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Comparative Study of *Arjun Twak Lepa* and *Arjun Twak Kukkutand Pottali* in Management of *Vyanga* with Special Reference to Melasma: An Update

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Hyperpigmentation is a darkening of the skin caused by an excess of the pigment melanin in the skin. Healthy and glowing facial skin enhances a person's beauty and self-confidence. *Vyanga* is a *Kshrudraroga* with the facial features of *Niruja* (painless) and *Shavavarna Mandalas* (bluish-brownish patches). Melasma, a hyper pigmented disorder with similar clinical features, can be compared to it. When applied locally, whole raw egg/egg yolk alone or with herbs has shown to be very effective in tightening skin, improving complexion, and healing skin disorders. In the current study, an egg is combined with *Arjun Twak* Churna (Fine powder made of skin of *Terminalia Arjun*) in *pottali (poultice)* in the experimental group to improve *Vyanga* management. Aim of the study was to study *Arjun Twak Kukkutand Pottali*'s effect on MASI (Melasma Area Severity Index). MASI of the patients was investigated, and the effects of *Arjun Twak Kukkutand Pottali* and *Arjun Twak Lepa* on MASI were compared.

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Methodology: A total of 44 patients were enrolled in the study (22 in each group). *Arjun Twak Lepa* was given to the control group for local use for 21 days. *Arjun Twak Kukkutand Pottali* was provided for local application for 21 days in the experimental group. On the 0th and 21st days, the assessment was completed.
Results: Positive Changes were seen in eight subjective and objective parameters, out of ten.
Conclusion: *Arjun Twak Kukkutand Pottali* performed better in reducing MSI (Melasma Severity Index).

Keywords: Arjun twak lepa; arjun twak kukkutand pottali; MSI (Melasma Severity Index); Vyanga.

1. INTRODUCTION

Healthy and glowing facial skin enhances a person's beauty and self-confidence. Acne, hyperpigmentation, and other factors can affect the complexion and texture of the facial skin. Hyperpigmentation is a darkening of the skin caused by an excess of the pigment melanin in the skin. Although it is most common in people in their forties and fifties, it can also be seen in teenagers and children. It is common and usually harmless, but it causes stigma for cosmetic reasons. Hyperpigmentation presents no medical threat. Thus the condition deserves serious attention [1].

Vyanga is a Kshrudraroga of face, which has *Niruja* and *Shavavarna Mandalas*. When it comes to the face, it is one of the most widespread illnesses. Melasma, a hyper pigmented disorder with similar clinical features, can be compared to it.

Melasma is an acquired skin pigmentation disorder that is additional prevalent in persons of Oriental, Hispanic, and Indo-Chinese descent and affects women far more frequently than men. Like other skin disorders, Melasma has a negative psychosocial effect that degrades one's quality of life and emotional well-being. To assess the severity of the disease and the efficacy of therapeutic options in Melasma, valid and reliable scoring systems are required. Furthermore, as with other conditions, not only should this scoring system be able to assess severity, but it should also be able to predict prognosis and help us to choose the best treatment option [2].

In Ayurveda, outstanding medicines are available for skin diseases. Massage with oils, medicinal pastes, and other procedures keep the skin smooth, soft and glowing [3]. In addition, there is a description of bloodletting as good therapy for skin diseases [4]. *Drugs in Vyanga's management* are having *Kushthaghna*, *Kandughna, Rakstaprasadaka, Twakprasadaka* and *Varnayakara* properties, which balances the Doshas and aids in Rakstashoadhana (blood purification). And ultimately, it can cause cutaneous depigmentation, which is the removal of blackish skin discolouration. *Arjun Twak* Churna has been chosen for research based on these considerations.

Raw egg is another drug in the trial group. Whole raw egg/egg yolk, alone or with herbs, has shown to be very effective in tightening skin, improving complexion, and healing skin disorders when applied locally [5]. Intracellular & extracellular glutathione content of egg white plays an essential role in skin healing. In addition, the effects of antioxidants such as vitamin A, E, and C, as well as trace elements such as zinc, copper, and selenium, were discovered. It has been demonstrated that L-Argin in eggs reduces inflammation, speeds up necrotic tissue cleansing, and accelerates epithelial cell growth with depigmentation [6].

Till today study on Melasma, including the external application of egg has not been carried out. In the current study, an egg is combined with *Arjun Twak Churna* in *Pottali* in the experimental group to reduce MSI in *Vyanga*.

Aim of the study was to examine the effects of *Arjun Twak Lepa, Arjun Twak Kukkutand Pottali* in the treatment of *Vyanga*, with a focus on Melasma. Objectives of the study were to determine the impact of *Arjun Twak Kukkutand Pottali* on MSI (Melasma Severity Index), to see how it affects MSI and to see how *Arjun Twak Kukkutand Pottali and Arjun Twak Lepa* affect MSI.

