

# Vitiligo-Ayurvedic Treatment Approach

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## Abstract

This is a single-blind clinical trial on patients of vitiligo, a disease rather difficult for a cure. Aetiology is multifactorial. It can be hereditary, autoimmune, hormonal, dietary, stress or secondary to other systemic diseases like diabetes mellitus, hypothyroidism, etc. This study was carried out on 200 outdoor patients suffering from vitiligo. Patients from both sexes, from age group five to seventy years complaining mainly as white patches over skin were studied. Patients were treated with an Ayurvedic polyherbal powder mixture containing *Psoralea corylifolia* (Bakuchi) as the main ingredient supplemented with local application and phototherapy (natural). Most of the patients undergo intermittent body purification i.e. shodhana-panchakarma treatments like Vamana (therapeutic emesis), Virechan (purgation), Basti (enematous treatment for Vaatadoosha) raktamokshana, etc., as per ayurvedic guidelines. Duration of treatment was of one month to one year depending upon response and requirement for the treatment. Follow-up was biweekly to monthly. The response to treatment was observed in terms of reduction in the area of depigmentation after treatment. Complete cure was noted in 12% of patients. A good result is noted in 18% cases, moderate in 45% cases and mild result in 25% cases noted. The result is statistically highly significant at 0.1% level. No major side effects of the treatment given were observed. The treatment is effective in kaphaja and pittaja types of vitiligo as per Ayurvedic classification. The results of internal medications and local treatment were aggregated especially after panchakarma treatment.

**Keywords:** Vitiligo; Ayurvedic polyherbal mixture shwitrayoga; *Psoralea corylifolia*; Natural phototherapy; Panchakarma highly effective

## Introduction

Since long ago, the treatment of vitiligo is a challenge to the medical fraternity. It creates a very bad social stigma for the victim. In my clinical practice, I came across the number of patients suffering from vitiligo. The victims are physically affected and also under very gross psychological stress. Allopathic skin specialists have no satisfactory permanent cure for vitiligo. In fact, allopathic skin specialists are

using harmful chemicals and steroids for the treatment. So I decided to work on this subject for the benefit of mankind with the basic Ayurveda principles for the safe and effective of vitiligo.

## Disease Description-Ayurvedic View

In Ayurveda majority of skin ailments are considered as minor (kshudra) diseases. But as in vitiligo (shwitra), in spite of manifestation of disease over the skin, there may be systemic involvement. It is 'Aparisravi (Non discharging)', so it is considered separate from leprosy. It affects males and females equally. Worldwide 0.5 to 1% population is affected with vitiligo. Age of onset is before the 20 to 30 years of age in most of the patients. Mostly it affects both sides of the body equally. It can affect any area of body eg: Face, lips, arms, legs, genitals, scalp, soles, palms, trunk, back, neck, fingers, etc. In some areas like lips, scalp, joints, genitals it is described as difficult for a cure. In Ayurveda, it is called as 'Shwitra' [1].

As per Ayurveda, it has same causative factors as kushtha i.e., leprosy. It is without discharge, vitiated with three doshas i.e., Vata, Pitta, Kapha doshas.

In Ayurveda, it is classified as Vaataja, Pittaja, and Kaphaja as per dosha vitiated. Vataja shwitra is dry (ruksha) and of Red-black (arun) in color. Pittaja is coppery or lotus-like in color and associated with inflammation (daha) and loss of hair. Kaphaja shwitra is hard, heavy with white color and associated with itching. It is associated with rakta (blood), mansa (Muscle tissue) and meda (lipid) dhatus as per Vaata, Pitta, and Kapha Dosha-vitiation respectively [1,2]. In fact, these are the progressive stages of the disease, so also prognosis worsens accordingly.

Additionally, Charaka has named Shwitra (Kilasa) as Darunam, Varunam, and Shwitrām when the Doshas are seated in Rakta, Mansa and Medo Dhatus respectively. In fact, dhatus are not practically affected, but their vitiation is expressed by dermis (twak).

