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Development and Formation of the Skin Ointment by Using the Extract of the *Oenothera Biennis* with Silver Nanoparticles to Treat the Ichthyosis Vulgaris-A Review

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ABSTRACT

Ichthyosis vulgaris is when the skin doesn't exfoliate its dead skin cells, it might develop the genetic or acquired skin disorder. As a result, patches of dry, dead skin cells develop on the skin's surface. Because the dead skin builds up in a manner reminiscent to fish scales, the condition is frequently referred to as "fish scale disease". The majority of cases are minor and limited to particular body parts. Yet, some instances are severe and affect a lot of the body, including the back, arms, legs, abdomen, and back. Due to its unique physical and chemical characteristics, silver nanoparticles are one of the most commonly used nanoparticles in research today. Silver nanoparticles can also be used in medical sectors for both diagnostic and therapeutic purposes. Antibacterial, antiviral, antifungal, antiangiogenic, antioxidant, cosmetic, anticancer, anti-inflammatory, drug carrier, imaging, water treatment, and bio sensing properties are all exhibited by silver nanoparticles. Using silver nanoparticles in the skin ointment can be used to treat the skin diseases like rashes, acne etc., Evening primrose extract is extracted from the flower of *Oenothera biennis*, also known as the fever plant, king's cure-all, scabish, sun drop, and tree primrose. This oil contains gamma-linoleic acid and has been used to treat a variety of conditions, including atopic eczema, premenstrual syndrome, and benign breast pain. One of the easiest, most practical, cost-effective, and ecologically beneficial ways to reduce the use of hazardous chemicals is through the synthesis of metal nanoparticles using evening primrose extracts. As a result, a number of environmentally benign methods for the quick synthesis of silver nanoparticles have been published in recent years employing aqueous extracts of plant components such leaves, bark, roots, etc., The environmentally friendly production of silver nanoparticles (AgNPs) utilizing various evening primrose extracts and the possible uses of these materials as antibacterial agents.

KEYWORDS: ICHTHYOSIS VULGARIS, FISH SCALE DISEASE, SILVER NANOPARTICLES, EVENING PRIMROSE, GAMMA-LINOLENIC ACIDS

INTRODUCTION

Ichthyosis vulgaris (IV) is a dry flaky skin condition frequently seen by all dermatologists. It is arguably the most common monogenic hereditary skin disorder. Some kind of defect in the skin barrier protein filaggrin might be involved in the pathophysiology of IV, no genetic defect had been identified to confirm or disconfirm [1]. *Oenothera biennis* is beneficial in the treatment of many diseases. Therefore, research is ongoing to determine the chemical composition of these plants and how it relates to the biological activity of evening primrose [2]. Due to an increased number of active phytochemicals found in several areas of the plant (aerial parts, leaf, roots, and seeds) and the fact that the oil extracted from evening primrose represents an important source of gamma-linoleic acid (GLA) and linoleic acid (LA) [3]. Ointments are supple medications meant to be applied to skin, wound edges, or mucous membranes. Ointments are employed in many different areas of contemporary medicine of ophthalmology, gynaecology, surgery, combat medicine, etc.,[4]. Gels are a typical semisolid formulation used for cutaneous treatments, along with creams and ointments. Due to solvent volatilization after application, gels may spread easily and provide a cooling effect. They fall within the hydrogel category and organogels [5]. Silver nanoparticles (Ag-NPs or nanosilver) were the most widely used of the many other metal nanoparticles because they differ from their macro scale counterparts in terms of their special physical, chemical, and biological characteristics [6].

MORPHOLOGY OF OENOTHERA BIENNIS

Evening primrose has yellow lance-shaped leaves in addition to elongated capsule fruits and often purple-tinged hairy stem. It contains four petals and blooms in the evening. It is known as agricultural crop instead of as wild flower and cultivated in gardens as ornamental plants. Evening Primrose is an erect native biennial rising up to 6 feet in height on a usually unbranched stem. The stem is green with some reddish tones, ridged and usually has fine white hair. The leaves are both basal and stem. Evening primrose (EP) extract has a protective effect on human skin against oxidative stress. Additionally, seed extract involves polyphenols that inhibit αglucosidase activity thus EP controls levels of blood glucose, also it has various fatty acids including; linoleic, oleic, γ-stearic and linolenic acid [7]. Evening primrose (*Oenothera* L.) is a plant belonging to the *Onagraceae* family. There are about 145

species in the genus *Oenothera* L., occurring in the temperate and tropical climate zones of North and South America. Some species have adapted to new areas, inhabiting the countries of the European continent, and about 70 species are now present in Europe [8].

MEDICINAL USES OF EVENING PRIMROSE

Atopic dermatitis, mastalgia, and lactation are three of evening primrose's main therapeutic applications. Other potential applications include diabetic neuropathy, premenstrual syndrome (PMS), rheumatoid arthritis (RA), seborrhea, fortification of newborn formula, and dry eyes linked to Jorgen syndrome [9]. Treatment of skin disorders can benefit from *Oenothera biennis* oil. Skin sores significantly improved after using *Oenethora biennis* oil, and dihomo-gamma-Linoleic acid, a precursor to the anti-inflammatory prostaglandin E1, increased. Gamma-linolenic acid enhances immune system performance [10].