2. MATERIALS AND METHODS

The raw materials were procured from reliable sources and were authenticated by the department of *Dravyaguna* MGAC & RC. Preparations of the material with its main ingredients are as follows.

Arjun Twak Lepa – 5gm *Arjun Twak Churna* along with a sufficient amount of *Madhu* (Honey*)* to make *Lepa.* Apply *Lepa* applied on the affected area once a day. After application, leave it to dry. They were then washed with Luke warm water.

Arjun Twak Kukkutand Pottali - 5gm *Arjun Twak Churna* along with 1 *Kukkutand*. Then *Pottali* was prepared using a cotton cloth. Applied *Pottali* in circular manner on affected is once a day. After applying *Pottali* for 15 min, leave the face pack to dry. They were then washed with Luke warm water.

Place of study: OPD & IPD of *Panchakarma*, MGACH RC, Salod (H)

Study Design: Randomized Standard controlled comparative clinical trial

Study Type: Intervention

Sample size [7]: 44 (22 in each group)

Sample Size Calculation

$$n = \frac{2(Z\alpha + Z_{1-\beta})2\sigma 2}{\Delta\, 2}$$

n = Required sample size

Z, As shown below, Z is a constant (set by convention based on the accepted error and whether it is a one-sided or two-sided effect):

α-error	5%	1%	0.1%
2-sided	1.96	2.5758	3.2905
1-sided	1.65	2.33	

Za = 1.96

For Z1-β, As shown below, Z is a constant that is set by convention based on the study's power:

Power	80%	85%	90%	95%
Value	0.8416	1.0364	1.2816	1.6449

Z1-β= 0.8416

σ is the standard deviation of the data (estimated)
σ =0.12(SD of control group)

Δ is the difference between the effects of two interventions that must be considered (estimated effect size)

Δ=70% (Expected result of trial group) - 60% (Estimated result of control group) = 10% = 0.1

n = (2(1.96+0.8416)2∗(0.12) 2)/((0.1)2)
= (15.6979∗0.014)/0.01
=21.97
=22

2.1 Inclusion Criteria

1. Subjects chosen for the study were regardless of sex, religion, occupation, or chronicity of less than five years.
2. Subjects chosen for the study were between the ages of 20 and 50.
3. Presenting with cardinal features of *Vyanga* like thin, painless, blackish/ brownish patch on facial skin.

2.2 Exclusion Criteria

1. Hyperpigmentation is a result of a systemic disease such as Addison's disease or Cushing's syndrome.
2. Neavus of Ota has hyperpigmentation since birth.
3. Tumours such as malignant melanoma cause hyperpigmentation.
4. Patients with systemic diseases such as renal failure or hepatic disease.

2.3 Criteria for Withdrawal

1. If any side effects were observed during the research.
2. If the symptoms have worsened.
3. If the patient refuses to continue with the treatment.

Assessment Criteria [8]: Subjective and objective criteria were used to evaluate the therapy's effectiveness.

Subjective Criteria: It includes itching and burning sensation.

Objective Criteria: It includes skin/lesion colour, texture (dry/oily), luster, number of lesions, size of lesions, darkness and photographs.

Table 1. Intervention of both groups

Objectives	Experimental Group: A	Control Group: B
Drug	Arjun Twak Kukkutand Pottali	Arjun Twak Lepa
Dose	5gm	5gm
Route of drug administration	Local	Local
Time of drug administration	Once-daily	Once-daily
Duration	21 days	21 days
Follow up Days	0, 21st	0, 21st
Pathya	Avoid direct sunlight	Avoid direct sunlight