Madhavidan classified shwitra on the basis of the causative factors viz., Doshaja and vranaja [3]. Acharya Charaka has described some special causes for vitiligo e.g. telling lie, not believing God, not apologizing someone's good deeds, performing sins, deeds of previous life (poorvakarma) etc. [1] (charak chikitsa 7/177). These causes point to the inheriting nature of the disease in some cases and towards mal or abnormal thinking by the brain (pradnyaparadha) as a major cause. Unbalanced diet (Virrudhahara) is also an important cause. It signifies production of toxic metabolites as an important cause for the development of the disease. It is different from Leprosy (kushtha) in the respect that it is non-contagious, non-bacterial, it doesn't destroy body tissues, doesn't have any discharge (vyadhiswabhaba). Leprosy

(Kushtha) deeply goes up to all Dhatus. Vitiligo (shwitra) occupies only skin, blood, muscle tissue (mansadhathu) and fat (medadhathu).

Treatment needs a holistic approach. There is an imbalance of regulating hormones for melanin synthesis. For homeostasis of hormones and detoxifying body with Ayurvedic body purification treatment i.e., panchakarma is very useful. In fact, in Ayurveda, it is described as powerful purificatory treatment and it should be done before commencing any specific medical treatment for the disease.

### Prognosis (Sadhyasadyata)

Madhavanidana described that Vitiligo (shwitra) in which hairs are black, in a small percentage, with ununited spots, new (<1 year-charak) is curable. Others including developed due to burns, in genitals, hands, and feet, lips, with a history of inheritance are non-curable or difficult for a cure [2].

### Treatment (chikitsa)

In Ayurveda internal medications (abhyantara chikitsa), Local application (lepchikitsa), sun UV rays exposure (aatapsevan), Body purification i.e., Panchakarma treatment-Therapeutic Emesis (vaman), Purgation (virechan), Basti-purification method for vata, Blood-letting (raktamokshan), etc., advised in texts. Treatment is long-term and should be continued from months to years [1].

### Modern (Allopathic Medicine) View

Vitiligo is a common acquired disorder of skin pigmentation characterized by localized loss of skin pigments secondary to melanocytes damage. It is estimated to affect approximately 0.5 to 1% of the population worldwide. It results from an autoimmune process that damages melanocytes. The disease disturbs individuals psychologically, particularly in dark-skinned victims. The cause is multifactorial, may be genetic, autoimmunity, neurologic factors, toxic metabolites, and lack of melanocyte production or early degeneration of melanocytes.

According to modern pathophysiology, in generalized vitiligo, melanocytes are not found in the affected skin. Melanocytes contain the pigment melanin which serves a protective action against the harmful effects of sunlight.

Phenylalanine → Tyrosine → Dihydroxyphenylalanine (DOPA) → Melanin (adrenals)

Melanin formation in the skin is augmented by the hormone Melanocyte Stimulating Hormone (MSH) or intermedion secreted by the pars intermedia of the pituitary gland. ACTH by anterior pituitary has melanocyte stimulating activity similar to MSH although to a much lesser degree. 25% of cases are autoimmune.

The pathogenesis is thought to involve an autoimmune process targeted against melanocytes. Histologic studies showed an absence of melanocytes in the affected skin. An autoimmune process is also suggested by the concomitant occurrence of other autoimmune diseases in patients with vitiligo. Patients with vitiligo have an increased incidence of several autoimmune disorders including hypothyroidism (common), Graves' disease, pernicious anemia, Addison's disease, alopecia areata, chronic mucocutaneous candidiasis, etc. Diabetes mellitus is also associated with some subjects. Vitiligo is a T-cell mediated autoimmune disease. Heat shock protein 70 (HSP70) plays a central nonredundant role in precipitating of depigmentation in vitiligo.

Localized hypopigmentation is also found in chemical leukoderma, piebaldism (autosomal dominant disorder), post-inflammatory, tinea

versicolor etc. Diagnosis of vitiligo can be ascertained by skin biopsy.

### Investigations

The commonly needed laboratory investigations like Complete Blood Count (CBC), BSL, Urine-Routine and Microscopic examination, and some hormonal assays like T3, T4, TSH estimation was done in suspected patients. In some patients, skin biopsy was required to confirm the diagnosis.

Also enquired about MSH hormone estimation, but such investigation technique was not found in available laboratories.

