SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 4.
Issue: 2.
Page N. 215-227
Year: 2020

Original Article www.wjahr.com

# EFFECTIVITY OF LEECH THERAPY IN VARICOSE VEINS

**Md. Anwer Alam[1], Zarnigar[2] and Md. Tanwir Alam[3]***

[1]Medical Officer, Under RBSK, Purnea, Govt. of Bihar.
[2]Assistant Professor, Dept. of Tahaffuzi wa Samaji Tib, NIUM, Bangalore, Karnataka.
[3]Assistant Professor, Dept. of Tahaffuzi Wa Samaji Tib, Govt. Tibbi College & Hospital, Patna.

**Received date:** 20 February 2020 **Revised date:** 10 March 2020 **Accepted date:** 30 March 2020

***Corresponding author: Md Tanwir Alam**

Assistant Professor, Dept. of Tahaffuzi Wa Samaji Tib, Govt. Tibbi College & Hospital, Patna.

## ABSTRACT

**Background & Objectives:** Varicose vein (*Dawali*) is a disease in which veins of legs and feet become dilated, tortuous, and greenish in colour due to excess accumulation of blood which is derived from *saudavi madda, balgham ghaleez.* The aetiology of varicose veins is still incompletely under stood, despite the fact that it is a very common disease affecting all ages from teenagers to elderly people. Prevalence of varicose veins increases with age. The complication of varicose veins like venous eczema, venous pigmentation, lipodermatosclerosis, superficial thrombophlebitis, venous ulceration *etc* impair health related quality of life significantly. The objective of the study is to evaluate the efficacy of *Taleeq* for secondary prevention of *Dawali* and to provide safe & cost-effective alternative treatment. **Methods:** Randomized controlled clinical open trial was conducted in regimenal unit of National Institute of Unani Medicine (NIUM). 50 patients were divided into 2 groups, 30 in test group & 20 in control group. Test group was treated with *Taleeq* on alternate day & control group was treated with grade 2 compression stockings & limb elevation for 2 months. Response was measured by assessment of pain / leg discomfort, limb girth, pigmentation colour & area. Ulcer healing was assessed by ulcer depth, pain in ulcer. PUSH Score, Periulcer surface, exudate amount & type on every 15$^{th}$ day. Hb% was assessed on every 15$^{th}$ day to check anaemia. Effect on anatomy of vein was assessed by colour flow Doppler USG in terms of valvular competency. **Result:** Test group showed significant reduction in pain, limb girth, pigmentation, number of perforators and out of 4 cases of ulcers 3 were completely healed in test group. Control group showed significant reduction in pain & limb girth, but there was no improvement on pigmentation in control group. There was improvement in ulcer parameters but ulcer was not completely healed. Both groups do not show significant improvement on SFJ & SPJ incompetency. **Conclusion:** Test group has major effects in improvement of all parameters. Study stresses that leech therapy should be administered in combination with compression stockings & other effective treatment modalities like weight normalization for obese patients, physical therapy, dietary modification etc for optimal results.

**KEYWORDS:** *Varicose Vein; Leeching; Dawali; Taleeq; Unani Medicine; Ilaj Bit Tadbeer*.

## INTRODUCTION

Varicose veins were first described in *Ebers papyrus* over 3500 years ago. This ancient Egyptian work described it as “Serpentine windings”. Varicose veins are a disease in which veins of lower limbs become dilated, tortuous, prominent and greenish in colour. The aetiology of varicose vein is still incompletely understood despite the fact that it is a very common disease affecting all ages from teenagers to elderly people. Greeco Arab physicians postulated that it is caused by accumulation of non-purulent *balghami, saudavi* or *damvi* matter in leg veins or due to weakness. Other reported risk factors are female gender, parity, positive family history of varicose veins, obesity in women, diet, and occupation involving prolonged sitting or standing and hormone medication. Today it is assumed that the aetiology of varicose veins is multifactorial. Patients may report aching especially on standing, itching, restlessness in legs, & ankle swelling. Complications of varicose veins may develop like venous eczema, venous pigmentation, lipodermatosclerosis, superficial thrombophlebitis, venous ulceration which is most troublesome, distressing and painful condition for patients and financial burden for health care providers. Health related quality of life is significantly impaired in individuals with vascular diseases.

