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A Review on Leucoderma

Sukhbir Kaur*,Harminder Pal Singh Kahlon, and Kushal Dhir.

C T Institute of Pharmaceutical Sciences, Shahpur, Jalandhar, Punjab, India.

ABSTRACT

Vitiligo is a common skin disorder characterized by the presence of depigmented macules resulting from the destruction of cutaneous melanocytes. Vitiligo affects the 1-4% of the world population. The exact pathogenesis of the vitiligo is unclear but a number of theories are made to describe the pathogenesis of vitiligo which includes the role of Genetics, Neural theory, autoimmune hypothesis, reactive oxygen species model and mechanocytorrhagy. A numbers of therapies in the treatment of vitiligo are present and show significant potential. In this review we will focus on the different types of therapies and herbs reported as antivitiligo effect.

Keywords: Leucoderma, Penetration, Vitigo.

Corresponding Author

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INTRODUCTION

Vitiligo was first noted in 1500 BC. The term vitiligo is thought to come from the Greek vitelius (calf), and thereby to connote the resemblance of the white spots of vitiligo to white patches on a calf. Its initial use is attributed to the Roman physician Celsus in the second century AD [1]. Vitiligo is a disorder of skin, in which white patches, develops on the skin due to the loss of functioning melanocytes [2]. The histological picture shows loss of melanocytes and melanin in the white patches and an inconstant lympho-mononuclear infiltrate in the advancing margins of vitiligo [3]. Vitiligo is defined as non contagious, idiopathic, acquired, chronic, pigmentary disorder characterized by white macules that usually increase in size over time [4]. The white macules in vitiligo can appear anywhere on the skin and spread quite quickly (over months) and then is stable or it relentlessly spreads over the body with time (over years) [1]. Vitiligo is usually harmless. It medically causes no physical pain to persons suffering from this disorder. But people with vitiligo experience emotional stress if the condition develops on the visible areas (face, hands, arms and feet) of the body or on genitals [5].

Epidemiology

Vitiligo affects 1-4% of the world population. Its prevalence is varying from 0.46 to 8.8% in India. The Gujrat and Rajasthan states have the highest prevalence i.e. 8.8% [6]. About 1% of the world population has vitiligo vulgaris and this prevalence is constant for all ethnic groups in all countries. Large studies in other countries have shown a prevalence of 0.38% in Denmark, 0.49% in rural areas in Surat, India, 1.78% in urban areas in Surat, India, and 0.2% in Culcutta, India. From the studies it had been concluded that the general prevalence of vitiligo vulgaris throughout the world is about 1 per 200 individuals, and both sexes are affected equally. In some location of India such as isolated villages, it had been noted that the prevalence can be much higher as 8% [7].

Melanocytes

Melanocytes are cells which produce the pigment melanin. These cells are present in skin, retinal pigment epithelium, uveal tract, inner ear and leptomeninges. In the skin they are present in the matrix of the hair follicle of the basal layer of epidermis. Melanocytes are highly dendritic and these dendrites project into the malphigian layer of epidermis where they transfer the melanosomes to keratinocytes. The melanocyte of each epidermal secretes melanosomes to approximately 36 keratinocytes in the neighborhood and this entire unit is called epidermal melanin unit.

Enzyme Tyrosinase is required for melanin production. The different steps of melanin production are shown in Fig 1. Tyrosinase enzyme catalyzes the hydroxylation of tyrosine to dihydroxyphenylalanine (DHPA). DOPA on oxidation converted into dopaquinone and then into 5, 6 dihydroxy indole (DHI). Tyrosinase related protein 2 (TRP 2) converts dopachrome to dihydro indole carboxylic acid (DHICA). DHI and DHICA further polymerise to form eumelanin. The switch between eumelanogenesis and pheomelanogenesis occur at dopaquinone stage. Cysteine/glutathione reacts with the dopaquinone to produce

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cysteinyldopas. The major function of melanin is to confer photo protection to the skin from ionizing radiations (4).

