



A Comprehensive Review On: A Vitiligo and its Cure from Nature

Patil HR^{1*}, Jain AS², Patil DR³, Shaikh AZ⁴, Shaikh SR⁵, Dr. Pawar SP⁶

P. S. G. V. P. M's College of Pharmacy, Shahada Dist. Nandurbar

harshadapatil946@gmail.com

Abstract

Vitiligo is a long lasting skin condition characterized by patches of the skin losing their pigment. The patches of skin affected become white and typically have sharp margins. The hair from the skin might also become white. The inside of the nose and mouth might also be concerned. The rate of colour loss from skin condition is unpredictable. Vitiligo happens when the cells that produce melanin stop or die functioning. Vitiligo affects the individual of all skin sorts; but it may be more noticeable in people with darker skin. Risk factors include a family history of the condition or other autoimmune diseases. In this review we focus on how plant based herbal products help in curing vitiligo.

Keywords: Vitiligo, Melanocyte, Repigmentation, Herbs, Herbal Medicine, Remedies, Treatments.

Introduction

A pigmentation condition called vitiligo arrives on when melanocyte cells are destroyed, these cells are responsible for the production of skin pigment (Melanin) ^[1]. The loss of melanocyte functions is responsible for vitiligo but the real cause of vitiligo is unidentified, A number of illnesses such as autoimmune disorder, genetic, neural, viral infections and oxidative stress perform an vital role in vitiligo ^[2]. Due to the breakdown of melanocytes in this condition, white patches and spots develop on the skin. In the entire world, just 1% of people have to deal by this medical condition ^[3]. The highest recorded cases of this disease are in India, Egypt, and Japan, where they affect 1.25 to 6 percent of the population. Vitiligo is usually more in childhood or in young adults (20–30

years of age) and in about 30 % there is a positive family history. These are mainly 3 types-Segmental Vitiligo (SV), Non-segmental Vitiligo (NSV), and Mixed Vitiligo (MV) ^[4-5]. White patches develop as a result of these illnesses on the lips, axillae, perioral, periorbital, and anogenital skin, as well as on the hands, wrists, feet, arms, cheeks, and perioral region. It may also have an impact on the body's mucous membrane ^[6]. In the majority of people, it often changes gradually, with stable periods that can last several years. The pigment may return in some patients after some time, but is not sure and scant returns completely ^[7]. These white patches are spread to other areas of the body but in some patients, the white patches do not spread, while some people patches spread slowly and

in some people quickly. White patches spread more quickly in those patients who suffer from higher levels of physical, physiological, and mental stress [8].

History

The Latin word "vitilus" (which means "calf") is where the word "vitiligo" originates. Celsus, a Roman physician, first used the phrase in the first century A.D. [9]. He claimed that the disease white patches looked similar to the white spots on a spotted calf. Religious prayers like the Bible, Veda, and the Holy Quran all mention the old disease vitiligo. The disease is even documented as “Bai Dian Feng” in traditional Chinese medicine, “Shewetakusta” in Indian classic Atharva Veda, “Kilas” in Vinay Pitah, “Bars” and “Phulbehri” in Arabic and Punjabi language [10].

Epidemiology

The most prevalent depigmenting skin condition is vitiligo, which affects 0.5–2% of the population world-wide, including both adults and children [11, 14]. In 1977, one of the first and largest epidemiological surveys ever

documented was carried out on the Danish island of Bornholm, where vitiligo was found to affect 0.38 percent of the population [11]. Males and females are equally impacted, yet women and girls usually seek advice more frequently, possibly due to the negative societal impact is stronger for them than for men and boys [13]. NSV can develop at any age; however it most frequently affects young people between the ages of 10 and 30 [15-17]. 25 percent of vitiligo patients experience the condition before the age of 10, 50 percent or more experience it before the age of 20, and between 70 and 80 percent or more experience it before the age of 30 [15,18]. Most populations have mixed age-of-onset groups and double peaks as has been noted [19].SV occur at a younger age than NSV [17].In 87% of cases, before the age of 30 and in 41.3% before the age of 10 [20]. In the report of Hann and Lee [20] the average onset age was 15.6 years. The earliest documented beginning occurred right after birth, and the latest was at age 54. Most cases, with lengths ranging from 2 months to 15 years, have been open for less than 3 years at the time of referral [20].

