ABSTRACT

The present review article introduces about leucoderma disease history, prevalence, epidemiology, pigment biochemistry, treatment and herbal drug of *Psoralea corylifolia*. Leucoderma also known as vitiligo. It is a pigmentation disorder. The most common treatment in leucoderma is the use of topical or oral psoralens followed by exposure to UVA radiation. Psoralen stimulates the skin and its produce melanin pigment when exposed to sunlight. Psoralens followed by exposure to UVA radiation in the region of 280-315 nm wavelengths.

Keywords: Leucoderma, *Psoralea corylifolia*, Psoralen, Exposure to UVA radiation.

INTRODUCTION

Leucoderma is also known as vitiligo. It is a pigmentation disorder.\(^1\) Leucoderma is a skin disease and the word leucoderma means “to have white skin”. There would be a gradual loss of pigment called melanin from the dermal layers that results into the white patches.\(^2\) It include the loss of functioning melanocytes which causes the appearance of white patches on the skin.\(^3\)

The most common treatment in leucoderma is the use of topical (cream, ointment, oil etc.) or oral (medicine) psoralens followed by exposure to UVA radiation in the region of 280-315 nm wavelengths.\(^4\) A thin coat of 0.01% to 0.1% methoxsalen ointment is applied on leucoderma skin. After 30 min, the skin is exposed to 0.12J/cm\(^2\) to 0.25J/cm\(^2\) UVA with increments of 0.12J/cm\(^2\) weekly.\(^5\)

Psoralen is an isomer of furanocoumarin obtained from the fruits of *Psoralea corylifolia* Linn. and it is a photosensitizing agent. *Psoralea corylifolia* or Bakuchiol contains furanocoumarins like psoralen.\(^5\) Psoralen stimulates skin to produce melanin pigment when exposed to sunlight. The *Psoralea corylifolia* seeds are believed to facilitate amino acid transport across the intestinal mucosa by acting as a photo-sensitizer for the initiation of erythema on the spots of leucoderma. Furanocoumarins initiated the transformation of DOPA (Dihydroxyphenylalanine) to melanin under the influence of UV light or sunlight. The epidermal tissues contains free sulphhydryl groups.\(^2\) These sulphhydryl group bind to the free copper ions which are required for the function of tyrosine.\(^6\) *Psoralea corylifolia* helps in the release of sulphhydryl group (SH-group) bound copper as free copper, which activates the tyrosinase activity for melanin synthesis.

Aim

Aim of present investigation is beneficial herbal drug of *Psoralea corylifolia* for leucodrma.

History

The term vitiligo has been derived from the latin word “vitilus” meaning calf and this term was first coined by Celsus, Roman physician in the 1\(^{st}\) Century A.D.\(^1\) According to him white patches of the disease look like the white patches of a spotted calf. Vitiligo is an antiquated disease mentioned in religious texts such as holy, quran, veda, and bible. The disease is even documented as “Bai Dian Feng” in traditional Chinese medicine, “Shewetakusta” in Indian classic atharva veda, “Kilas” in vinay pitah and “Bars” and “Phulbehri” in the Arabic and Punjabi languages.\(^8\)

Prevalence

Leucoderma or vitiligo affects approximately 1–2% of world’s population, but the prevalence has been reported as high as 4% among few of south asian, mexican, and American populations. In hospitals kuala lumpur, Malaysia during the period of 2003–2007, approximately 2.2% new cases have been reported for this disease within the same period.\(^10\)
Epidemiology

Vitiligo is a common depigmenting skin disorder, with an estimated prevalence of 0.5–2% of the population in both adults and children worldwide. One of the earliest and largest epidemiological surveys to have been reported was performed on the Isle of Bornholm, Denmark, in 1977, where vitiligo was reported to affect 0.38% of the population. Vitiligo affects ethnic groups and people of all skin types with no predilection. However, there seem to be large geographic differences.11

Pigment biochemistry

Melanin is the major skin pigment. It is synthesized by specialized cells called melanocytes. Melanin is a formed through the series of oxidative reactions involving amino acid tyrosine in the presence of tyrosinase (enzyme). Melanocytes synthesize the melanin within the membrane controlled organelles called melanosomes and later melanosomes are transferred through dendrites to surrounding keratinocytes. Each epidermal melanocyte secretes melanosomes to approximately 40 keratinocytes (1:40) in the neighborhood, and this entireunit is called” epidermal melanin unit”. Consequently, the type (eumelanin/pheomelanin) and amount of melanin synthesized by the melanocyte and its distribution in the surrounding keratinocytes determine the actual color of the healthy skin.