ICHTHYOSIS VULGARIS

Ichthyosis vulgaris is the genetic disorder of keratinization clinically characterized by scaling, especially on the extensor limbs, dry skin, and palmoplantar hyper linearity. Ichthyosis vulgaris symptoms are mostly caused in winter or in cold, dry climates [11]. IV was ascribed to loss-of-function mutations in the gene encoding filaggrin (*FLG*), namely p.R501X and c.2282del4. Associated findings include hyperkeratosis and hyperlinearity of the palms ('I-hand') and soles, keratosis pilaris, hypohydrosis, atopic dermatitis (AD), allergic rhino conjunctivitis and asthma. Histologically, the epidermis of IV subjects is characterized by hyperkeratosis and an attenuation or absence of the granular layer (Robert *et al*., 2007). The most common ichthyosis vulgaris (IV), affects around 1 in 100–250 of the northern European white population and has a complex genetic aetiology often involving the filaggrin (*FLG*) gene. New evidence suggests an elevated rate of mood disorders/symptoms in patients with IV, together with a moderately decreased QoL and increased social rejection [12].

TREATMENT OF ICHTHYOSIS VULGARIS

A wide variety of emollients and topical keratolytic aim to facilitate desquamation and improve the appearance of the skin. These include urea, lactic acid, glycolic acid, glycerol, paraffin, propylene glycol, ammonium lactate, salicylic acid, tazarotene, N-acetyl-cysteine, and a diversity of fatty cream [13]. It was treated with a combination regimen including ammonium lactate (AL) 12% lotion (Lac-Hydrin 12% Lotion, followed by a physiological lipid-based barrier repair cream containing ceramides, cholesterol, and free fatty acids in a 3:1:1 ratio designed to simulate the normal intercellular lipid bilayer [14].

SYMPTOMS OF ICHTHYOSIS VULGARIS

A wide range of hereditary illnesses known as inherited ichthyoses are distinguished by dry, scaly skin, hyperkeratosis, and impaired skin-barrier function. Despite the complexity and wide range of aetiologies of various cutaneous keratinization disorders, they share disruption of the stratum corneum and generalised scaling [15]. Ichthyoses are a sizable set of hereditary cornification illnesses that primarily affect the patient's entire skin surface and are clinically and etiologically variable. Since the ancient Greek word "ichthys" means "fish," the term "ichthyosis" finds its origins [16].

SKIN OINTMENT

The optimal ointment base should be stable, non-irritating, smooth and pliable, and compatible with the skin. Non-sensitizing, inert, able to absorb water or other liquid pharmaceutical preparations, and easily capable of releasing these medications [16]. The best dose form is an ointment, which combines elements with various chemical properties, aggregation states, and biological activities [4].

SILVER NANOPARTICLES

Metallic silver, silver nitrate, and silver sulfadiazine have all been used for the treatment of burns, wounds, and various bacterial illnesses from the beginning of time. But since a number of antibiotics have been developed, the utilisation of these silver compounds has dramatically decreased. The ability of nanotechnology to modulate metals into their nanosize, which significantly alters the chemical, physical, and optical properties of metals [17]. Silver nanoparticles (AgNPs) are widely employed in a wide range of applications, such as water purifiers, medical devices, and home disinfectants. They are well known for their excellent antibacterial ability and superior physical qualities [18].

SYNTHESIS OF SILVER NANOPARTICLES

Modern synthetic methods can be divided into three categories: physical, chemical, and biological green syntheses. The biological synthesis of AgNPs has desirable features, such as high yield, solubility, and stability, in contrast to the physical and chemical syntheses, which are typically more labor-intensive and dangerous. The synthesis of spherical AgNPs, shape-controlled Ag colloids, and the synthesis of size-controlled AgNPs are only a few of the many synthesis techniques covered in depth in the sections that follow. The sections also attempt to introduce different synthesis approaches and their

mechanisms, clarifying how shape- and size-controlled synthesis of AgNPs can be accomplished by using the right methods [19]. The physical and chemical synthesis of nanoparticles can be replaced by biological synthesis since it is more economical and environmentally being hazardous and expensive. Consequently, microbes and plant extracts have been used to create nanomaterials. Due to the simplicity of scaling up biohazards and the complex process of maintaining cell cultures, using plant extracts for the synthesis of nanoparticles has the potential to be advantageous over using microbes [20].

PROPERTIES OF SILVER NANOPARTICLES

The idea of using silver nanoparticles' optical characteristics as a functional component in various goods and sensors is gaining popularity. Unlike many dyes and pigments, silver nanoparticles' colour relies on the size and shape of the particle and is incredibly effective at both absorbing and dispersing light. The reason why silver nanoparticles interact with light so strongly is because surface Plasmon resonances (SPR) [21].

APPLICATION OF SILVER NANOPARTICLES

Silver nanoparticles are of great interest and can be used in electronic components, cryogenic superconducting materials, composite fibers, antimicrobial applications, biosensor materials, and cosmetic and antibacterial products. Numerous sectors, including medicine, nanotechnology, filters, medication administration, and cancer hyperthermia, use nanoparticles in a variety of ways [22]. Many common antibacterial products that contain silver are available, including silver nitrate, silver sulphadiazine, silver sulphadiazine/chlorhexidine, silver sulphadiazine with cerium nitrate, and silver sulphadiazine impregnated lipidocolloid wound dressing. ActicoatTM and Silverlon1, two recently enhanced products, feature a better organized and protracted release of nanocrystalline silver to the wound surfaces [23].

CONCLUSION

Silver nanoparticles are highly used for the therapeutic of different applications. Using *Oenothera biennis* flower extract with silver nanoparticle has been highly useful for skin related diseases. Skin ointment made by the above extract is useful for the external use of skin diseases.

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