Classification

Table No. 1: Classification of Vitiligo

Types of Vitiligo	Subtype
Segmental Vitiligo (SV)	Focal Unisegmental Bi or Multisegmental
Non segmental Vitiligo (NSV)	Focal Mucosal Acrofacial Generalized Universal

There are three different forms of vitiligo: segmental, non-segmental, and mixed [21]. Segmental cases typically affect one side of the body, and the diseased region of skin does not grow over time. It may have an impact on different body parts. This kind makes for almost 10% of all known cases of vitiligo. Most cases of vitiligo that are known to exist are of the non-segmental kind; it is more prevalent and affects both sides of the body. Usually, it starts begin with a temporary discoloration of the hands, feet, or face. Acrofacial type typically involves the peritoneal cavity. Patients with acrofacial disorders may also have mucosa in certain areas. The most prevalent variety in adulthood, universal has the most impact on the tegument (affecting 80–90% of the body surface). It typically comes after the generalised or common form. Mixed Vitiligo is a combination of both Segmental and Non-Segmental vitiligo [21].

Types and Patterns of Vitiligo

- **Focal Vitiligo:** This is the type which mostly occurs in children. This unique type of vitiligo involves a small area and it don't spread in certain pattern within 1-2 years. The term "focal vitiligo" was used to describe a small, isolated acquired pigmentation without the typical segmental distribution as well as two to three smaller acquired lesions that were up to 5 cm in size and localised in a non-segmental area [22].
- **Mucosal Vitiligo:** The mucosal vitiligo generally affects the mucous membranes of the body parts; generally, of mouth and genitals. Mucosal vitiligo (MV) may develop by itself, as a development of perioral acrofacial vitiligo, or as a component of

vitiligo vulgaris. The most likely subtype of this illness is pure MV [22].

- **Acrofacial Vitiligo:** This kind of vitiligo can spread to the periorificial and distal fingers. If this only affects the lips & fingertips; then it is called 'Liptip vitiligo' [22].
- **Generalized Vitiligo:** This condition commonly known as "Vitiligo Vulgaris," is the most prevalent variety of vitiligo. This form of discoloured patches is widely distributed and symmetrically arranged. Generalised vitiligo, often referred to as nonsegmental vitiligo, is the most frequent form which results in depigmentation (pigment loss) in patches of skin all over the body. Depigmentation is most common on the face, neck, and scalp, as well as around body openings such as the mouth and genitals [22].
- **Universal Vitiligo:** This unusual type shows the involvement of 80% of skin in the disease [22].
- **Segmental Vitiligo:** Early onset is a feature of segmental vitiligo. Patches of this type are only observed on one side of the body or in one specific area, like the hands, the face, etc [22].
- **Mixed Vitiligo:** This very rare kind of segmental vitiligo appears as a clearspot of segmental vitiligo on one side of the body, which becomes restricted by the midline [22].

Diagnosis of Vitiligo

The only indication that someone has vitiligo is the presence of patchy, depigmented skin, which usually appears on the extremities. People occasionally feel a lot of itching right before the next patch appears. The patches can begin in a limited region at first and then develop, spread, and change shape. The face, wrists, and hands are the areas of the body where skin lesions are most common. Around

body orifices, such as the mouth, eyes, nostrils, genitalia, umbilicus, and others, the loss of skin pigmentation is most visible. Around the margins in specific affected areas, there is additional layer of skin pigmentation [23]. It is very difficult to differentially diagnose vitiligo. To correctly identify vitiligo, one must be able identify between various skin conditions such complete depigmentation, hypo pigmentation, and the skin's original colour. The diagnosis of vitiligo can be very difficult in persons with very light skin tones. The use of Wood's lights in the diagnosis of vitiligo patients with skin conditions I and II has been shown to be very helpful. Techniques and equipments like Pure Tone and Speech Audiometer, Sound Treated Room, Cochlear Emission Analyzer Madsen, Emittance Meter, Evoked Response Audiometer Nickolet Compact Four, Wood's Light Lamp have been very useful in the diagnosis of vitiligo [24].