In suspected hereditary cases the diagnosis can be confirmed by DNA analysis also. In this study hereditary factor is decided by detailed family history taking.

### Treatment

In allopathic system no satisfactory and permanent cure is available. Treatment is steroid based, systemic psoralens with exposure to long wave UV radiation. Topical potent corticosteroids are used. Other treatment options are surgical and cosmetic. Skin grafting is practiced but again it has its serious side effects and limitations [4].

### Aims and Objectives

A. To study the efficacy of Ayurvedic Polyherbal mixture 'shwitrayoga' with local application and natural phototherapy and panchakarma in vitiligo (Shwitra) patients.

B. To note side effects of the treatment if any.

### Materials and Methods

The following methodology is adopted to conduct the study.

### Literary review

For collecting all the available information about Vitiligo, the literary review of available ayurvedic texts and Samhitas done thoroughly. Also, references from modern medicine books studied. Also, previous research on vitiligo reviewed from literatures [1-11].

### Clinical study

**Study design:** This is a single-blind clinical trial in patients with vitiligo. The study was carried out on 200 outdoor patients. Patients were just informed that they are undergoing ayurvedic medicine treatment for vitiligo. They were not informed about the exact medicines or the identity of medicines. No written prescriptions of the medicines given to patients under trial. The hospital staff was also unaware of the formulation. The study was conducted for last 12 years.

**Selection of patients:** The study was carried out on outdoor patients suffering from vitiligo.

#### A) Inclusion criteria

- Patients complaining of white depigmentation areas over skin as the main complaint.
- Patients from age 5 to 60 years of age.
- Selection is irrespective of the constitution (prakruti), sex, duration of the disease.
- Patients with or without a family history (kulavrutta) of vitiligo.

#### B) Exclusion criteria

- Patients below age of 5 years and above 70 years of age.

b. Pregnant and lactating women.

c. Patients unfit for treatment.

### Place of work

1. Mulla Ayurvedic Hospital, Islampur District, Sangli, Maharashtra, India

2. Mulla Clinic, Shirala District, Sangli, Maharashtra, India

3. Mulla Clinic, Sangli, Maharashtra, India

### Informed consent

Informed consent about nature and purpose of study from each patient was taken.

### Materials

“SHWITRAYOGA” (Anubhoot-experienced) contains five ingredients for 10 grams as follows:

- *Psoraliya corylifolia*-Bakuchi seed powder (purified)-5 grams
- *Acasia catechu*-Khadir (skin) powder-2 grams
- *Plumbago zeylanica*-Chitrak (root) powder-0.5 grams
- *Nordostachys jatamansi*-Jatamansi (root) powder-1 grams
- *Embllica officinalis*-Aamalaki (fruit) powder-1.5 grams

Local Application: (Anubhoot-experienced) tablets with *Psoraliya corylifolia*-(Bakuchi) as main ingredient.

**Collection of Material:** From well known Ayurveda raw material dispenser.

**Mode of action:** (Drug Pharmacology) [5] (Table 1).

### Dose (matra)

Textual dose of churna is 1 Karsha i.e., approximately 10 grams. Today it seems very high.

Practically used dose: adults-3 to 5 grams

Children-doses adjusted according to age and weight.

Local Application: as required

Natural phototherapy (sunbath)-5 to 20 mins, early in the morning as required depending on sunrays intensity and body response.

### Mode of administration

Patients were advised to take medicine as per scheduled dose 2 times a day after food. Also advised for applying local application once in a day in the early morning and advised to take natural sun exposure on affected areas. Intermittently panchakarma procedures like vamana, virechan, basti, and raktamokshan were carried out in these patients as and when required as per textual guidelines.

### Duration of treatment

One month to one year.

Follow up-Monthly for one year.

### Observations

#### Doshaja type of disease shwitra-vitiligo (classification)

It is shown in table 2 and figure 1.

#### Disease severity in observed patients

It is given in table 3 and figure 2.