Approximately 15% adults have varicosity of veins. The prevalence of varicose veins varies substantially in different parts of the world, being highest in the western world; mostly from 10-30% in men and from 25-55% in women in population-based studies (Callom 1994; Beebe Dammer *et al.* 2005, Robertson *et al*. 2008). In population in middle to late adulthood (40-69 years) the incidence of varicose veins ranged from 9-19 per 1000 persons-year in men and from 19-26 per 1000 persons-year in women in follow up studies from Finland & USA (Brand *et al* 1988), (Makivaara *et al.* 2004) one branch of Framingham study found that the incidence was 2.6% in women & 2.0% in men. A study conducted among railway men of identical socio-economic status and doing identical work of sweepers in North & South of India showed over all prevalence was significantly higher among south Indian workers than North Indian (6.8%).

Surgical treatment of varicose veins is widely used. The main principles of surgical treatment are to ligate the source of the venous reflux and to remove the incompetent saphenous trunks and the associated varices. Sapheno femoral ligation is associated with a high rate of recurrence of varices. Removal of the saphenous veins has the disadvantage that vein is accompanied by a nerve that may be damaged in the vein stripping operation, further the chances of recurrence of such cases are also very high. Due to high rate of recurrence and disadvantages of surgical treatment the need of hour is to find efficient & low-cost alternative management. All the sign & symptoms or complications of varicose veins develop due to plethora (venous congestion). In order to save the limb & relieve the sign & symptoms, the venous blood must be removed and pressure must be reduced. Greeco-Arab physicians have mentioned bloodletting in cases of plethora. *Buqrat, Jalenoos, Abul Faraj, Zakaria Razi, Ibn Sina, Ismaiel Jurjani* etc have mentioned fasd in *Dawali*, but *M Azam Khan* and *A Arzani* mentioned *Taleeq* (Leech Therapy) in *Dawali* (varicose veins) for bloodletting. *Taleeq* was used as substitute of phlebotomy on the guide lines of bloodletting prescribed in Unani literature. In some cases, *Taleeq* was preferred over *fasd* because of definite benefits that it entails. *Taleeq* seems to be effective for the management of varicose veins & their complications. Therapeutic effect of *Taleeq* to control the complications of varicose veins may be attributed to the salivary secretions of leech which contains certain bio-chemicals with vasodilating, anticoagulant, anaesthetic, thrombolytic, analgesic, antibiotic & anti-inflammatory properties.

Venous disease is typically progressive; no treatment can prevent the appearance of new varicose veins in future. Apart from numerous complications, recurrence may also occur in future after surgical treatment. Modes of treatment that offers efficacy (long term control of symptoms or complications) without medication or surgery are given most priority.

The present study is a randomized controlled open study conducted to know the effect of *Taleeq* for secondary prevention of *Dawali.* 50 patients were assigned randomly to 2 groups, 30 in test group & 20 in control group. Test group was treated with *Taleeq* and control group was given compression stockings grade 2 for wearing and also advised limb elevation. The response was measured by assessment of pain / discomfort in legs, pigmentation (colour & area), limb girth (at calf, ankle & foot), assessment of ulcer healing by pain, ulcer depth, periulcer surface and PUSH Score 3.0 on every 15$^{th}$ day up to 2 months and pre & post treatment colour flow Doppler USG. The data was analyzed by computerized statistical package Graph pad (Instat version 3) results & observations were discussed.