Treatment of Vitiligo

While there are presently no known cures for vitiligo, there are certain herbal and medicinal products that can be applied to stimulate the development of new pigment cells in the skin. Some important herbal remedies are the following:

- **Ginkgo Biloba:** Ginkgo biloba (also called the "maiden hair tree") is one of the oldest trees on Earth whose leaves and seeds are largely used in medicine. A common plant called ginkgo biloba is used to treat a number of diseases, including allergies, vein problems, premenstrual syndrome, headaches, vertigo, and others. These plants' seeds and leaves have been used in medicine for a very long period. It is mostly showing the anti-inflammatory, repigmentary,

immunomodulatory and antioxidant properties [25, 26]. A large percentage of the white areas have been treated by this treatment, but melanocyte repigmentation is not uniform. The drug is safe and well-tolerated at therapeutic dosages (normal value: 120mg/day). The daily dosage > 240mg may result in restlessness and gastrointestinal disorders, and this treatment is contraindicated for haemorrhagic patients because these drugs are interfuse the blood [27].

- **Muskmelon:** The fruit muskmelons are a member of the Cucurbitaceae family. It grows usually as climbing plants with stems that are 1.5 metres long and sprawl along the ground. It is primarily found along riverbanks and deserts [25, 28]. High levels of superoxide dismutase, an antioxidant, are found in curcumas melo extract. This antioxidant is essential for preventing the melanocyte from becoming damaged under oxidative stress [29]. When combined with narrow band UVB and curcumas melo extract, it is applied to skin lesions and is effective in treating vitiligo [30].

- **Picrorhiza Kurroa:** An alternative name for Picrorhizakurroa is "kutki." The main application of kutki extract is as a hepatoprotective agent and it contains antioxidant and immuno-modulating properties. Thepicrorhiza is used to treat vitiligo as a result of a recent study that shows a common effect in repigmentation [31].

- **Psoraleacorylifolia:** Due to the presence of psoralen in the seeds, Psoraleacorylifolia is also used to cureleucoderma.The seeds are consumed in the morning, empty stomach [32].These seeds' extracts are combined with ultraviolet a light (UVA), and the treatment includes receiving a medication that raises the

sensitivity of UV light. The duration of this therapy is BD (twice a day) for at least six to ten months [33].

- **Ginger And Red Clay:** Red clay and ginger juice are combined, and then applied to regions that have lost their colour to help treat vitiligo [34]. Clay contains copper, which causes the skin to re-pigment. Ginger promotes increased blood flow to the white spot, which helps in the re-pigmentation of the spots. The river bank and hill are where the red clay is collected [35].
- **Khellin:** The Khellin is obtained from the natural source; it is derived from the plant of *Amnivasnaga*. This plant has been used as an herbal remedy for a variety of disorders. It promotes melanogenesis and melanocyte proliferation. This medication doesn't perform well when taken orally because it is hepatotoxic. It works best when combined with UVA Phototherapy [36].
- **Polypodium leucotomos:** *Polypodium leucotomos* is a tropical fern and is also called as "Calaguala", and *Polypodium aureum*. It is belonging to the family of *Polypodiaceae*. Due to the high concentration of antioxidant and photo protective compounds in this fern, it is primarily used to treat a variety of skin conditions, including vitiligo, psoriasis, and atopic dermatitis [37, 38]. It indicates that the combination of oral *Polypodium leucotomos* with PUVA therapy produced superior results than photo chemotherapy alone in the form of faster repigmentation [39].
- **Capsicum:** One of the most significant spice components is the capsicum, which contains the active ingredient found in chilli peppers known as capsaicin. Anti-inflammatory and antioxidant effects are present in it. Since a few decades ago,

capsaicin has been used to treat vitiligo because it prevented the cellular damage caused by ROS [40].

Medicinal Remedies of Herbs in Vitiligo

- **Bakuchi (*Psoralea corylifolia*)**

Commonly referred to as Bakuchi. In India, it is widely distributed. Its seed shows stimulant, aphrodisiac, diuretic, cytotoxic, anthelmintic, antibacterial, astringent, cardiac, deobstruent, and cytotoxic effects [41]. In the treatment of vitiligo, it is an important herb. Many coumarins, including psoralen, are present in the seeds of this plant. For the treatment of Vitiligo, or skin conditions that cause white spots, psoralea and sunshine work well together [41].

