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A review of Application of Ostrich oil in Pharmacy and Diseases treatment

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ABSTRACT: In the recent years the number of slaughter ostriches has been increasing. Over the last decade there is a growing interest in *Ratitae* farming, mainly ostriches that provide dietetic meat, valuable skins as well as feathers and eggs and specially oil. Ostrich oils are used widely in the cosmetics and pharmaceutical industry. They are apparent to have exceptional moisturizing, penetrating and therapeutic qualities for humans and animals. Ostrich oil also contains variable levels of compounds including carotenoids, flavones, polyphenols, tocopherol and phospholipids in the nontriglyceride fraction, which may present therapeutic benefits including antioxidant properties.

***Keywords*:** Ostrich oil, Pharmacy, Diseases, products

INTRODUCTION

In the recent years the number of slaughter ostriches has been increasing. With growing demand for prime products such as dietetic meat and valuable skin, the ostrich industry started to make use of ostrich negligible products, especially fat. This includes the oil provided from fat and used in cosmetics (Sales et al., 1999). Moreover, food industry uses ostrich fat as an ingredient of value-added products for humans, as well as a supplement to pet food, mainly for dogs and cats. Fat in the *Ratitae* (ostrich, emu, rhea) carcass is situated in specific depots in abdomen, on breast, and on back (Sales et al., 1999). Recently Horbańczuk et al., 2003 reported on cholesterol content and fatty acids profile of breast fat obtained from ostrich females collected at the age of five years. Since our knowledge about the quality of ostrich fat (Gunstone and Russell, 1954; Sales et al., 1999) is still limited, an effort should be made at obtaining information on the cholesterol and fatty acids content of ostriches. Over the last decade there is a growing interest in *Ratitae* farming, mainly ostriches (Sales et al., 1999; Horbańczuk and Sales, 2001; Cooper and Horbańczuk, 2004; Kawka et al., 2007) that provide dietetic meat, valuable skins as well as feathers and eggs (Sales and Horbanczuk, 1998; Cooper et al, 2007; Horbańczuk et al., 2007; Poławska et al., 2011). The higher demand for ostrich meat is associated among others with growing interest for searching on the meat market alternative type of red meat from not traditional animal species after second outbreak of BSE in European cattle (Horbańczuk et al., 2008). Although some research on the nutritive value of ostrich meat has been carried out, a relatively little information is found regarding the physical and sensory characteristics of ostrich meat after plant oil introduction into the bird's diet. This issue seems to be interesting and important for industry as well as for consumers since using different oil seeds additives in bird's diet may affect both technological parameters of ostrich meat and its sensory properties. This review aims at study the application of ostrich oil in pharmacy and its effect on human life.

MATERIALS AND METHODS

Firstly, articles regarding to ostriches and the oil and effects of ostrich products on human life were searched in several data bases available through UI (University of Isfahan) library website and Google scholar too. Referral articles (20 articles) were reviewed during 4 months and important points related to the effect of ostrich products, specially its oil, on human life were studied particularly. We, in this review, studied the molecular mechanism of

ostrich oil on some specific organs of human body and the effect of ostrich oil compositions in treatment of some dangerous diseases in human.

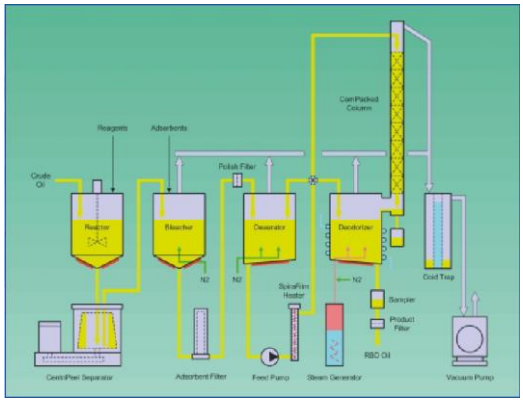


Figure 1. Several extraction processes of concentration or others can be carried out for the obtaining of other pure sub-products of the oil

Ostrich Oil composition:

Fatty acids (FAs) represent the predominating component of ostrich oil, with a lipid content of 98.8% for subcutaneous adipose tissue, and 98.0% for retroperitoneal adipose tissue. Ostrich oil comprises approximately 42% oleic acid, 21% linoleic acid, and 21% palmitic acid, with lower levels of other FAs, including 1% a-linolenic acid. Ostrich oil also contains variable levels of compounds including carotenoids, flavones, polyphenols, tocopherol and phospholipids in the nontriglyceride fraction, which may present therapeutic benefits including antioxidant properties. More recently, Beckerbauer *et al*. demonstrated that Ostriches fed a diet rich in unsaturated fat (soybean oil) produced oil that was more polyunsaturated compared with ostrich fed a diet rich in saturated fat. These findings indicate that diet composition can significantly influence the composition of ostrich oil and hence possibly impact on oil efficacy (Abimosleh et al., 2012).