Fig. 1. Treatment procedure photographs

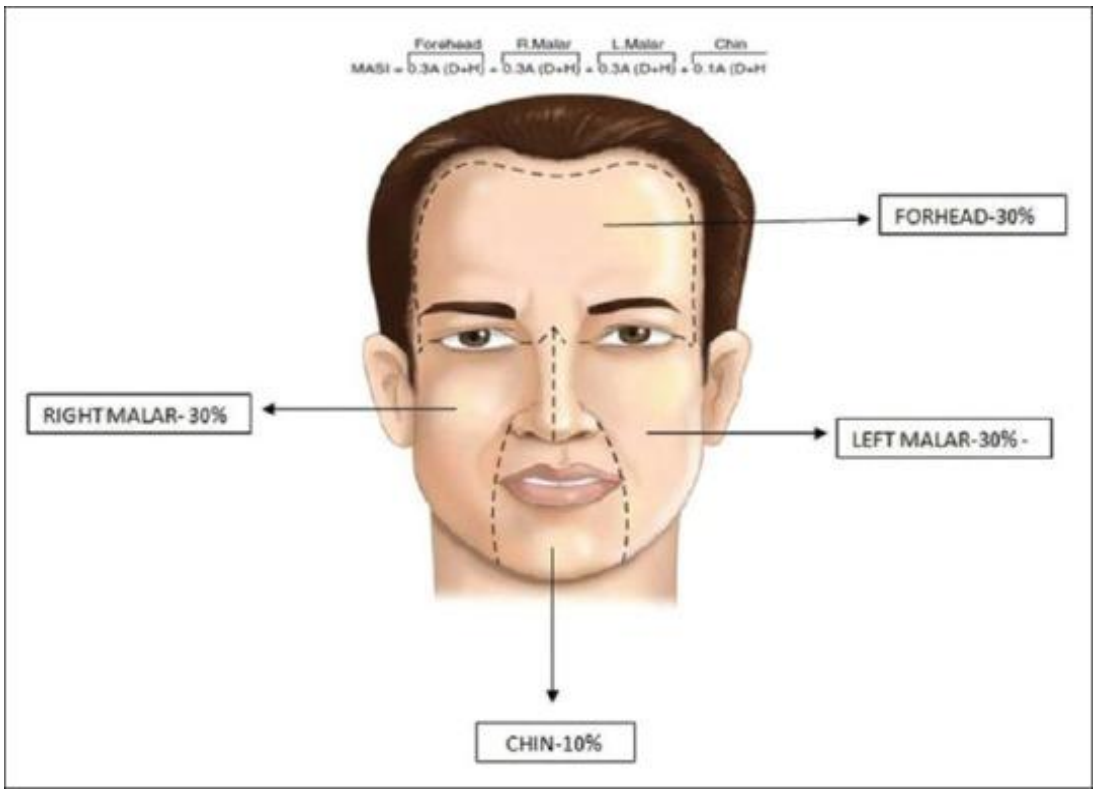


Fig. 2. Melasma area severity index score

Table 2. Subjective parameters

1. Itching		
Sr. N.	**Items**	**Score**
1.	There is no itchiness	0
2.	Minor itchiness (occasional, does not disturb routine)	1
3.	Itching that is moderate (Itching that disrupts daily activities but not sleep)	2
4.	Severe itching (disturb routine activity and sleep)	3
2. Burning		
1.	No burning	0
2.	Mild burning (occasional, sensation mostly when exposed to sun)	1
3.	Moderate burning (frequent burning, which increases when exposed to sun)	2
4.	Severe burning (continuous burning without sun exposure)	3

Table 3. Objective parameters

1. Skin texture (dryness)		
Sr. N.	**Items**	**Score**
1	Absent	0
2	Mild (tolerable not seen but felt)	1
3	Moderately challenging (stretching of skin that person feels)	2
4	Severe (visible dryness chapping of skin-hardness of skin)	3
2. Skin texture (oiliness)		
1	Absent	0
2	Mild (not seen with naked eye) oiliness felt by touch (no Face washing is required on a regular basis, but only 1-2 times per day.)	1
3	Moderate (Face must be washed frequently because it is visible on the skin.)	2
4	Severe (excessive oiliness, formation of acne)	3
3. Skin Luster		
1	Poor	1
2	Mild	2
3	Moderate	3
4	Good/radiant	4
4. Number of lesions		
1	1-2	1
2	3-4	2
3	5-6	3
4	>6	4
5. Size of lesions (in cm)		
1	0-2	1
2	3-4	2
3	5-6	3
4	>6	4

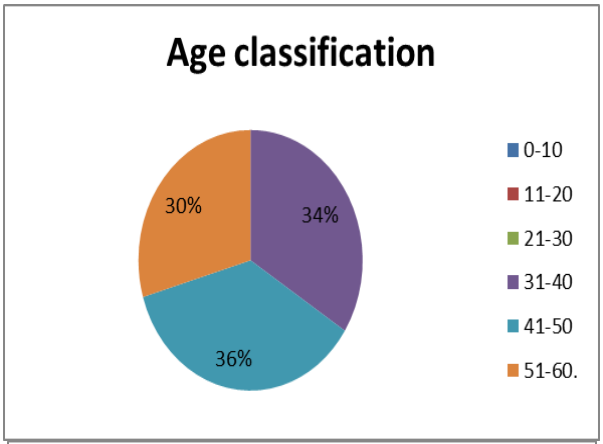
Three parameters are used to calculate the melisma area severity index (MSAI) score: Area (A), Darkness (D), and Homogeneity (H) of involvement, with 30% of constituents in the forehead (f), 30% in the right malar region (rm), 30% in the left malar region (lm), and 10% in the chin (c). For each of the four facial areas, the MSAI score is calculated by multiplying the sum of the darkness and homogeneity severity ratings by the area of involvement value. The total score ranges between 0 and 48—the severity increases as the score rise.

The following formula will be used for calculation is: MSAI total score = 0.3A (f) [D (f) +H (f)] + 0.3 A (lm) [D (lm) + H (lm)] + 0.3A (rm) [D (rm) + H (rm)] + 0.1 A (c) + H (c) [D (c) + H (c)].