The study aimed at evaluating the effect of leeching in the rehabilitation of varicose vein patients as it is acclaimed for the beneficial effects in the management of this disease by *unani* physicians. It further evaluated the treatment procedure with the conventional measures of tight stocking and foot elevation. The study tried to validate the *unani* claims. If these claims are found true, it will help in the better management of varicose vein patients to decrease the DALY and increase the productive hours of these patients.

## OBJECTIVES OF THE STUDY

- To evaluate the efficacy of *Taleeq* for the secondary prevention of Varicose Veins
- To provide safe and cost-effective alternative treatment.

## METHODOLOGY

**Study design:** Present study is a randomized controlled open clinical trial "to evaluate the efficacy of *Taleeq* (Leech application) for secondary prevention of varicose veins." Patients were recruited from OPD/IPD of National institute of *unani* medicine. *Taleeq* was undertaken at regimenal unit.

**Study duration:** The present study was completed within a period of 12 months from April 2009 to March 2010.

**Criteria for the selection of cases:**

**Inclusion criteria**

- Patients of either sex
- Patients of less than 75 years of age
- Varicose veins conformed by history, physical examination and colour flow Doppler ultra sound.

**Exclusion criteria**

- Patients above 75 years of age
- Patients with severe anaemia
- Patients with diabetes.
- Patients with peripheral arterial diseases
- Any bleeding disorders
- HIV & AIDS

- Hepatitis B
- Pregnant and lactating women.

**Informed consent:** Patients, fulfilling the inclusion criteria as mentioned above, were given the information sheet having details regarding the nature of the study, the technique to be used etc. Patients were given enough time to go through the contents of informed consent sheet. They were given the opportunity to ask any question, and if agreed, they were asked to sign the informed consent form.

**Selection of the subjects:** Patients were selected on the bases of inclusion and exclusion criteria from OPD / IPD of National institute of *unani* medicine hospital, and evaluated for consideration as a research subject. The selected subjects were allocated into test group and control group by using random allocation software. Written informed consent was obtained from the study subjects before enrolment in the study. During the selection procedure, complete history including general physical and systemic examination was carried out and recorded on a prescribed case report proforma which was designed with the consultation of the guide. The patients were enquired about their name, age, sex, marital status, address and occupation. All the patients were interrogated about their chief complaints and duration of suffering in detail which were noted down in chronological order in the prescribed proforma. While taking the history emphasis was given on the past history of Hypertension, Hyperlipidaemia, Diabetes mellitus, MI, Claudication, and DVT etc. Dietary habits, type of diets, smoking habits, pan chewing etc. were inquired about in personal history. Regarding family history, patients were asked about the presence of any significant history of varicose vein in the family. In socioeconomic history, patients were assed about their monthly income, education and occupation and were graded into different socioeconomic strata by using Kuppuswamy's socioeconomic scale- (Modified 2007).[1] After history, general physical examination was done with special emphasis on pulse (rate, rhythm, character and volume), blood pressure, temperature, respiratory rate, respiratory distress with simple activities, built, skin, hair, tongue, eyes, clubbing of fingers, cyanosis, pallor, anaemia, oedema and lymphadenopathy, BMI etc. Likewise, a careful systemic and local examination was also done to look for any findings and involvement of any other serious illness.

**Investigations:** CT, BT, Blood sugar Fasting & PP, HBsAg & ELISA test for HIV and AIDS were carried out to exclude the patients according to the exclusion criteria, and following investigations were done in every case before & after treatment for safety and efficacy assessment except Hb% which was done on every follow-up i.e. 15$^{th}$ day to check anaemia.

- Complete Hemogram (Hb%, TLC, DLC)
- ESR
- Colour flow Doppler ultra sound

**Sample Size:** Fifty patients were randomized into two groups, 30 in test group and 20 in control group by using random allocation Software.

**Assessment of *Mizaj*:** Determination of *mizaj* was done on the basis of assessment of different parameters mentioned in literature. These parameters have been shown in the table attached with the case report form in annexure.