Table 1. Ostrich oil compositions

No	Carbon Number	Fatty Acid Composition	Fatty Acid%
1	C14:0	Myristic Acid	0.92
2	C15:0	Pentadecanoic Acid	0.24
3	C16:0	Palmitic	22.60
4	C16:1W7	Palmititolec Acid	8.75
5	C17:0	Hepedocanoic Acid	0.35
6	C18:0	Stearic Acid	3.68
7	C18:1W9-Omega9	Oleic Acid	34.80
8	C18:2W6-Omega6	Linoleic Acid	19.27
9	C18:3w3-Omega3	Linolenic Acid	11.18
10	C20:0	Arachidic Acid	0.12
11	C20:1W9	Eicosentic Acid	0.21

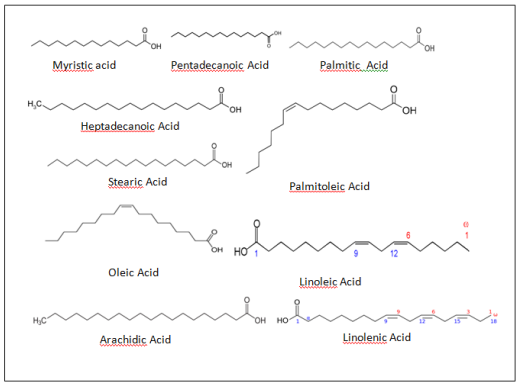
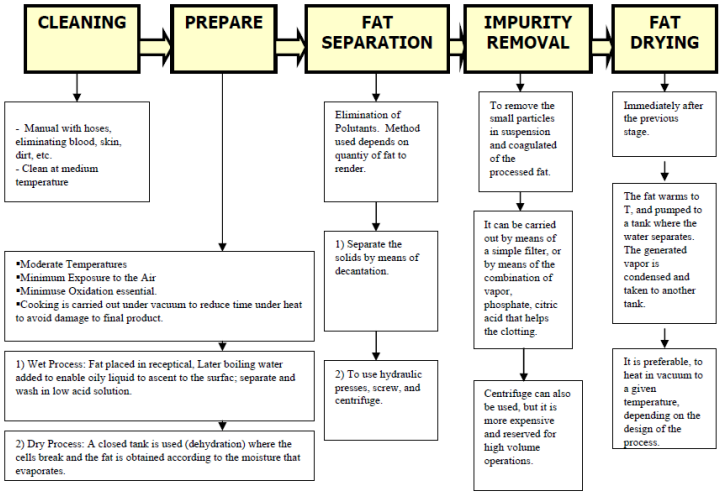


Figure 2. Chemical structures of common fatty acids presented in ostrich oil

Ostrich oil has been used for centuries by the Egyptian, Roman and African cultures for topical relief of dry skin, burns, lesions, contact dermatitis, eczema, psoriasis, sunburn, chapped lips, muscular pain, hair growth, dry hair, bed sores, fine lines and wrinkles, to soften cracked heels and for minor cuts and scratches. Ostrich oils are used widely in the cosmetics and pharmaceutical industry. They are apparent to have exceptional moisturizing, penetrating and therapeutic qualities for humans and animals. Emu oil, for instance, has been shown to have anti-inflammatory and probably skin de-sensitizing properties (Whitehouse et al., 1998).