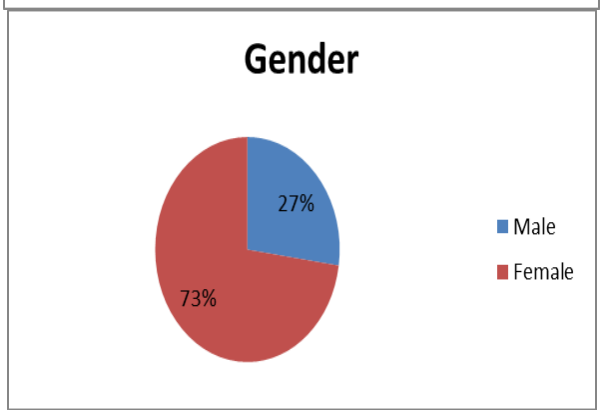
Table 4. Grading for parameters of melasma area severity index score

Grading of Parameters of MSAI score		
1. Area of involvement (%)		
Sr. N.	**Items**	**Score**
1	No involvement	0
2	0-9	1
3	10-29	2
4	30-49	3
5	50-69	4
6	70-89	5
7	90-100	6
2. Darkness		
1	Absent	0
2	Slight	1
3	Mild	2
4	Marked	3
5	Maximum	4
3.Homogeneity		
1	Absent	0
2	Slight	1
3	Mild	2
4	Marked	3
5	Maximum	4

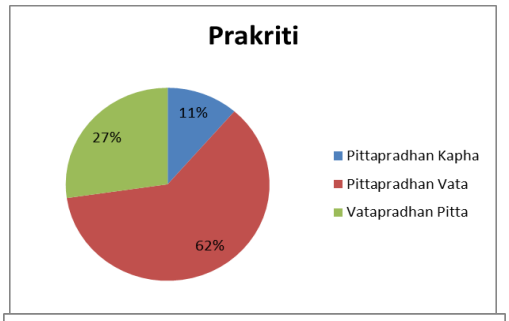
3. OBSERVATIONS



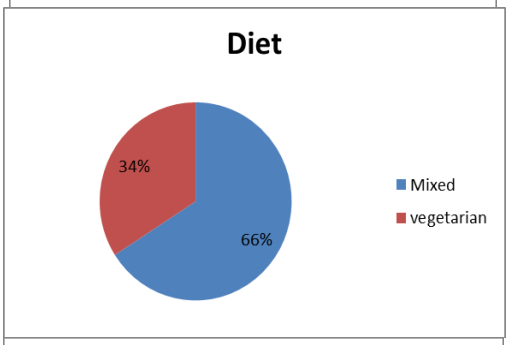
While observing demographic parameters, Age classification is one of the important parameter as diseases are bound to particular age group. In Age classification age group was included between 20-60 years. Among them 41-50 age group was 36%, 31-40 was 34 %, while 51-60 was 30% observed.



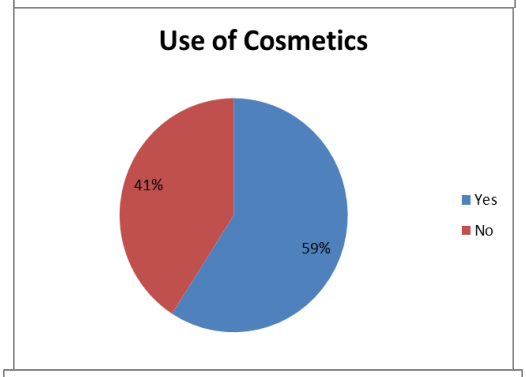
There are some diseases which are concern with gender. Melasma is also one of the disease which is more common in females but involvement of males can't be ignored. In gender both male and female were taken in consideration for study. Among them 73 % females reported, while male 27 % reported in this study.



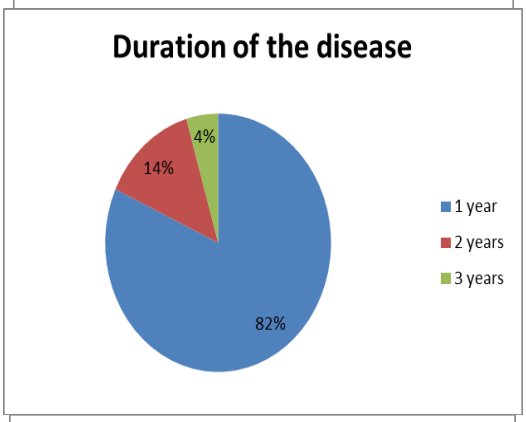
Prakriti is unique parameter. Subjects having different Prakriti were included in study. But most dominant was Pittapradhan Vata i.e. 62 % observed, whereas Vatapradhan Pitta was 27 % and Pittapradhan Kapha was 11%. In all Prakriti, Pitta was common in all.