- **Haridra (*Curcuma longa*)**

Curcumin is the principal curcuminoid of the popular Indian spice turmeric, which is a member of the ginger family (*Zingiberaceae*). Turmeric has long been used in Ayurvedic medicine as an antibiotic and blood purifier, skin diseases and wound healing. It also was used externally, to heal sores and cosmetic use is common. It inhibits viral and fungal disease. Haridra or turmeric has the potential of improving repigmentation in vitiligo. Curcumin, the prime constituent of turmeric by means of its antioxidant and anti-inflammatory mechanisms, helps in repairing skin in vitiligo [41].

- **Kumari (*Aloe barbadensis*)**

It is potent Ayurvedic medicine for vitiligo. The plant contains strong anti-inflammatory and antioxidant properties that soothe and heal the skin [41].

- **Ashwagandha (*Withania somnifera*)**

Popularly known as Ashwagandha and is the most powerful herb of its kind. Basically used

as a rejuvenating drug. *Withaniasomnifera* holds a place in the Ayurvedic practices very similar to Ginseng in Chinese traditional practices. It is also termed as “Indian Ginseng”. *Withaniasomnifera* is used in many Ayurvedic medicines for maintaining good health. It provides better immunity and considered as a good nerve tonic ^[41].

- **Giloy (*Tinosporacordifolia*)**

Tinospora is known as “Guduchi” commonly and from family Menispermaceae, found at higher altitude. Widely used in formulations for fever, liver disorders and various skin diseases. The herb is better known for immunity improvement and *tridos-samak* according to Ayurveda ^[41].

- **Basil-Herb (*Ocimum Sanctum*)**

Commonly called Tulsi and found in almost every Indian home. It has a role in providing better immunity and it works well to improve body metabolism. Used to treat respiratory disorders, fungal infections, and bacterial infections. Tulsi is good for skin care and eye care. It has antimalarial property and widely used in Malaria and Typhoid ^[41].

- **Chirayata (*Swertiachirata*)**

It has Indian name Chirayata. It has antimicrobial properties and usually is being used as blood purifier. It has anti-inflammatory properties and is used to treat malaria also. And used to treat various skin diseases and infections ^[41].

- **Shatavari (*Asparagus racemosus*)**

It is also called Shatavari and is a powerful herb from family liliaceous. It is a climbing plant that can be found all over India in low forest settings. It is primarily used to support immunity and general health. Many Ayurvedic medicines apply the powder to promote health ^[41].

- **Neem (*Azadirachta indica*)**

Popularly known as Nimba or Neem in India. Neem tree is found throughout India. It is a popular village tree. In India, toothbrushes are frequently used. The antiseptic effect of it can treat a variety of bacterial illnesses. In Ayurveda, neem is regarded as a potent blood cleanser. Neem leaves are used to treat vitiligo, leprosy, and numerous skin conditions. It contains immunomodulating properties that make it useful for treating skin's white patches ^[41].

Prevention

Currently, there is no treatment for vitiligo and hardly to prevent the condition. If a person chooses to have therapy, the goal is often to restore pigment and stop further skin depigmentation. One of the best methods to avoid damage and de-pigmentation is to limit your exposure to the sun. Some food is also helps to cure vitiligo like fig, beet root, carrot, chick peas, dates, green leaf vegetable and reddish etc. but despite any evidence, some people prevented vitiligo by following some tips.

1. Water consumption can help the body's immunological system, which can help prevent vitiligo.
2. Vitiligo can be avoided by consuming green leafy vegetables and fruits like bananas and apples.
3. Avoid drinking alcohol, caffeine, eating red meat, and consuming fish to prevent the development of white spots.
4. White spots can be avoided by consuming foods high in vitamins B, C, amino acids, and folic acid.

5. It will also help if you add minerals like iron, zinc, and copper to your food.
6. When a cut, burn, or sunburn affects the skin, the skin pigment cells are destroyed. That might lead to vitiligo.
7. Vitiligo can be prevented by avoiding serious skin wounds and burns ^[41-42].