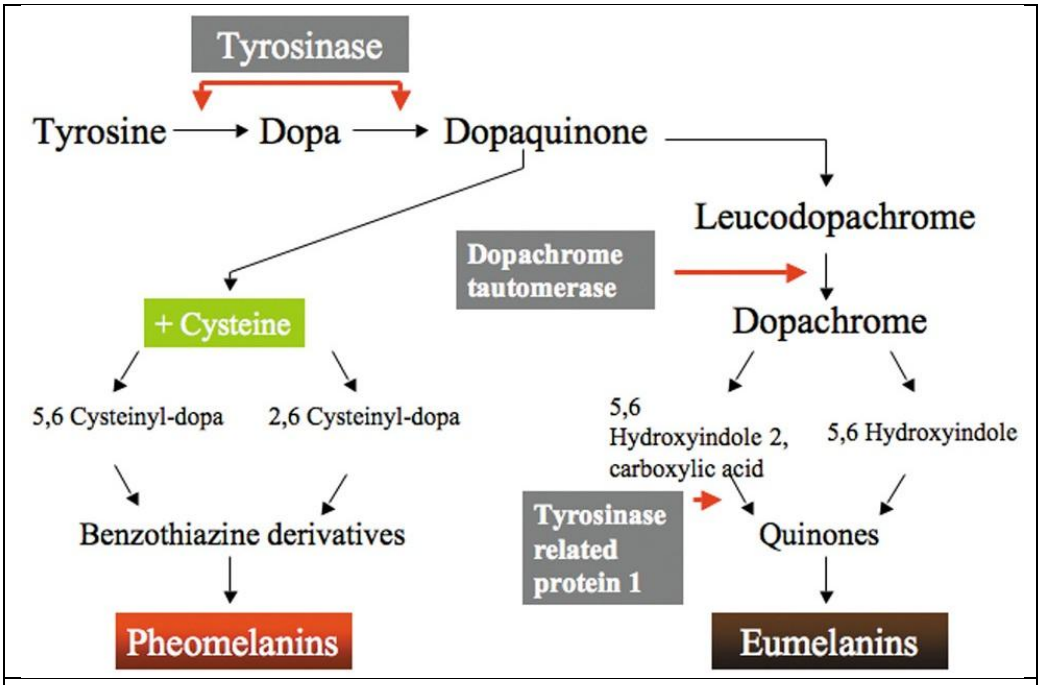

Fig 1 (4)

Pathophysiology

The exact pathogenesis of vitiligo is unknown and the question, "What causes vitiligo?" remains ambiguous. Most of the population generally accepts that it is the concept of the "autoimmune destruction of the pigment-producing cells called melanocytes" but research shows that it is complex and it involves the multiple factors many of which are not elucidated. There are many theories are made to describe the pathogenesis of vitiligo.
These theories are:

- Role of Genetics
- The Neural theory
- The autoimmune hypothesis
- The reactive oxygen species model
- The mechano-cytorrhagy hypothesis

The year of research provide us a framework about the pathogenesis of disorder. But the pathogenesis of vitiligo has yet to be elucidated. A numerous studies show the genetic predisposition involved for developing the disease. The Neural theory for pathogenesis of vitiligo suggests that the nervous system is involved. According to the theory, neurogenic factors are release in response to stress event which then affect the survival of melanocytes. Cytotoxic and immune mechanisms are proposed to underlie the destruction of melanocytes through neuropeptides. The Autoimmune theory argues that the loss of melanocytes observed in vitiligo is the result of an autoimmune reaction. The Reactive Oxygen Species Model suggests that faulty oxygen metabolism results in the excess production of reactive oxygen species, which causes melanocyte destruction. In addition,

the Melanocytorrhagy theory states that melanocyte loss occurs from defective cell adhesion coupled with friction or other types of stress. These mechanisms underlying vitiligo pathogenesis likely overlap and may vary depending on the type of vitiligo. Genetic factors likely precede neurogenic factors which, influenced by mental stress, may act via the aforementioned cytotoxic and immune mechanisms to cause destruction of melanocytes and resulting skin depigmentation. Future research will confirm that if these theories occur in a sequential fashion. The treatment of vitiligo can be done by targeting these pathways for better results for recovery from the disease [6].

Classification [4, 8]

There are many reports on the classification of vitiligo, but most of the investigators classified the vitiligo into two large subtypes:

Segmental Vitiligo (SV)

- Begins in childhood
- Autoimmunity rare
- Frequently facial
- Stable results after autologus grafting
- Dermatomal, unilateral distribution

Non-segmental Vitiligo (NSV)

- Later onset
- Autoimmunity associated
- Trauma prone sites and koebnerisation
- Unstable results after autologous grafting
- Non-dermatomal bilateral distribution

According to the distribution pattern and extent of depigmentation, clinically vitiligo is classified as: Localized, Generalized, and Universal.

- Localized: Localized vitiligo can be further classified as:
    - Focal: One or more macules with casual distribution
    - Unilateral: One or more macules are localized in a unilateral body region, with a dermatomeric distribution; a typical feature is an abrupt stop of the lesions at the midline
    - Mucosal: Unique involvement of mucous membranes
- Generalized:
    - Acrofacial: Patches are localized on distal extremities and face
    - Vulgaris: Presence of scattered stains extensively disseminated
    - Mixed: Co-existence of acrofacialis and vulgaris forms

- Universal: Depigmented lesions interest completely or almost completely the skin surface

Treatment

There are many treatment options for the vitiligo but the repigmentation rate do not reach figure beyond 70-75%. The long list of therapies for vitiligo confirms that there is no good approach.

Sunscreens

In vitiligo, Skin has a high risk to the development of cancer. Due to this reason, Sunscreen with sun protection value 15 or greater are recommended to prevent the sunburn on exposed sites [9].