#### Observations regarding etiology (Table 4 and Figure 3)

Observations were made in the following ways; Initial areas of white lesions were taken as 100% for each patient separately. The response to the treatment was observed in terms of normal pigmentation developed and reduction in the area of depigmentation after the treatment and expressed as percentage improvement in each patient. Most important factor noted was that the areas of repigmentation developed. Repigmentation developed by way of new spots of skin color at the base of hair follicles or as borders between the normal and affected skin and the baseline recoloration. Photographs before and after treatment were taken and shown in figures 4-20, also side effects if any were observed, noted and treated accordingly.

Percentage relief was calculated according to following formula:

$$\text{Percentage relief} = \frac{A_o - A_L}{A_o} \times 100$$

Where,

$A_o$  = % of vitiligo lesions before treatment

$A_L$  = % of vitiligo lesions after 12 months of treatment. (After the end of treatment).

**Table 1:** Mode of action: (Drug Pharmacology) [5]

Drug	Rasa-taste	Veerya-potency	Vipak-Post- digest effect	Action on Doshas	Specific Action	Active Ingredient	Reference
<i>Psoraliya corylifolia</i>	Bitter Pungent	Hot	Pungent	Checks Kapha, Vaata	Stimulates melanocytes for Melanin synthesis, Immunomodulatory	Psoralen Isopsoralen, bakuchiol, bavchinin bavachin, corylin	Bhavaprakash Dhanvantari Nighantu
<i>Acasia catechu</i>	Bitter Astringent	Cool	Pungent	Checks Kapha, Pitta	Shwitragnha	Catechin Rutin	Bhavaprakas
<i>Plumbago zeylanica</i>	Pungent	Hot	Pungent	Checks Kapha Vaata	Kushthaghna	Plumbagin	Bhavaprakash
<i>Nordostachys jatamansi</i>	Bitter astringent, sweet	cool	Sweet	Checks vitiation of 3 doshas	Kushthaghna Stress reliever	Acaciin, ursolie acid nardosinonedi-ol	Nighantusangraha
<i>Embllica officinalis</i>	Sour, Astringent pungent, bitter sweet	Cool	Sweet	Checks vitiation of 3 doshas	Rasayana blood purifier Skin rejuvenation immunomodulatory	Vitamin C emblicanin A, B	Bhavaprakash

The criteria for evaluation were decided which are presented in table 5.

Change in the mean of severity before and after treatment is calculated. Statistical methods like mean, Standard Deviation (SD), Standard Error (SE), etc., are applied to find out variations in observations.

## Results (Table 6 and Figure 21)

### Calculations [12]

We take the sample size as 200 and apply paired “Z test”.

1.  $X_1$  = % of vitiligo lesions before treatment i.e., 100% for a particular patient

$X_2$  = % of vitiligo lesion after treatment

$x$  = difference ( $X_1 - X_2$ )

Mean of difference  $\bar{x} = \frac{\sum x}{n} = \frac{11289}{200} = 56.44$

$H_0$  = Null hypothesis - there is no real difference between the means of two sets of observations.

3. SD of differences = 25.45

4. SE of difference =  $SD \div \sqrt{n} = 25.45 \div \sqrt{200} = 1.79$

5.  $Z = \frac{\text{Observed difference between means of two samples}}{SE} = 56.44 \div 1.79 = 31.53$

The observed ‘Z’ value is 31.53 times the standard error. Here probability is <0.001. So it is highly significant at 99.9% confidence limits.