Homemade Preparation of Formulations

1. Turmeric and Psoralea Seed: The herb (psoralen) that works the most effective is used to treat vitiligo. Turmeric has anti-inflammatory and antiseptic properties in it and also plays a vital role in Ayurvedic medicine because of its health benefits. When both of them are combined with turmeric as an effective cure for Vitiligo. Psoralen should be handled with extreme caution and knowledge of all aspects of it, since failure to do so could be harmful ^[43].

Direction for Use: soak seed of psoralen with turmeric in water for about four days. Dry the soaked seed and grind to a paste. The paste should be applied on the white spot for at least one month, you will be noticing changes in the skin, for best results, it is recommended to continue treatment beyond one month.

2. Mustard Oil and Turmeric: Turmeric has anti-inflammatory and antiseptic properties in it and also plays a vital role in Ayurvedic medicine because of its health benefits. It increases the body's natural immunity when used on wound that can prevent bacterial infection. Patients with Vitiligo can benefit greatly from homemade medicines produced with mustard oil and turmeric. Because it is antimicrobial, the oil might aid in body detoxification ^[43].

Direction of Use: Mix 5 tablespoon of turmeric powder with 250 ml of mustard oil. Make sure the oil and turmeric are thoroughly

combined. On the white spots of skin, use this mixture twice daily. To achieve good results, the spots must be completely eliminated after a year of treatment, and your skin will be clear and healthier. The remedy is natural and safe ^[43].

3. Lemon Juice and Basil Leaves: Basil leaves are one of the common useful kitchen ingredients. It has antiviral and anti-aging effect and proved effective in curing Vitiligo and stress. Lemon juice has much positive effect as it also acts an anti-inflammatory effect and good source of vitamin C. When lemon juice and basil leaves extracts are combined they stimulate the stimulation of melanin in the body ^[43].

Direction of Use: In a bowl, mix the lemon juice and basil leaf extract. Apply the mixture on the white spot and leave it for a while. Use this treatment 3 or 4 times daily. Within 5-6 months you can see visible result. The treatment has no side effects and it absolutely safe for Vitiligo patients ^[43].

4. The Water Stored in Copper Utensils: As vitiligo is also caused due to the deficiency of vitamins and some other deficiency. Water reserves in copper bottles, glasses are very useful ^[43].

Direction of Use: The water used in copper utensils is kept overnight. The water should be taken every morning and within six months we can notice a difference in the skin. The treatment promotes the production of melanin by melanocytes stimulation in the body. It is a safe home remedy and with no side effect ^[43].

Conclusion

The real reason for vitiligo is unknown. It happens when the melanocytes, which are the cells that give skin its colour, die or stop

functioning. However, this is an immune system issue and not just a skin condition. People who have a family history of vitiligo are more likely to develop the disorder, but it can't come from someone who already has it because vitiligo is not a condition. Although there is no known treatment for vitiligo, drinking lots of water and eating lots of green, leafy vegetables may help to prevent the condition. Patches are prevented by vitamins

B, C, and amino acids. Avoid coffee, fish, alcohol, and red meat to prevent the spots. Papaya pieces can be applied to the patches to help from vitiligo control. Vitiligo cannot be totally cured, but it can be treated. There is many herbs that can help in vitiligo (e.g. - Neem, Shatavari, Chirayata, Giloy, Ashwagandha, kumari, basil leaves, Haridra, Bakuchi etc.)

