Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(4s), 1015-1020 | ISSN:2251-6727

Overview, Pathogenesis and Medicinal Plant Used for Treatment of Vitiligo

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(Received: 07 October 2023 Revised: 12 November Accepted: 06 December)

KEYWORDS:
Vitiligo, Melanocytes, Pathophysiology, Nonsegmental, Depigment

ABSTRACT:

The condition known as vitiligo results in the death of melanocytes. This destruction is caused by three main factors. It is estimated that 0.5% to 2% of people world wide suffer from vitiligo, a prevalent cutaneous disorder that causes depigmentation. Melanocytes are specifically destroyed in this disorder, resulting in non-scaly, chalky-white macules. Depigmented mice also exhibit a muted response to contact allergens, one of the numerous abnormal functions of their skin. Although albinos' white skin, which is similar in colour to that of vitiligo patients, is more prone to skin cancer, vitiligo patients' white skin does not develop non-melanoma skin cancers. The term "vitiligo" was defined in 2011 to refer to all non-segmental types of vitiligo, while segmental vitiligo was classified separately from all other kinds of vitiligo according to an international consensus. This review summarised the current synthetic medicine and some natural phytoconstituents used for vitiligo, as well as discussing the types, signs & symptoms, aetiology, and pathophysiology of vitiligo.

Introduction

Vitiligo is a pigmentation disorder characterized by depigmented molecules which is resulted as an immune – medicated destruction of melanocytes in both humoral and cell mediated immunity and with combination of auto immunity diseases such as hyperthyroidism, adrenocortical insufficiency, alopecia areata, and pernicious anaemia [1]. According to international consensus in 2011 they classified vitiligo in two categories as Non segmental vitiligo, Segmental vitiligo [2]. Types and subtypes of vitiligo are discussed in table 1.

There are three hypotheses of pathogenesis can occur in vitiligo are biochemical/ cytotoxic [toxic to living cell]. The neurons hypothesis is based on nerve injury development with affected sites that results in segmental vitiligo with neurons that interact with melanocytes and release melano cytotoxic substrates; the autoimmune hypothesis is based on genetic data which are more associated with autoimmune diseases. Neural and autoimmune biochemical/cytotoxic hypothesis emphasizes that vitiligo occurs when the melanocyte is killed by cytotoxic precursors to melanin synthesis [4]. Vitiligo is a white patch occurs in the skin and it's alternative known as leukoderma (leuko means white; derma means skin). Treatment for vitiligo have normally concentrated on corticosteroids, immunomodulators and phototherapy topical therapies does not produce better effect in some cases in the persons for alteration narrow - band ultraviolet B (NB -UVB) light is used [5].

Table 1: Types and subtypes of vitiligo

Types	Subtypes
Non - segmental vitiligo	Mainly (it is involved into segmental (SV) or non-segmental vitiligo (NSV), acrofacial, mucosal, generalized, universal and rare variants of vitiligo.
Segmental Vitiligo (SV)	Mainly it is involved into segmental (SV) or Non segmental vitiligo (NSV), unisegmental, Bisegmental or multi segmental.

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JCHR (2023) 13(4s), 1015-1020 | ISSN:2251-6727

Mixed (NSV +SV)	Concomitant occurrence of SV and NSV according to the severity of SV [3].

Immunosuppression is a important compound in the clinical management of vitiligo for an a autoimmune diseases. calcineurin inhibitors and topical corticosteroids promote repigmentation [6-8] for repigmentation of vitiligo there are two treatment is involved. Suppression of autoimmunity Regeneration of melanocytes from their stem cell niche in the hair follicle. Psoralen molecules are transformed by PUVA using UVA radiation into DNA reactive oxidation chemical products that inhibits immunological function and promote melanocyte proliferation and pigmentation [9,10]. Phototherapy is also used in treatment of vitiligo.

Skin pigmentation

Skin pigmentation refers to the colour of your skin that is produced by melanin pigment which is responsible for the tone of your skin, eyes and hair it is produced by cells called melanocytes. Skin pigmentation is caused due to three leading causes are: Genetics, Sun exposure, particular medication. Treatment and prevention can do only when we understood causes of skin pigmentation [11]. There are two types of pigmentation disorder (hypopigmentation) lighter and (hyperpigmentation) darker melanin regulates skin colour it produces less frequently by the body is called hypopigmentation. Increase in melanin synthesis is called Hyperpigmentation [12,13,14]. Hypopigmentation can be caused due to infections, burns, exposure to chemical, other wounds and other hereditary disorder such as albinism, melanoma, fungal infections, pityriasis versicolor, and vitiligo. Pigmentation on hand and skin is mentioned in figure 1.