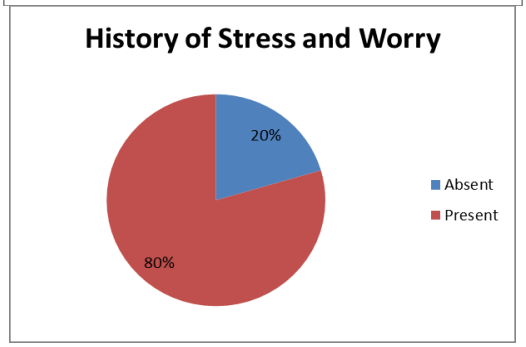
Diet is one of the essential parameter which is influencing the Disease. In diet parameter, both mixed i.e. Veg as well as non-veg and pure vegetarian subjects were included. While vegetarians were 34 % and mixed were 66 % observed.



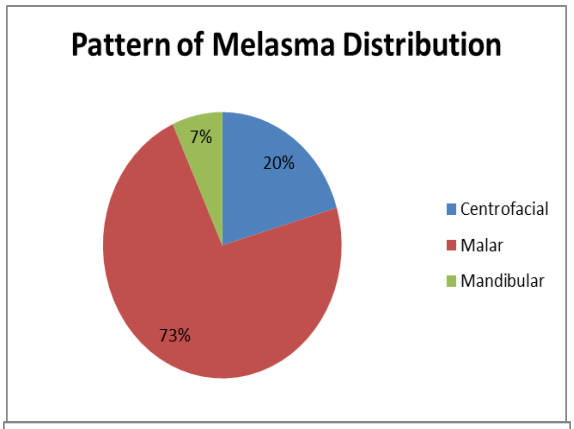
Use of cosmetics have huge role in skin ailments. It has good as well as bad impact on skin. In the same study survey was done on the basis of Use of Cosmetics, where 59 % subjects were using cosmetics and 41 % subjects were not using cosmetics.



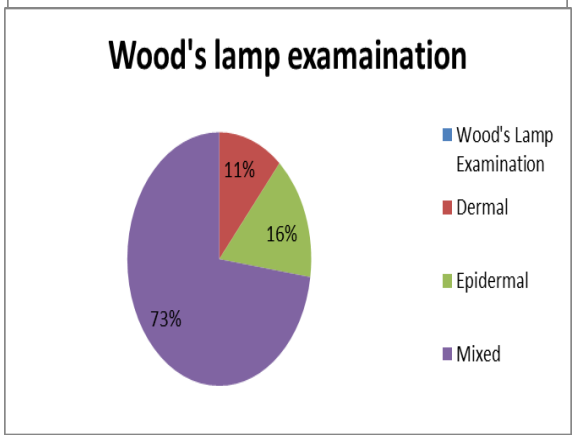
Disease progression was observed in the context of Duration of the disease. In 82 % subjects Duration of the disease was 1 year, where in 14 % subjects duration of the disease was 2 years and in 4 % subjects' duration of the disease was 3 years.



In psychological parameters stress and worry are vital. In present study history of Stress and Worry was taken. In maximum i.e. 80 % subjects were suffering from Stress and Worry, where 20 % subjects were not suffering from Stress and Worry.



Melasma is distributed different parts of face like malar region, mandibular region and Centro facial. In present study 73 % subjects were having malar type of Melasma. 20 % had Centro facial& 7% had mandibular type of melisma distribution.

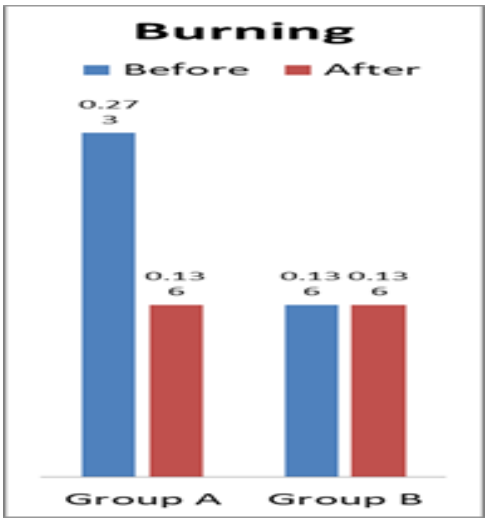


Wood's lamp examination was done. It was done to detect involvement of type of skin layer Melasma. 73 % subjects have mixed type of Melasma, 16 % had epidermal type of melisma and 11 % subjects had dermal type of melisma.