**Table 2:** Doshaja type of disease shwitra-vitiligo (classification)

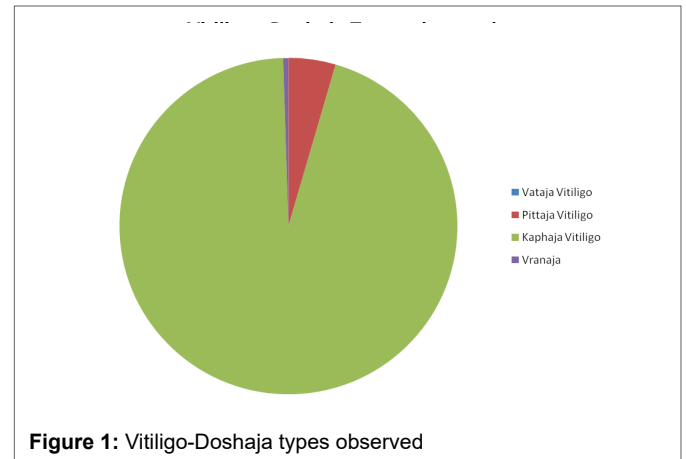
Doshaja Type	Diagnostic signs	Dushya (Affected dhatu) (Body tissue)	Patients observed	%
Vaataja (Darunam)	Ruksha (Dry), red-black (arun)	Rakta (blood)	0	0
Pittaja (Varunam)	Coppery/Lotus like, Daha (inflammation)	Mansa (Muscle tissue)	9	4.5
Kaphaja (Shwitram)	Hard, heavy, white, itching	Meda (Lipid tissue)	190	95
Vranaja (due to scar tissue)	Hard, white, pinkish	Twak (skin), Mansa etc.	1	0.5

**Table 3:** Disease severity in observed patients

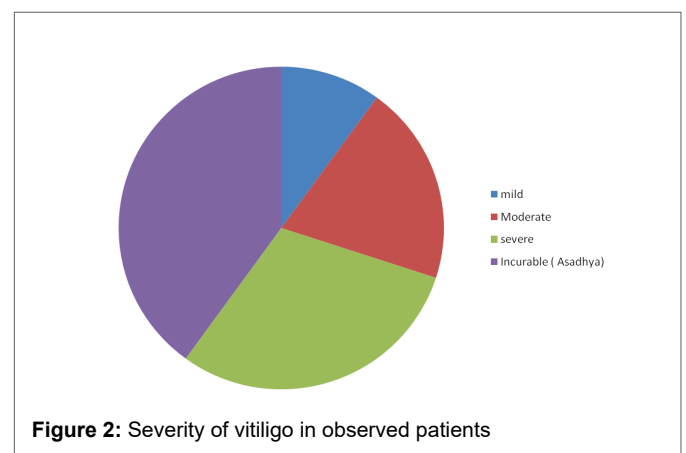
Severity	No. of patients	Percentage
<b>Mild</b> -New (<one month), normal hair colour, lesions not intermixed), lesions not clearly white	20	10
<b>Moderate</b> -onset of 2 to 6 months, affected hair colour, lesions intermixing, lesions clearly white	40	20
<b>Severe</b> -onset 6 months to 1 year, lesions intermixed, clear white lesions with hair colour affected	60	30
<b>Incurable (Asadhya)</b> -lesions >1 year duration, lesions very close to each other, lesions on palmer and planter surfaces, anal area, genitals, lips etc. lesions due to burns	80	40

**Table 4:** Observations regarding aetiology

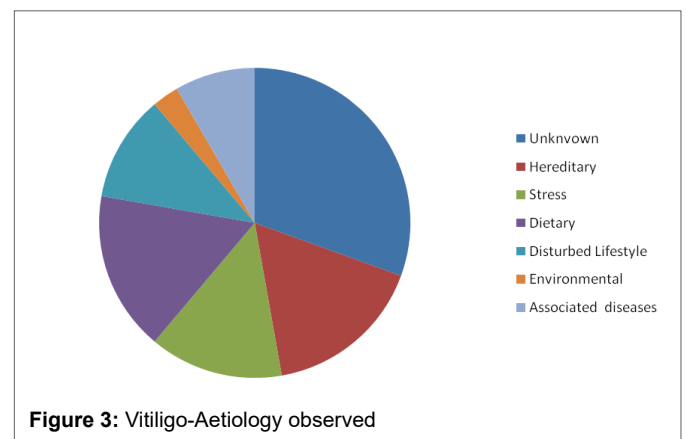
Causative factor	No. of patients	Percentage
Hereditary	30	15
Stress	25	12.5
Dietary	30	15
Disturbed Lifestyle	20	10
Environmental	05	2.5
Associated other diseases like thyroid disorder, Diabetes Mellitus, etc.	15	7.5
Unknown	55	27.5