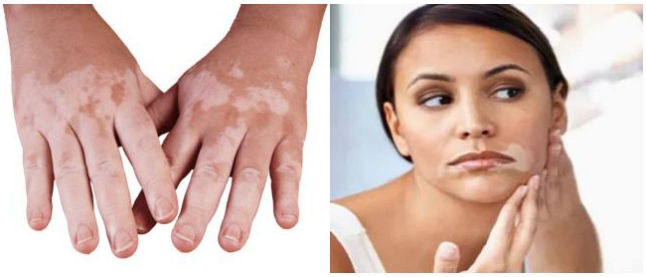

Fig .1. pigmentation on hand and face

Sign and symptom ofVitiligo

- Occasional loss of skin tone.
- Premature whitening occurs on your eyebrows, eyelashes, beards and scalp of your hair.
- Loss of colour in the tissues that line the inside of your mouth and nose (Mucous Membranes).
- Hyperpigmentation at the edges of the discoloured patches on the skin.

Depigmentation patches on skin is a most common symptom in vitiligo. Beginning patches will be very small according to the time patches increases. The skin lesions are mostly observed on hand, face, and wrists. patients those who suffer from this disease will suffer from depression [15].

Causes

Melanocytes are the cell produces melanin if the melanocytes stop functioning or died vitiligo will occurs. A disorder in which the skin's melanocytes are targeted and harmed by your immune system, family heredity, a trigger event [sun burn, stress or exposure to industrial chemical], stressful events [16,17].

DIAGNOSIS

If acquired, amelanotic, nonscaly, chalky-white macules with obvious ends appear in a typical distribution, the diagnosis of vitiligo usually occurs clinically. periorificial, segmental, penis, lips, and tips of distal extremities; spots of friction. It is usually not necessary to carry out confirmatory laboratory testing for the purpose to identify vitiligo. Other than checking out other illnesses, a skin biopsy or other testing are not required. A skin samples or in vivo confocal microscopy can be used to noninvasively assess a lesion's lack of melanocytes. The whole loss of melanin pigment in the center of a vitiligo lesion can be seen by histology. A layer of skin and absence of melanocytes. Occasionally, lymphocytes can be seen in the border of the lesions as they progress. A Wood's lamp is a portable ultraviolet, or UV, light source that emits UVA radiation and can help in the diagnosis of vitiligo. Particularly in cases of pale skin, it aids in recognizing signs of focal melanocyte loss and identifying areas of depigmentation in puts that may not be evident to the naked eye. The vitiligo lesions look well-defined and produce a stunning blue-white fluorescence when exposed by the Wood's light.

Vitiligo can be differentiated from other depigmenting conditions via dermoscopy. Residual perifollicular

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JCHR (2023) 13(4s), 1015-1020 | ISSN:2251-6727

pigmentation and telangiectasia are typical characteristics of vitiligo that are not present in other hypopigmentation terms. Additionally, it can be useful to identify the stage of evolution and disease activity in vitiligo: Perifollicular pigmentation appears in moving lesions, but perifollicular depigmentation appears in stable or remitting lesions. Areas of depigmentation that resemble vitiligo are present in a variety of common and uncommon disorders. It is important to differentiate vitiligo from melanoma-associated leukoderma and to prevent its misdiagnosis as vitiligo especially that it may precede melanoma detection. Antibodies against the melanoma antigen recognized by T cells 1 (MART1) in melanoma-associated depigmentation can help differentiate it from vitiligo even if both conditions have similar clinical features. Segmental hypopigmentation, also called nervus depigmentation, can be present at birth or noticeable during the first year of life. It may grow in proportion to the child's growth, yet it is stable. While it is a common differential diagnosis of SV, nevi usually contain a normal number of melanocytes and generate fewer pigments. The variance between lesional and normal skin under Wood's lamp examination isn't as apparent as it is in vitiligo.

PATHOGENSIS

A multifactorial disorder called vitiligo is defined by a loss of feasible melanocytes. There are many theories about why vitiligo causes the destruction of melanocytes. These includes melanocyte detachment mechanisms, oxidative stress, autoimmune responses, genetics, and the creation of inflammatory mediators. It seems that both the immune system's innate and adaptive splits are engaged. While there is now arrangement on the autoimmune nature of vitiligo, none of the proposed theories by themselves is sufficient to explain the different vitiligo phenotypes, and the corresponding effects of each of these processes remain unsettled. The progressive loss of melanocytes may be caused by a number of mechanisms, two of which are immune attack and cell degeneration and detachment. The "convergence theory," also known as the "integrated theory," postulates that a number of methods could work together in vitiligo to contribute to the destruction of melanocytes, which would ultimately result in the same clinical outcome.

Since NSV and SV present clinically variously, it was believed that they were different underlying pathogenetic mechanisms; for the segmental form, the neuronal hypothesis or somatic mosaicism was favored. More recent research, however, indicates the autoimmune pathophysiology of NSV and SV overlaps. Both appears to involve a multi-step process that starts with the release of proinflammatory cytokines and neuropeptides in response to an injury, whether it is internal or external, which is followed by vascular dilatation and an immune response.

