolled, fourteen ceased treatment within three weeks of registration due to a variety of reasons unrelated to toxicity of treatment. The primary outcome was subjective pain improvement as measured by the visual analogue scale (VAS) and brief pain inventory (BPI) questionnaire. Baseline VAS and BPI scores were taken at the day of randomization and after 8 weeks therapy. The authors found that there was no statically difference between the groups for joint pain but VAS ($p = 0.45$) or by BPI ($p = 0.76$) this study appears to represent a common use for topical emu oil, at least anecdotally, with regards to joint pain. However, due to the specificity of the pathology reviewed, the results are generalizable only to that patient population.

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- Another study was a double-blind, placebo- controlled, single-site pilot study of adults with histologic evidence of breast cancer to asses "ultra emu oil" versus placebo in the prevention of radiation dermatitis in a cohort who were to undergo radiation therapy as part of their treatment plan [26]. Forty-five patient's enrolled randomly selected to receive treatment with either emu oil or placebo (a cotton substance similar in consistency to emu oil). Three participants were asked to use 1.5ml of emu oil twice daily for the duration of radiation therapy and for six weeks following radiation therapy. The primary outcome was dermatologic, but used the Skindex -16, which is an analog scale of symptoms and functional end points. The symptom subscale within the Skindex-16 assesses itching, burning or stinging, hurting, irritation within its question set. In this study, the authors found that patient-reported Skindex-16 area under the curve (AUC) scores, including each subscale score, tended to be lower in emu oil patients (AUC=7.2) than in placebo patients (AUC=0.4). However, this finding was not statistically significant (p=0.29). Overall, quality of life was slightly better in the Emu oil group, but again, not to significant degree.
- Finally, Twidwell and Levine performed a study to evaluate the safety and efficacy of a new developed topical treatment for acute phase Peyronie's disease. [27] Called H-100, this compound consisted of nikardipine, superoxide dismutase, and the emu oil. Participation criteria included patients with documented Peyronie's disease of less than 12 months duration, who had not used any treatment in the past 6 months and were able to get an erection without use of Phosphodiesterase inhibitor. 22 men were recruited and randomly assigned for treatment with either with emu oil or placebo. Both groups received respective intervention for 3 months, after which all 22 men were treated for 3 additional months with H-100. Penile flaccid stretch length, penile curvature, and pain (using a VAS) were measured at monthly intervals. All participants completed the study. Pain was reduced in both groups, although more notably in the H-100 group. At 3 months, the H-100 showed a statistically significant reduction in pain compared to baseline (p=0.03). (table.1 [25, 26, 27])

Table 1: Quality appraisal.

Author	Year	Patients (n)	Demographics	Study Design	Pain Scale	Compound	Placebo	Level of Evidence	Results
Chan, et al. [25]	2017	57	Postmenopausal patients who had been receiving an aromatase inhibitor for a minimum of 3 months, planned to continue to take the same aromatase inhibitor for at least a further 6 months, and had at least 1 evaluable joint in which patients had noted subjectively worsened pain following commencement of the aromatase inhibitor.	Randomized phase II placebo-controlled study	Visual Analog Scale, Brief Pain Inventory	Pure emu oil of oral grade quality	Blend of shea butter medium chain triglycerides, almond oil and carrot oil	Level 2	No statistical difference between the control and emu oil group for joint pain as assessed by VAS (p = 0.042) and BPI (p = 0.76)
Rollman, et al. [26]	2015	42	Adults with histologic evidence of primary invasive breast carcinoma or ductal carcinoma *in situ*, who were to undergo a panned course of continuous, definitive or adjuvant external beam radiation therapy to the whole breast or to the chest wall.	2-arm, double blinded, randomized pilot study	Skindex 16	Ultra Emu Oil	Cottonseed oil	Level 1	No significant statistical difference. The Skindex 16 area and the curve scores were decreased in the emu oil patients (AUC = 7.2) when compared to placebo (AUC = 10.4), however p = 0.29.
Twidwell, et al. [27]	2016	22	Adults with documented Peyronie's disease for more than 12 months.	Randomized, prospective, placebo controlled pilot study	Visual Analog Scale	H-100 compound consisting of emu oil, nicardipine and superoxide dismutase	Not reported	Level 1	At 3 months, the H-100 group showed a statistically significant reduction in pain compared to baseline (p = 0.03) and an overall reduction at 6 months (p = 0.004).

A Google search for "emu oil" in 2010 returned 710,000 results, while a search in 2020 for "emu oil" produced 102,000,000 results - a 43% increase [28].

- WOUND HEALING ACTIVITY OF EMU OIL WITH *BAUHINEA TOMENTOSA* LINN. IN RATS:

  Objective is to investigate the wound healing activity of emu oil with methanolic flower extract of Bauhinia tomentosa
  Method: Male Wister albino rats (n = 25) were used in this study. Excision wounds were created on the skin of five groups of 5 rats using surgical blade under anaesthesia. The first group was topically treated with Vaseline alone, group 2 was topically treated with standards i.e., Soframycin ointment, group 3 was treated with Bauhinia flower extract alone, group 4 was treated with Emu oil alone and group 5 was treated with combination of Bauhinia flower extract and Emu oil [43]

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- EVALUATION OF BIOEFFICIENCY OF POLY-HERBAL FORMULATION WITH EMU OIL FOR ANALGESIC AND ANTI- INFLAMMATORY ACTIVITY:[44]

RISKS

Even though Emu oil is a natural product we can sometimes experience few side effects.
Few of them include:
1) Applying Emu oil directly to skin as a topical ointment can sometimes cause skin irritation for few people. To avoid this, a person should apply a small amount of emu oil to a small patch of skin, such as the back of one hand. If an allergic reaction occurs, they should stop using the oil [29]. 2) It may also be important to consider the source of the emu oil. Emus thrive when they have plenty of room to roam and are able to eat a rich diet. Low-quality living conditions may result in inferior quality oil. It is best to buy oil from a reputable source, especially as the United States Food and Drug Administration (FDA) do not regulate its production [29].
3) Women who are pregnant or breastfeeding should talk to their doctor before using emu oil. It is important to consult a doctor about the possible uses of emu oil and if it will affect a pregnancy [29].

CONCLUSION

In the conclusion it is observed that the oils from different parts can be marketed by mixing them together that can be advantageous for the industries that are working on the production of Emu oil. Emu oil has many benefits but it is also observed that when it is not used under proper supervision can sometimes have harmful implications.

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