**Figure 1:** Vitiligo-Doshaja types observed



**Figure 2:** Severity of vitiligo in observed patients



**Figure 3:** Vitiligo-Aetiology observed





Figure 4: a) Before treatment b) After treatment



Figure 5: a) Before treatment b) After treatment

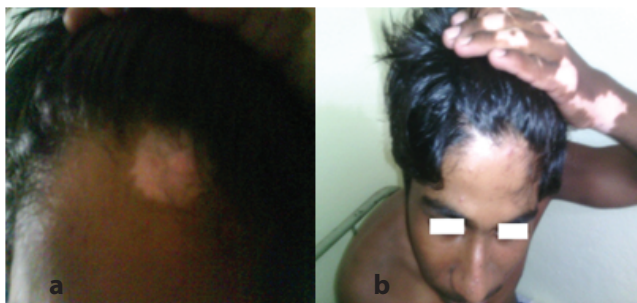


Figure 6: a) Before treatment b) After treatment



Figure 7: a) Before treatment b) During treatment



Figure 8: a) Before treatment b) With treatment c) With Treatment



Figure 9: a) Before treatment b) After treatment



Figure 10: a) Before treatment b) With treatment



Figure 11: a) Before treatment b) After treatment

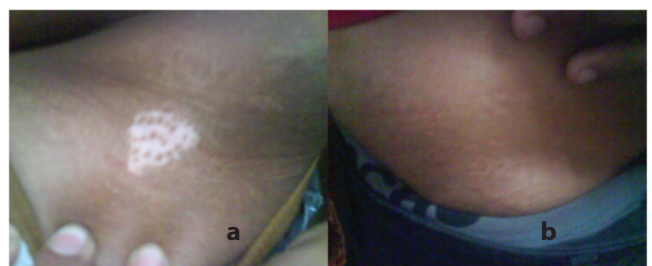


Figure 12: a) Before treatment b) After treatment



Figure 13: a) Before treatment b) After treatment

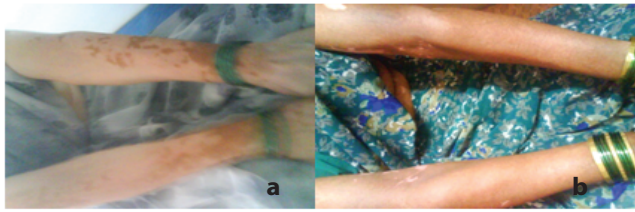


Figure 14: a) Before treatment b) Few months after treatment start



Figure 15: a) Before treatment b) With treatment



Figure 16: a) Before treatment b) With treatment

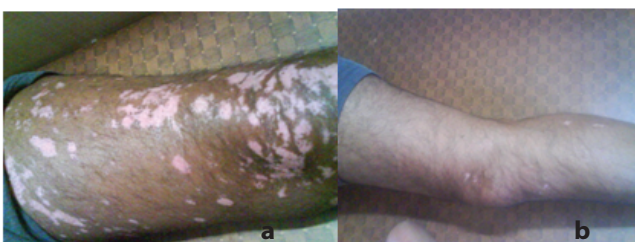


Figure 17: a) Before treatment b) With treatment



Figure 18: a) Before treatment b) With treatment

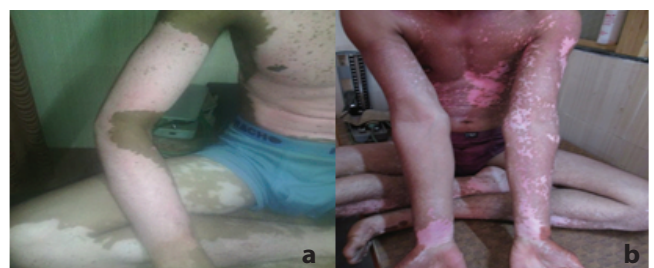


Figure 19: a) Before treatment b) With treatment

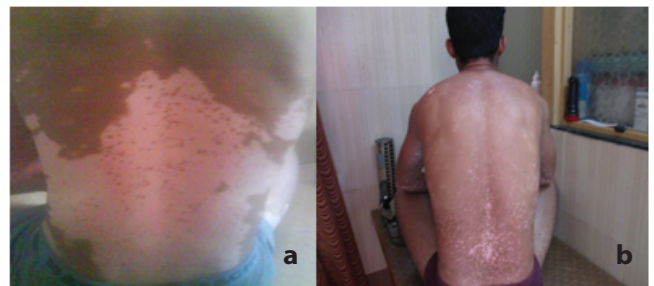


Figure 20: a) Before treatment b) With treatment

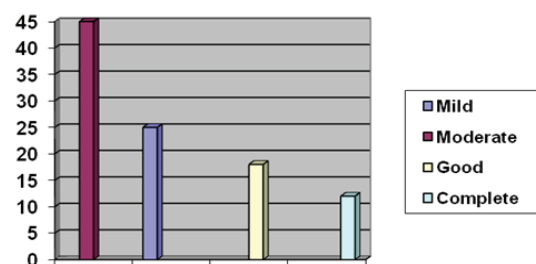


Figure 21: Showing % of result after treatment with Shwitravyoga

Probability comes to  $<0.001$  (real variability). So the difference in the means of two sets of observations is highly significant at 1% (0.1%) level. So we reject the null hypothesis and accept the alternative hypothesis ( $H_1$ ). So the Ayurvedic treatment approach with "Polyherbal powder mixture shwitravyoga along with local application, phototherapy and panchakarma therapy" is responsible for this difference.

### Summary-Discussion

This is a single-blind clinical trial on patients with vitiligo. Total 200 patients were treated and observed for the response with Ayurvedic treatment with polyherbal powder mixture "shwitravyoga" along with

local application and phototherapy with intermittent panchakarma treatment. Percentage of repigmentation noted with regular follow up of patients.

The observations can be summarized as follows:

- Patients from all age groups and both sexes were treated and observed.
- Thirty patients were noted with history of inheritance.
- It was noted that some patients also suffered from other endocrine diseases like diabetes mellitus and hypothyroidism along with