Referred to as the "neural hypothesis," some writers have proposed that the nervous system performs a part in the pathogenesis of vitiligo. On SV's unilateral distribution pattern, this idea has been founded. But SV is not always, if at all, dermatomal, and its distribution pattern differs from that of any other skin disorder. Additional proof that autoimmunity plays a role in SV's mediated state comes from the discovery of melanocyte-specific T-cell infiltrations that are identical with those found in NSV [18]. Synthetic drugs amd list of medicinal plants used for vitiligo is given in table 2.

CONCLUSION

Vitiligo is a pigmentation disorder characterized by depigmented molecules. There are two types of vitiligo and vitiligo causes mainly through Family heredity, sun burn, stress or exposure to industrial chemical synthetic drug. vitiligo pathogenesis begins with altered melanocytes that exhibit an elevated cellular stress response. Roxolitinib cream and this cream is used in treatment of vitiligo and causes many side effects and adverse effects (redness and itching) for that reason wear are using medicinal plant for curing vitiligo Ginkgo biloba are most effective in halting progession of the disease and speed up repigmentation process in vitiligo patients. So that we are using medicnal plants through that we can reduce side effects and better repigmentation occurs in skin.

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JCHR (2023) 13(4s), 1015-1020 | ISSN:2251-6727

Table 2: Medicinal plant used for vitiiligo

Common name	Biological name	Family	Chemical constituents	Uses
Maidenhair tree	*Ginkgo biloba*	Ginkgoaceae	Quercetin, kaempferol, isorhamnetin, Ginkgolide, Bilobetina, ginkgetina, ginkgolic acid.	Treatment of tuberculosis, cognitive dysfunction, stomach pain, asthma, bronchitis. [23] Treatment of neurological disorders and Alzheimer's disease , anti - inflammatory, and antioxidant activities, cardiovascular disorders, neuroprotective, immunomodulatory[24].
Muskmelon or Sweet melon	*Cucumis melo*	Cucurbits	Linoleic acid, oleic acid, vitamin C&E, cucurbitacins (terpenes)	Vitamin -A, Vitamin C- antioxidant, prevent heart diseases and even cancer [25].
Picrorhiza	*Picrorhiza kurrooa*	Scrofulariaceae	Picrorhizin, kutkin picroside -1, 2 & 3, D-mannitol, vanillic acid, kurrin, kutkiol kutki -sterol.	Jaundice, skin diseases and improves eye sight, treatment of liver disorder, reduce fever, chorinc diarrhea, dyspepsia.
Calaguala	*Polpodium leucotomos*	Polypodiaceae	Kaempferol, rutin, trimeric proanthocyanidin, selligueain, coumarinicacid derivative, melilotoside.	Treat a variety of dermatologic disorders immunologically-mediated photodermatoses, vitilIgo, melasma. Anti -inflammatory and anti tumor properties [26].
Green tea	*Camellia sinensis*	Theaceae	Caffeine, amino acids, vitamins, carbohydrate, lipids, polyphenos, epigallocatechin – 3 – gallate [27-29].	Prevention of cancer and antibacterial, anti-inflammatory, antiangiogenic, antiarthritic antioxidative, antiviral, cardiovascular diseases, cholesterol-lowering effects neuroprotective [30].
Chilli	*Capsicum annuum*	Solanaceae	Oleoresin, carotenoids, thiamin, Capsaicin.	Arthritis, backaches, muscle strains, bruises, in some chronic pain syndromes such as (bladder dysfunction, musculo skeletal pain postherpetic neuralgia) are used as topical application.
Flame vine, Firecracker vine	*Pyrostegegia venusta*	Bignoniaceae	Naphthoquinones, iridoid glucosides, alkaloids, flavones, triterpenes, polyphenols.	Treatment of vitiligo, dysentery, immoderate menstrual flow, respiratory system, genital infections, cough, flu, diarrhoea, vitiligo, and jaundice [31].
Synthetic drug used in vitiligo				

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Khellin	There are two major compounds Khellin and visnagin are in addition to 4-norvisnagin, visamminol, khellinol, khellol, ammiol. Coumarins, which may be further divided into two sub-groups Pyranocoumarins: represented by an angular-type dihydro-pyranocoumarin glucoside which was isolated from the fruits and named cis-khellactone-30 -β-d-glucopyranoside, in addition to visnadin, samidin, and dihydrosamidin, furanocoumarins such as xanthotoxin, ammoidin, bergapten, and psoralene are present, but only in small amounts. Other important γ-pyrones include 5,7-dihydroxy-2-methyl-γ-pyrone-7-O-glucoside and pimolin (III), as well as, khellinin, khellinone, and visnaginone [32].

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