4. RESULTS

4.1 Subjective parameter

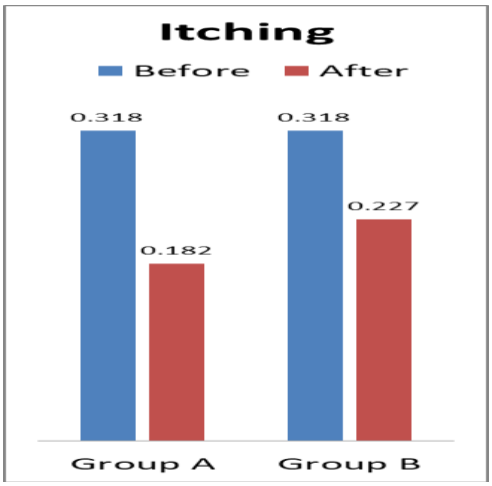
Burning: The Score of burning reduced from 0.273 to 0.136 in Group A, and no change in the scores was seen in Group B. Statistically there was no significant difference in reduction of burning in two groups.



Positive sum is 22. Negative sum is -22 & test statistics is also 22. Critical value for subjective parameter burning in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the positive and negative sums are equal, Null hypothesis cannot be rejected.

There is no significant difference in two groups regarding Burning sensation improvement

Itching: The Score of itching reduced from 0.318 to 0.182 in Group A, and reduced from 0.318 to 0.227 in Group B. Statistically, Group A showed significant reduction in itching.

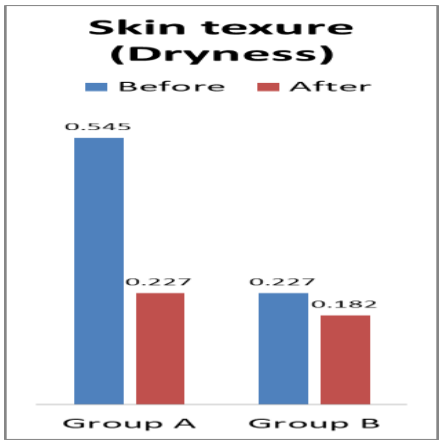


Here Positive sum is 22. Negative sum is -21& test statistics is 21. Critical value for subjective parameter Itching in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in Itching sign.

4.2 Objective Parameters

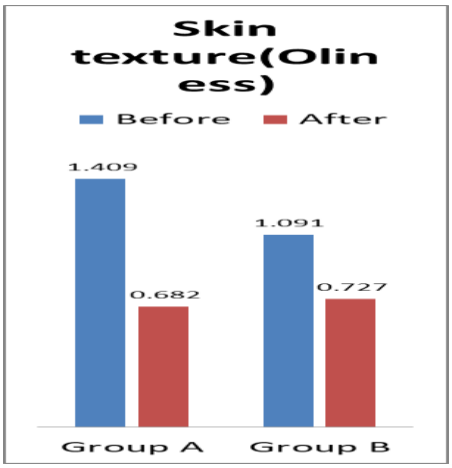
Skin Texture (dryness): The Score of skin texture (dryness) reduced from 0.548 to 0.227 in Group A, and reduced from 0.227 to 0.182 in Group B. Statistically, Group A showed significant reduction in Skin texture dryness).



Here Positive sum is 6. Negative sum is -32& test statistics is 6. Critical value for objective parameter Skin texture (Dryness) in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in Skin texture (Dryness) sign.

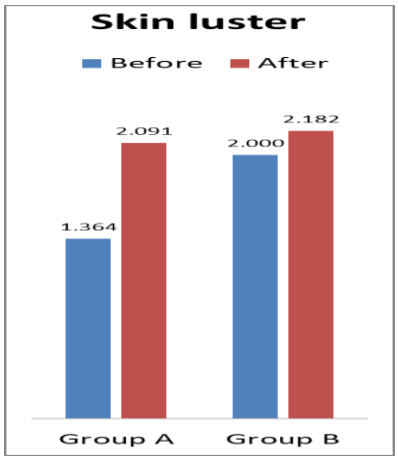
Skin Texture (Oiliness): The Score of skin texture (oiliness) reduced from 1.409 to 0.682 in Group A, and reduced from 1.091 to 0.727 in Group B. Statistically, Group A showed significant reduction in Skin texture (oiliness).



Here Positive sum is 110. Negative sum is -16& test statistics is also 16. Critical value for objective parameter Skin texture (Oiliness) in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in Skin texture (Oiliness) sign.

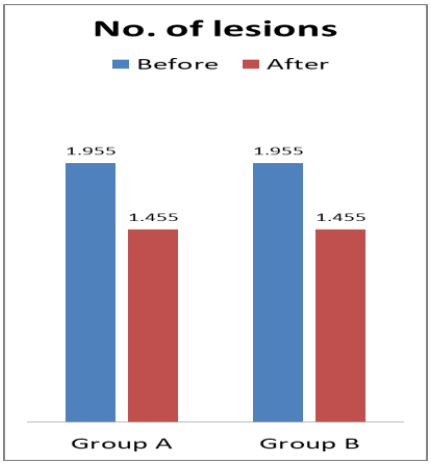
Skin Luster: The Score of skin luster increased from 1.364 to 2.091 in Group A, and increased from 2.000 to 2.182 in Group B. Statistically, Group A showed significant reduction in Skin luster.