**Duration of protocol:** 2 months

**Identification of leech:** Leeches were sent for identification to Zoology department of Bangalore University. Dr. P. Mahboob Basha, Department of Zoology, Bangalore University, Bangalore-56, has been identified the leeches as *Hirudinaria granulosa*.

Procedure of *Taleeq* (leech Therapy): following 3 phases involves in leeching:

- Pre leeching procedure
- Leeching procedure
- Post leeching procedure

**Pre leeching procedure:** Following material was required for *Taleeq* and was gathered before starting a *Taleeq* session.

- Fresh unused, well cleaned leeches gathered 24 hours before starting a leeching session
- Small sealable containers partly filled with water for used leeches. These containers were labelled with patient's name
- Water proof padding and towels.
- Bandages or highly absorbent material
- Adhesive tape
- Water
- Scissor, disposable razor
- Surgical gloves
- Small cupping device
- Anti-allergic medicine

**Leeching procedure**

- Patients were advised not to use perfumes, chemicals to the skin at the intended application site for at least 2 days before treatment.
- Skin of the target area was thoroughly cleaned with soap and water or removes all substances with strong odour or taste, because leeches are very sensitive to strong odour.
- Application site was shaved and dry rubbed until the skin become rosy or red, it helps to get the animals to bite quickly.
- A dampen square gauze with 1 cm square hole in the middle was placed in close contact with the area to be treated to protect the leech from wandering.
- After wearing surgical gloves, active and healthy leeches that swim quickly and lively in the water, attached to the handlers hand immediately when it is put in the container, immediately draws up into an 'o' shaped when touched, and then extend the head

regions forward in searching movements were selected and the head of the leech was put in the hole of the gauze, attachment generally occurs quickly. If the leech was reluctant to bite, a small needle prick was made on the skin to produce a tiny droplet of blood, which results in enthusiastic attachment.

- Once the leech was attached to the skin rhythmic and pulsating movements are visible in the curved neck of leech, the gauzed square can be removed without disturbing the animal.
- The target area was kept warm and dark by covering it with a towel or other material.
- Leeches usually stay attached for 30-60 minutes and fell down itself. When the leeches drop off, they were placed in a jar labelled with patient's name to avoid confusion between used and unused animals and to prevent use on another patient.

**Post leeching procedure or post bite care:** The tripartite jaw of the leech makes a three-pronged Y shaped bite wound. After the leech has dropped off it usually takes 3-48 hours for the wound to stop bleeding. The slow drainage of blood is an important part of treatment. The drainage of blood reduces venous congestion. When there was a good outflow of blood after leech feeding, the wound was loosely covered and checked the extent of bleeding 15-30 minutes later, if satisfactory, a loose dressing was applied. Patient was advised to avoid strenuous physical activity until the bleeding stop naturally. Primary dressing was consisting of a wide and thick sterile pad to absorb all the blood oozing from the wound. The layers of padding were loosely secured with a gauze bandage that is not so tight that it obstructs the blood flow. Area around leech bite was routinely observed for local infection.

**Tight stocking:** Patient in control group was advised to put the stockings on as soon as get out of bed, before gravity gets a chance to cause pooling of blood in varicose veins. Keep the stockings on all day. Take them off when lying down, with legs raised above the level of the heart.

**Efficacy assessment:** Assessment of efficacy in the test and control group was assessed on the bases of two types of parameters:

**Objective parameters:** The Baseline observations were recorded on zero day thereafter at an interval of 15 days till 2 months. At every visit the patients were asked about the improvement and worsening in their symptoms and subjected to examination to assess clinical findings. Concomitant treatment was not allowed during the protocol period. The patients who were taking any medicine for the treatment of varicose vein were advised to observe abstinence from that drug, then after one-week treatment with *Taleeq* and tight stocking was started.