References

1. Abu tahir M., Kumar P., Ansari S.H., Javed Ali. *Current remedies for vitiligo*, *Autoimmunity Reviews* 9 (2010) 516–520.
2. Ghafourian E., Ghafourian S., Sadeghifard N., Mohebi R., Shokoohini Y. ezamoleslami, Hamat R.A. *vitiligo: Symptoms" Pathogenesis and Treatment*, *Int. J. Immunopathol. Pharmacol.* (2014) vol. 27: 485-489.
3. Dhvani M. Lakhani, Ashwini S. Deshpande, *Various Treatments for Vitiligo: Problems Associated and Solutions*, *Journal of Applied Pharmaceutical Science*, 2014Vol. 4 (11), pp. 101-105.
4. Tortora G.J., Derrickson B., *Principles of Anatomy and physiology*, Willey international, 11th edition, 2006; 150-151.
5. Faria A.R., Roberto G. Tarlé, G. Dellatorre, M.T. Mira, C.C., Castro S.D., *Vitiligo - Part 2 - classification, histopathology and treatment*, *Anais Bras Dermatol.* 2014; 89 (5):784-790.
6. *What is Vitiligo, Fast Facts: An Easy-to-Read Series of Publications for the Public*, U.S. Department of Health and Human Services, Public Health Service, 2010.
7. *British Association of Dermatologists Patients Information Leaflets*, August 2004.
8. Yoon J., Sun Y.W., Kim T.H., *Complementary and Alternative Medicine for Vitiligo*, *Vitiligo–Management and Therapy*, 2011, 143-158.
9. Abu Tahir M, Pramod K, Ansari SH, Ali J. *Current remedies for vitiligo*. *Autoimmune Rev* 2010; 9:516-20.
10. Ansari FZ, Alam S, Jain P, Akhter S, Ansari MZ. *Vitiligo and its herbal treatment*. *Pharm Rev* 2008; 12:137-9.
11. Howitz J, Brodthagen H, Schwartz M, Thomsen K. *Prevalence of vitiligo. Epidemiological survey on the Isle of Bornholm, Denmark*. *Arch Dermatol.* 1977; 113(1):47–52.
12. Boisseau-Garsaud AM, Garsaud P, Calès-Quist D, Hélénon R, Quénehervé C, Claire RC. *Epidemiology of vitiligo in the French West Indies (Isle of Martinique)*. *Int J Dermatol.* 2000; 39(1):18–20.
13. Alikhan A, Felsten LM, Daly M, Petronic-Rosic V. *Vitiligo: a comprehensive overview Part I. Introduction, epidemiology, quality of life, diagnosis, differential diagnosis, associations, histopathology, etiology, and work-up*. *J Am Acad Dermatol.* 2011;65(3):473–91.
14. KrügerC, Schallreuter KU. *A review of the worldwide prevalence of vitiligo in children/adolescents and adults*. *Int J Dermatol.* 2012; 51(10):1206–12.
15. Sehgal VN, Srivastava G. *Vitiligo: compendium of clinico-epidemiological features*. *Indian J Dermatol VenereolLeprol.* 2007; 73(3):149–56.
16. Ezzedine K, Diallo A, Léauté- Labrèze C, Seneschal J, Boniface K, Cario-André M, et al. *Pre- vs. post-pubertal onset of vitiligo: multi-variate analysis indicates atopic diathesis association in pre-pubertal onset vitiligo*. *Br J Dermatol.* 2012; 167(3):490–5.
17. Nicolaidou E, Antoniou C, Miniati A, Lagogi-anni E, Matekovits A, Stratigos A, et al. *Child-hood-*