Fake tan products

Fake tan products bind to the stratum corneum. These are used in extensive vitiligo. Dihydroxyacetone is the active ingredient in the preparations. The colour of the skin changes within 2-3 days and then disappears over a few days if application stops. The fake tan products change the skin colour to orange yellow, the colour match is often poor [10].

Cosmetic camouflage

In facial vitiligo, cosmetic camouflage gives good results. It is time consuming and the preparation rub off on clothing. In the USA market the best known is Covermark [9].

Topical Corticosteroids

Topical corticosteroids are useful on small patches. Low, Mild, and High –potency steroids are often used for the treatment of vitiligo (9). A potent topical agent such as 0.1% betamethasone valerate (Betnovate) may be used on the face, and a super potent agent clobetasol propionate (Dermovate) on the body. This treatment is recommended for 1-2 months, if no response has been seen within 3 months, treatment should be stopped. If some repigmentation has begun, the therapy may be continued under close supervision [10].

Vitamin D analogues

It has been reported in the study that the combination of PUVA sol (psoralen-sun therapy) and calcipotriol is highly effective and works faster and may be used for shortening the therapy with PUVA in the treatment of patchy areas of vitiligo depigmentation [11]. In another study topical application of calcipotriol appeared to be an effective and well-tolerated treatment for vitiligo and it can be safely used in conjugation with PUVA [12].

Phototherapy

Ultraviolet light have been used in the treatment of vitiligo. The oldest source used for UV light is the sun. Different types mercury lamps, Long wave UVL, High intensity UVA bulbs are used for the emission of UV radiations. Fluorescent lamps emit the different regions of UVL e.g. broadband UVB (290-320nm), selective UVL (295-335nm), Narrow band UVB (311) and UVA 1 (340-400nm) [13].

Depigmentation

Depigmentation therapy includes the removal of the remaining pigment rather than to regain new pigment in the skin. This therapy is especially done when residual pigmented skin is located on the face (14). Bleaching the remaining pigmented skin is the practical approach of therapy in patients having vitiligo on considerable area s of the body [15]. This therapy consists of the application of a bleaching agent containing monobenzylether of hydroquinone (MBEH). This compound leads to a satisfying degree of depigmentation in most patients [14]. Permanent depigmentation maybe achieved within 1 year by the use of hydroquinone-containing preparations, 20% monobenzyl ether of hydroquinone being the most used [10].

Pseudocatalase

Pseudocatalase is a low-molecular weight inorganic complex of unknown formula with catalase activity [10, 16]. The patient with vitiligo has been shown with an extremely low catalase activity [15]. Topical application of pseudocatalase, topical calcium preparation used in combination with short term UVB light exposure has been reported in an open study to show repigmentation. Complete repigmentation on the face and dorsum of the hands appeared in 90% of those treated [10, 16].

Cognitive behavioral therapy

Cognitive behavioral therapy plays an important role in the treatment of vitiligo. Papadopoulos L and other authors have examined the effect of cognitive behavioral therapy on coping with vitiligo and adaptation to the negative effects on body image, quality of life, and self esteem in adult patients. Two matched group vitiligo patient were compared, one of which received the cognitive behavioral therapy over a period of 8-weeks. The patients receive this therapy show a change while other received no change in the treatment status. A result from this study suggests that patients can benefit from cognitive behavioral therapy in terms of coping and living with vitiligo [17].

Surgical techniques for vitiligo

The basic principle of surgical treatment is to transplant autologous melanocytes from a pigmented donor skin to region without melanocytes. This is theoretically possible in all patients with pigmented donor areas, some prerequisites are necessary for vitiligo patients to be eligible for transplantation [18].

Traditional Indian Medicine

Indian medicines have thousands of years of history. It has many branches which include Ayurveda, Yoga, Naturopathy, Unani, and Sidda medicines. There are similarities in the medicinal plants utilized and their indications in the India and China due to a long history of active trading through Silk Road (via Central Asia, trans-Himalayan or sea-route). Ayurvedic medicines primarily use mineral-based and herbal drugs that act as photosensitizer and blood purifiers.

Photosensitizing agents include Psoralea corylifolia, Semicarpus anacardium (marking nut), and Ficus hispida. They are administrated locally as well as systematically in conjunction with sun exposure. Sun exposure is advised three hours after drug administration. Blood purifiers include Curcuma longa, Eclipta alba, Tinospora cardifolia, Hemidascus indicus, Acasia catachu, and Acaranthus aspara [19].

CONCLUSION

In the conclusion we can say that, Vitiligo is a disorder of skin, in which white patches, develops on the skin due to the loss of functioning melanocytes. We have a number of treatment options for the disease but there is no satisfactory treatment for this disease. There is a need to find the exact pathogenesis for the disease for the development of effective treatment. The results in the disease in term of repigmentation are occurred with the use of herbal treatment along with irradiation of the depigmented skin. Surgical treatment can be considered if the other treatments failed.

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