Here Positive sum is 0. Negative sum is -118& test statistics is 0. Critical value for objective parameter Skin luster in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in Luster sign.

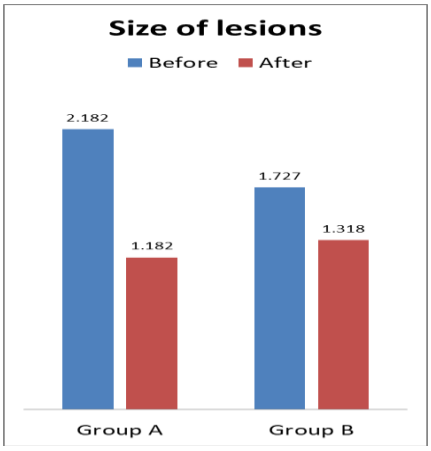
Number of lesions: The Score of number of lesions reduced from 1.955 to 1.455 in Group A, and reduced from 1.955 to 1.455 in Group B. Statistically, there was no difference in two groups for reduction in number of lesions.



Here Positive sum is 0. Negative sum is -22 & test statistics is 0. Critical value for objective parameter No. of lesions in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the negative sum is equals to Sample size, Null hypothesis cannot be rejected.

There is no significant difference between two groups in regards with number of lesions.

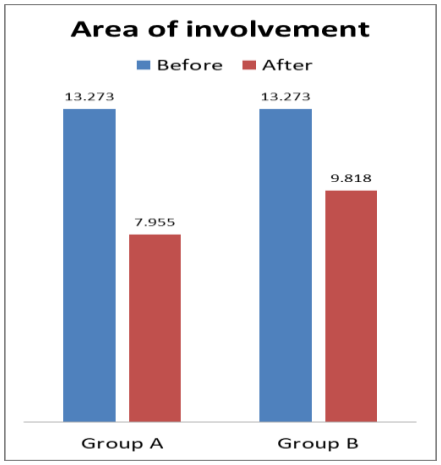
Size of lesions: The Score of size of lesions reduced from 2.182 to 1.182 in Group A, and reduced from 1.727 to 1.318 in Group B. Statistically, Group A showed significant reduction in reduction of size of lesions.



Here Positive sum is 151. Negative sum is -12& test statistics is 12. Critical value for objective parameter size of lesions in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in size of lesions.

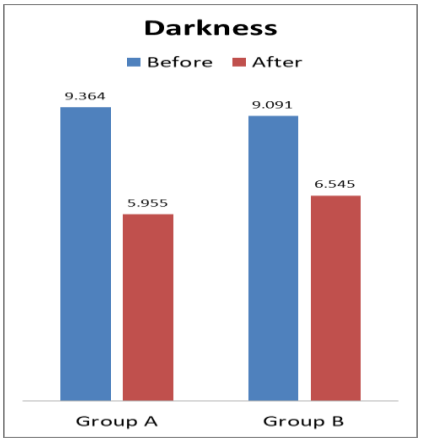
Area of involvement: The Score of area of involvement reduced from 13.273 to 7.955 in Group A, and reduced from 13.273 to 9.818 in Group B. Statistically, Group A showed significant reduction in reduction in area of involvement.



Here Positive sum is 206. Negative sum is -5& test statistics is 5. Critical value for objective parameter Area of involvement in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in Total area of involvement

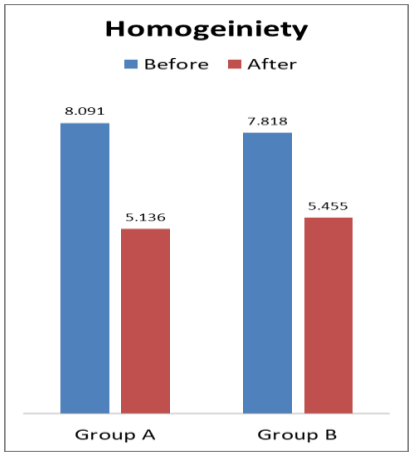
Darkness: The Score of darkness reduced from 9.364 to 5.955 in Group A, and reduced from 9.091 to 6.545 in Group B. Statistically, Group A showed significant reduction in reduction in darkness.



Here Positive sum is 163. Negative sum is -9& test statistics is 9. Critical value for objective parameter darkness in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in total Darkness.