- and later-onset vitiligo have diverse epidemiologic and clinical class analysis of a series of 717 patients with vitiligo allows the identification of two clinical sub-types. *Pigment Cell Melanoma Res.* 2014; 27(1):134–9.
18. Hann SK, Lee HJ. Segmental vitiligo: clinical findings in 208 patients. *J Am Acad Dermatol.* 1996; 35(5 Pt 1):671–4.
 19. Dhvani M. Lakhani, Ashwini S. Deshpande: Various treatments for Vitiligo: Problems Associated and Solutions 2014; 4: 101-105.
 20. Shamana Rajesh Gondalia, Mr. Bhavik Chuhan, Monika Rakholia, Divya Kanojiya. A Review on a Vitiligo and its Cure from Nature. *Gisscience journal.* volume9, issue 5, (2022).1381-1391.
 21. Huggins RH, Schwartz RA, Janniger CK (2005) Vitiligo: *Acta Dermatovenerologica Alpina, Pannonica et Adriatica* 2005; 14 (4): 137–42, 144–45.
 22. Talia K. Vitiligo in children: A review of classification hypothesis of pathogenesis and treatment. *World J. Pediatric*, 2009; 4:265-268.
 23. Gianfaldoni S., Wollina U., Tirant M., Tchernev G., Lotti J., Satolli F., Rovesti M., França K., Lotti T. Herbal Compounds for the Treatment of Vitiligo: A Review, *Open Access Maced J Med Sci.* 2018; 6(1):203-207.
 24. Parsad D., Pandhi R., Juneja A. Effectiveness of oral Ginkgo biloba in treating limited, slowly spreading vitiligo. *ClinExpDermatol.* 2003; 28(3):285-7.
 25. Szczurko O., Shear N., Taddio A., Ginkgo biloba for the treatment of vitiligo vulgaris: an open label pilot clinical trial. *BMC Complementary and Alternative Medicine.*
 26. Naini F.F., Shooshtari A.V., Ebrahimi B. The effect of pseudocatalase/superoxide dismutase in the treatment of vitiligo: A pilot study. *J Res Pharm Pract.* 2012; 1(2):77-80.
 27. Yuksel E.P., Aydın F., Senturk N. Comparison of the efficacy of narrow band ultraviolet B and narrow band ultraviolet B plus topical catalase-superoxide dismutase treatment in vitiligo patients. *Eur J Dermatol.* 2009; 19(4):341 -344.
 28. Buggiani G., Tsampau D., Hercogová J. Clinical efficacy of a novel topical formulation for vitiligo: compared evaluation of different treatment modalities in 149 patients. *Dermatol Ther.* 2012; 25(5):472-476.
 29. Bedi K.L., Zutshi U., Chopra C.L. Picrorhizakurroa, an ayurvedic herb, may potentiate photo chemotherapy in vitiligo. *J Ethnopharmacol.* 1989; 27(3):347-52.
 30. Ghafourian E. Ghafourian S. , Sadeghifard N. , Mohebi R. , Shokooitni Y., Nezamolledlami S. And Hamat R.A. Vitiligo: Symptoms" Pathogenesis and Treatments. *International JIP.* Vol. 27, no. 4, 485-489 (2014).
 31. Anon. Vitiligo -treatment. Patient UK.NHS. Retrieved 2013-06-03.
 32. Dhvani M. Lakhani, Ashwini S. Deshpande. Various Treatments for Vitiligo: Problems Associated and Solutions, *Journal of Applied Pharmaceutical Science* Vol. 4 (11), pp. 101-105, 2014.
 33. Soni P., Patidar R., Soni V., Soni S., A Review on Traditional and Alteranative Treatment for Skin Disease "Vitiligo", *International Journal of Pharmaceutical and Biological Archives* 2010; 1(3): 220 – 227.
 34. Carlie G, Ntusi N.B., Hulley P.A.KUVA (khellin plus ultraviolet A) stimulates proliferation and melanogenesis in normal human melanocytes and melanoma cells in vitro. *Br J Dermatol.* 2003; 149(4):707-17.
 35. Edlich RF, Winters KL, Lim HW. Photo protection by sunscreens with topical antioxidants and systemic antioxidants to reduce sun exposure. *Journal of Long - Term effects of Medical Implants.* 2004; 14: 317 - 340.
 36. Berman B, Ellis C, Elmets C. Polypodium Leucotomos - An Overview of Basic Investigative Findings. *J Drugs Dermatol.* 2016; 15(2):224-8.
 37. Nestor M., Bucay V., Callender V. Polypodium leucotomos as an Adjunct Treatment of Pigmentary Disorders. *J Clin Aesthet Dermatol.* 2014; 7(3):13-17.
 38. Becatti M., Prignano F., Fiorillo C. The involvement of Smac/DIABLO, p53, NF - kB, and MAPK pathways in apoptosis of keratinocytes from perilesional vitiligo skin: Protective effects of curcumin and capsaicin. *Antioxid Redox Signal.* 2010; 13(9):130921.
 39. Mahendra Dwivedi. Preventing Vitiligo with Herbal Remedies. *Journal of Pharma and Ayurved Research* Volume 1 Issue 1. *CR Journals* (Page 7–16) 2020.

40. *Vitiligo prevention: Is it possible?" Medically reviewed by Owen Kramer, M.D. Written by Jessica Caporuscio, Pharm. D, 2020.*
41. *Umamayezdani, Mahmood Ali, Mohammad Gayoor khan, Ayushkumar, princebhalla, mayursadar. World journal of pharmaceutical research. Volume 8, Issue 9. 884-892.*