Figure 3. Process of using ostrich fat



Molecular mechanism of ostrich oil:

Ostrich oil is rich in polyunsaturated fatty acids (PUFA). There are many reports about the effects of PUFAs regarding their ability to modify cell membrane phospholipids, modify cellular functions, exert a protective role towards normal tissues and low cytotoxicity to normal cells. Ostrich oil contains omega 9 (oleic), omega 6 (linoleic) and omega 3 (linolenic), essential fatty acids (EFAs) and certain vitamins and amino acids that help the healthiness of skin membranes. Ostrich oil possesses the ability to penetrate totally into the skin without blocking pores. This feature is due to its high levels of oleic acid and as such can be used as a carrier mediator in combination with various medicinal or cosmetic ingredients and to transport them beneath the skin barrier. EFAs have been known to ensure the proper functioning of the cardiovascular, reproductive, immune and nervous systems. These EFAs are used in the production of phospholipids that are necessary for the formation and maintaining the integrity of healthy cell membranes, neuronal development and functioning of the brain and nervous system (Palanisamy et al., 2011).

Effect on nervous system, heart and immune system:

EFAs are nutritionally important since they act as precursors to a group of hormone- like substances known as eicosanoids which include prostaglandins, thromboxanes and prostacyclins that help in regulating the central nervous system, blood pressure, heart rate and also play a role in the immune system by regulating inflammation and motivating our body to fight against infections. Omega-6 fatty acids are generally necessary for growth development, regulating metabolism, promoting carrying of fatty acids from liver to the tissues and maintaining reproductive performance (Palanisamy et al., 2011).

Effect on skin and cancer:

These fatty acids have become increasingly popular in the cosmetic industry due to its beneficial properties on the skin. Research has shown that linoleic acid, when applied topically on the skin, has anti-inflammatory, acne reduction and moisture maintenance properties. It is shown that EFA insufficiency which induces inflammatory processes in rats and humans can be upturned by the cutaneous application of linoleic acid. Meanwhile, omega-3 fatty acids are beneficial for reducing hypertension and stroke risk, decreasing effect of arthritis, increasing autoimmune disease survival rates, aiding in prevention of cancer and many more(Palanisamy et al., 2011).

Important role of Omega 9:

Omega 9, on the other hand, plays a role in inhibiting breast cancer and helps healthy inflammation responses. Omega 9 may also support the production of prostaglandins, which has many health benefits. Lipid peroxidation is considered the main cause of oil rancidity. Peroxidation is more common in oils which are rich in PUFA such as ostrich, emu and rhea oil (Palanisamy et al., 2011).

Common methods in preparing ostrich oil:

Several common methods are available for purifying and production of ostrich oil. In Iran, M-oil is prepared by Mobin Tolid Tasnim company via a special technology in which the produced oil is odorless and colorless without damaging its beneficial properties. A common method used to purify ostrich oil, where the rendered oil is heated to 160 degrees F, after which, 1-2% diatomaceous earth is added by weight to the preheated oil and oil is kept at 200 degrees F, under vacuum and with agitation, for 5 minutes. The oil is vacuum filtered twice to remove all the bleaching earth and to separate the solid fat from the pure oil. The refined oil is then cooled in stages to 98 degrees F for 24 hours, 74 degrees F for 24 hours, and 60 degrees F for 24 hours. Another bleaching process for ostrich oil is through adding the minced fat mass into a steaming cooker and then oil is separated with 60-90 °C hot water. Filtered oil is put into a vessel and kept at a condition of reduced pressure for more or 1 day to remove odors. The purpose of refining is to remove all the impurities from the oil without removing or damaging any of the advantageous properties (Palanisamy et al., 2011).

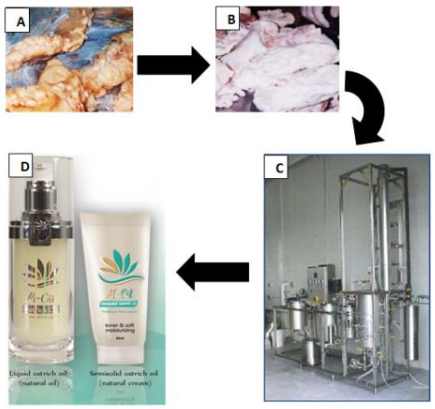


Figure 3. Process of preparing ostrich fat, oil and cream

CONCULSION

To this end, further development of ostrich oil for gut disorders will involve its application to *in vitro* assays of physiological processes such as inflammation and cancer function, followed by the connection of these results with *in vivo* indications of efficacy. These assays could then be used as a component of quality promise to predict the clinical efficacy of ostrich oil preparations.

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