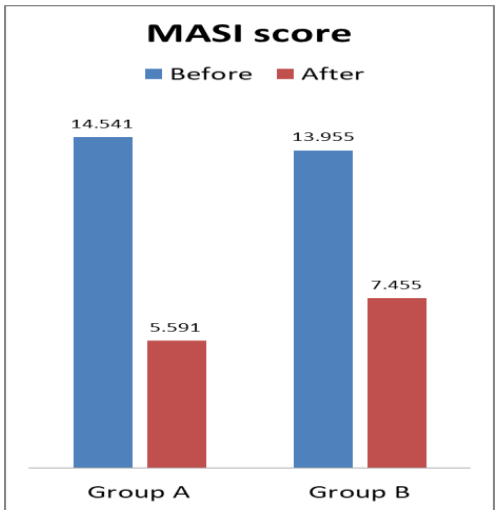
Homogeneity: The Score of homogeneity reduced from 8.091 to 5.136 in Group A, and reduced from 7.818 to 5.455 in Group B. Statistically, Group A showed significant reduction in reduction in homogeneity.



Here Positive sum is 146. Negative sum is -13& test statistics is 13. Critical value for subjective parameter Itching in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in Homogeneity.

MASI score: The Score of MASI reduced from 14.541 to 5.591 in Group A, and reduced from 13.955 to 7.455 in Group B. Statistically, Group A showed significant reduction in reduction in MASI.



Here Positive sum is 246. Negative sum is -3& test statistics is 3. Critical value for objective parameter Melasma Area Severity Index Score in signed rank table, for two tailed signed rank test, for sample size 22 is 65. As the Test statistics is lesser than Critical value, Null hypothesis is rejected.

Group A shows significant improvement in MASI score i.e. Melasma Area Severity Index.

Table 5. Overall assessment

There is a significant difference in the following Criteria for Assessment	There is no significant difference in the following Criteria for Assessment
Itching	Burning
Texture (Dryness)	No. of lesions
Texture (Oiliness)	
Skin Luster	
Site of Lesions	
Total Area of involvement	
Total darkness	
Total MASI score	

Fig. 3. Patient's photographs

5. DISCUSSION

The main culprits of *Vyanga* are *Krodha* (Anger), *Shoka* (Sorrow), and *Ayasa* (Mental Exertion), which are caused by *Vata Pitta Dosha* as well *Manasik Nidan* (psychological etiological factors) [9].

Treatment modalities and other strategies for hyperpigmentation are typically unsatisfactory because it exhibits alleviation and cessation due to a variety of influencing elements such as frequent exposure to UV rays, pollution, stress, and hormonal fluctuations. *Arjun Twak* (Terminalia Arjun Bark) is *Rakta Prasadak* (blood soother), *Twak prasadak* (Skin soother), *Varnyakar* (Enhancing complexion of the skin), Pacifying aggregated *Doshas* (Body Humors) and *Raktashodhana* (Blood purification or detoxification) [10].

Arjun improves the moisture content of the skin by preventing water loss. It also improves the blood supply. It has suitable antioxidant property that prevents skin damage. It promotes the growth of new skin cells, hydrates the skin, and increases skin elasticity [11] due to its *Kashaya* (astringent) and *Sita* (cold) properties, *Arjunachaal* aids in the reduction of tanning and pigmentation [12]. It has anti-inflammatory properties [13-14].

Raw Egg has some critical contents, which play a good role in skin diseases when locally applied. An egg contains L-Arginine, glutathione, retinol, Vitamin E & C, including some trace elements such as, Zinc, copper & selenium. L-Arginine is an amino acid in eggs that reduces inflammation, speeds up necrotic tissue cleansing, and accelerates epithelial cell proliferation with depigmentation [15]. Glutathione content of egg white is anti-oxidant, plays an essential role in skin healing. Retinol of Vitamin A is responsible for cell growth & it is an anti-oxidant. Vitamin E and C have antioxidant property & that may help protect skin from sun damage. Zinc plays a vital role in protein synthesis and wound healing of the skin, whereas Copper is responsible for synthesizing and stabilizing skin proteins. And Selenium neutralizes free radicals and other skin-damaging compounds [16].

Here medicine is used in the form of *Pottali;* during the process of *Pottali,* the temperature rises, and there is vaso-dilation of the localized blood vessels [17]. This vaso-dilation stimulates the *Bhrajak-Pitta* in the skin, which takes up the nutrients from the *Kukkutanda* promotes to remove metabolic waste through circulation. It also provides lipid media which helps in bioavailability, and the drugs reach the cellular level, removing metabolic waste [18].

6. CONCLUSION

Many studies have been conducted on the management of Melasma but a study on effect of local application of egg, not yet conducted. *Arjun Twak Kukkutand Pottali* is proved to be more effective than *Arjun Twak Lepa* on subjective & objective parameters of melasma. The contents of *Arjun Twak Kukkutand Pottali* are cheap & readily available, especially for women not willing for hospitalization.

The study highlights the efficacy of “Ayurveda” which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

CONSENT

As per international standard or university standard, patients’ written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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