**Table 5:** The criteria for evaluation was decided as

Repigmentation/ Recolouration %	Description	Result
0	No effect-No repigmentation	Nil
1-33	Intermittent repigmentation (spots) with normal skin colour	Mild
34-67	Dense repigmentation (large united spots) with borders around lesions and base recolouration	Moderate
68-99	Very dense repigmentation with borders and base recolouration and totally normal skin colour development	Good
100	Total healing of the lesion (Normal Skin)	Complete

**Table 6:** Results

Result	No. of patients	Percentage %
Nil	0	0
Mild	50	25
Moderate	90	45
Good	36	18
Complete	24	12

vitiligo. In these patients management of these disorders was also needed along with treatment for vitiligo.

- Causative factors like unbalanced diet (viruddhahara), excessive consumption of milk, rice, non-vegetarian food, etc. were noted. Stress, disturbed lifestyle was also found in significant number of cases. In some patients, environmental factors like pollution, unmatched working atmosphere, etc might be the causative factors. In a significant number of patients cause of vitiligo was unknown; some of these categories might be of an autoimmune mechanism.
- Past history of taking allopathic medicines including steroids was noted in a significant number of cases for the cure of vitiligo at other treatment centers. Patients under trial were treated after many days, months or years after taking these types of drugs. So the probability of interference in the results of these drugs becomes very less or nil.
- The early cure was noted in patients with short duration of disease occurrence (few days to 2-3 months). Repigmentation was started between 3-4 weeks of starting the treatment in a significant number of cases.
- Response to medicinal treatment was augmented with intermittent panchakarma (body purification) treatments, e.g., Vaman (therapeutic emesis, Virechan-purgation, Basti-Ayurvedic enema treatment).
- Duration of response to treatment varied with the individual patient. Some patients with fresh disease and a lesser percentage of depigmentation responded quickly in few days to months. Patients with chronic, longstanding disease (>year), and those who tried other treatment options previously responded irregularly and generally, longer time was taken for a response to treatment.
- Response to treatment in patients with a history of inheritance was guarded. It was very hard to get a complete cure in these

patients. Although we got a moderate cure in these patients.