There are four major steps involved in melanogenesis process:

I. The development of melanocyte precursor cells (melanoblasts) and their migration from the neural crest to peripheral sites.

II. Differentiation of melanoblasts in to melanocytes.

III. Survival and proliferation of melanocytes.

IV. Formation of melanosomes and production of melanin.

All the four steps are important for normal melanin biosynthesis and any disturbance in the melanin pathway results in either hypopigmentation or hyperpigmentation of skin.1

Treatment

In the present review we highlight the combination therapy of herbal drug Psoralea corylifolia contain psoralen and exposure of UV radiation.

Patients with vitiligo or leucoderma have areas of completely white skin. PUVA or phototherapy is combination treatment of psoralen and exposing skin to UV radiation. PUVA (UVA is long wave radiation and UVB is short wave radiation) can bring about some repigmentation, particularly for vitiligo of the face and dark skinned patients. Results for other body sites and white skinned patients are less encouraging. Treatment is usually twice a week for two years. Even then complete repigmentation cannot be guaranteed and relapse is possible.12 Many different modalities have been used and continue to be used for the treatment is given below1:...

Figure 1: Represents different treatment modalities of leucoderma

PSORALEA CORYLIFOLIA

Vernacular name:

- English: Babchi seeds, Psoralea seeds
- Gujarati: Bavachi
- Hindi: Babchi, Bavachi, Bakuchi13

Family:

- Leguminosae

Chemical constituents:

Psoralea corylifolia extract contains several phytochemicals are :

- Flavonoids (neobavaisoflavone, isobavachalcone, bavachalcone, bavachinin, bavachin, corilin, corilifol, corilifolin and 6-prenylnaringenin),
- Meroterpenes (bakuchoil and 3-hydroxybakuchoil)
- Furancoumarins (psoralidin, psoralen, isopsoralen and angelicin).14

The furancoumarins, which contain psoralens it is promote pigmentation on the skin. The table given below the information about psoralen.15,16

<table>
<thead>
<tr>
<th>Table 1: Drug profile of psoralen</th>
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<tbody>
<tr>
<td><strong>Name</strong></td>
</tr>
<tr>
<td><strong>Molecular formula</strong></td>
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<tr>
<td><strong>Molecular weight</strong></td>
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<td><strong>IUPAC name</strong></td>
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### Structure

![Image of Psoralen structure](image)

### State
- Solid

### Melting point
- 163.00 to 164.00 °C

### Boiling point
- 362.00 to 363.00 °C

### Extract
- From the seed of Psoralea corylifolia L.

### Solubility
Psoralen is soluble in organic solvents such as ethanol, Dimethyl sulfoxide (DMSO), and dimethyl formamide (DMF), which should be purged with an inert gas. The solubility of psoralen in ethanol is approximately 1 mg/ml and approximately 30 mg/ml in DMSO and DMF. Psoralen is sparingly soluble in aqueous buffers.

### Storage conditions
- Keep container tightly closed in a dry and well-ventilated place.
  - Recommended storage temperature: 2-8 °C.
  - Light sensitive.
  - Store in the dark.
  - Store under inert gas.
- Keep in a dry place.

### Mechanism of Action
Melanocytes are activated and pigmentation occurs over the following week. This action is used to repigment areas of disfiguring depigmentation, e.g. vitiligo in black-skinned persons. In the presence of UVA the psoralen interacts with DNA, forms thymine dimers and inhibits DNA synthesis.

### Uses
- Skin diseases like Psoriasis, Vitiligo

### Adverse effects
- Itching, Redness, Burns, Blisters, Freckles or aged skin.

### Parts used:
- Seeds
- Seed oil
- Roots
- Leaves

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**Figure 2:** Psoralea corylifolia seed

**Figure 3:** Psoralea corylifolia seed oil

**Figure 4:** Psoralea corylifolia leaves

**Mechanism of action for leucoderma:**

The drug seem to have a purely local action with a specific effect on the arterioles of the sub capillary plexuses, which are dilated so, that the plasma is increased in this area.

The skin becomes red and the melanoblasts (pigment for mingscells) are stimulated. In leukoderma, melanoblasts do not function correctly and their stimulation by the drug leads them to form melandudate pigments, which gradually
The furanocoumarins, which contain psoralens it stimulates the skin to produce melanin pigment when exposed to sunlight. *Psoralea corylifolia* also used as antifungal, antitumor, antioxidant, antibacterial agents etc.

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