- Autoimmune and hereditary type patients were managed by doing frequent panchakarma treatments. It seems that the panchakarma brings very good immune-neuro-hormonal balance in human body. So better homeostasis is achieved which brings out faster results.
- The good or almost complete cure was achieved even in areas like lips, scalp, joints that are described as difficult for cure or incurable in texts.
- One patient with scar due to burns responded poorly probably due to fibrosis in the affected area.
- No major side effects of the treatment given were observed. Minor side effects like gastrointestinal discomfort, redness, and itching of affected skin were noted in some patients. These were managed accordingly.
- Shwitrayoga formulation is safe and well tolerated by children and elderly also for long-term use. It is not tried in pregnant and lactating ladies.
- 10 patients left treatment for various reasons i.e., lack of time, money, longer duration of treatment, unable to follow pathya (Do's and don'ts) etc.
- No negative results of the treatment were noted in any patient that means that disease didn't get worsened due to treatment.
- No recurrence after stoppage of treatment was noted even after one year or more in completely cured patients. In others, the progress remained stationary but didn't get worsened.
- The treatment was effective in almost all types of vitiligo except vranaja (Scar). Majority of patients observed were of kaphaja type followed by pittja shwitra (vitiligo). No patient of vatajashwitra (vitiligo) was observed.

## Conclusion

The following conclusion can be drawn from the present study

- The trial therapy with Ayurvedic polyherbal powder mixture 'Shwitrayoga' with a local application, Phototherapy (natural) and panchakarma has statistically highly significant results in vitiligo.
- The results of internal medications and local treatment were aggravated after the panchakarma procedures.
- Autoimmune and hereditary type patients can be better managed by doing frequent panchakarmas. It seems that the panchakarma brings very good immune-neuro-hormonal balance in human body. So better homeostasis is achieved which brings out faster results.
- The results of the present study need to be verified by taking larger sample size at institute level.
- There is also need to do some laboratory research like estimation of MSH and other related hormones in blood before, during and after the treatment.
- Ayurvedic panchakarma procedures i.e., vaman, virechan, basti, raktamokshan etc. should be studied on large scale for their efficacy in immunological, hereditary, autoimmune and psychosomatic diseases.
- Results show that there is very effective and safe treatment available for vitiligo patients.

- Results are faster than any other therapy.
- Overall treatment modality puts forward the strength of Ayurveda in the management of vitiligo irrespective of aetiology.

### Acknowledgment

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To all my patients who participated in this study.

To effective Ayurveda and its firm principles.

### References

1. Agnivesh, Charaka, Dridhabala (1993) Charaksamhita. Chaukhambha Bharati Academy, Varanasi chikitsathana 7: 162-177.
2. Madhavkar (1994) Madhavanidana. Chaukhambha Chaukhambha Sanskrit Sansthan, Varanasi 37: 164.
3. Madhavkar (1994) Madhavanidana. Chaukhambha Sanskrit Sansthan, Varanasi Kushthanidanam 39: 164.
4. Fauci AS, Harrison TR (1998) Harrison's Principles of Internal medicine. 14<sup>th</sup> Edition, McGraw-Hill 316-317.
5. Ranade S, Deshapande AP, Jawalagekar RR (1996) Dravyagunavigyan. Anmol Prakashan, Pune 34: 444.
6. Mulla S (2015) Efficacy of Vaman (Therapeutic Emesis) in Vitiligo. Journal of Medical and Dental Science Research 2: 8-12.
7. Mulla S (2016) Efficacy of Bastikarma in Vitiligo. Rashtriya Ayurveda Vidyapeeth, New Delhi, National Seminar Souvenir.
8. Latha PG, Evans DA, Panikkar KR, Jayavardhanan KK (2000) Immunomodulatory and antitumour properties of *Psoralea corylifolia* seeds. Fitoterapia 71: 223-231.
9. Panda AK (2005) The Medico historical Perspective of Vitiligo (Shwitra). Bull Indian Inst Hist Med Hyderabad 35: 41-46.
10. Prasad PV, Bhatnagar VK (2003) Medico-Historical Study of "Kilasa" (Vitiligo /leucoderma) a common skin disorder. Bull Indian Inst Hist Med Hyderabad 33: 113-127.
11. Mulla S (2017) Efficacy of Panchakarma in Endocrinopathies. International Ayurveda Congress, London Proceedings.
12. Mahajan BK (2002) Methods in Biostatistics. Jaypee Brothers 127-129.