**Subjective parameters:** Subjective parameters included pain/leg discomfort on walking, pain in ulcer, Assessment of objective parameters included stasis pigmentation, Limb girth for measurement of oedema, area of ulcer, condition of ulcer bed, exudates amount and type, undermining, tunnelling, sinus tract formation, ulcer depth, Periulcer surface. As these parameters differ in severity from patient to patient, an arbitrary grading of various parameters was improvised for appropriate assessment and statistical evaluation of various signs and symptoms to evaluate the efficacy of *Taleeq* and tight stocking. After two months of treatment, the pre and post treatment values of different parameters of both groups were analysed and compared. These parameters are

**Pain / leg discomfort during walking**

Intensity of leg pain / leg discomfort during walking was assessed on 4-point scale ranging from 0-3 (0 for no pain, 1 for mild pain, 2 for moderate and 3 for severe pain). Scoring for pain is as follows:

0= None - No pain
1= Mild - Irritating & uncomfortable
2= Moderate - Dreadful & Horrible
3= Severe - unbearable or Agonising

**Pigmentation**

Pigmentation was assessed by colour of pigmentation & area of pigmentation.

**Colour of pigmentation:** Colour of pigmentation was scored as follows;

0- None
1- Reddish to light brown
2- Light brown to dark brown
3- Dark brown to blackish.

Area of pigmentation: Area of pigmentation was obtained by multiplying the greatest length of ulcer (head to toe) and greatest width of ulcer (side to side) i.e. length × width. Both dimensions were measured by centimeter ruler.

**Oedema**

Oedema was measured by taking difference between the values of limb girth, before and after the treatment. Limb girth was measured at 3 points i.e. calf, ankle and foot.

**Limb girth at calf:** Girth measurement of the calf took place with subjects positioned prone, with their knees extended and lower extremity musculature relaxed, then the circumference was measured at the region of greatest circumference. Prior to formally measuring calf girth, it was necessary to determine the region of the calf that was greatest in circumference on the non-involved extremity, as this point would serve as the landmark for each of the calf measurements. After identification of the calf region that was largest in girth on the non-involved extremity, a mark was placed at this point on the skin of the lateral aspect of the calf with an ink pen. The distance from this point to the distal aspect of the fibular head was measured. Then, on the involved extremity,

this distance from the fibular head was measured and marked. The distance from the fibular head was documented during the pre-procedure measurement and used as a landmark during the follow-ups and post treatment measurement. All measurements were taken with a non-elastic measuring tape.

**Limb girth at ankle:** This girth measurement is usually taken at the level of the narrowest point of the ankle. The minimal girth point is not always obvious, and the tape may need to be moved up and down to find the point of least circumference. When recording, the tape is not too tight or too loose, is lying flat on the skin, and is horizontal. It may help to have the subject stand on a box to make the measurement easier. The distance was measured and documented at the commencement of study, during follow-ups and at the culmination of study.

**Limb girth at foot:** Foot circumference was measured with a tape so that the tape passes over the Metatarsal tibial and the Metatarsal fibula. The Metatarsal tibial is the most medially prominent point on the head of the first metatarsal bone, and the Metatarsal fibular is the most laterally prominent point on the head of the fifth metatarsal bone. The distance was measured and documented at the commencement of study, during follow-ups and at the culmination of study.

**Assessment of ulcer**

Healing of ulcer was assessed by visual assessment, physical assessment of wound, and its surrounding skin. Healing of ulcer was assessed by PUSH Tool 3.0.[2] For this scale three parameters of wound were assessed ie. size /area of the wound, exudates amount and tissue type/condition of ulcer bed. Appropriate scores were assigned to these parameters and the sum of the scores yields a total wound score. Score ranges from 0 (healed) to 17 (worst possible score). The PUSH score was determined at each wound assessment in order to monitor the changes in the direction and magnitude of the score over time indicates whether the wound is healing or not.[2]

**PUSH (Pressure Ulcer Scale for Healing) Tool 3.0 Scores[2] are as follows**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Length X Width (In $Cm^2$) | 0<br>0 | 1<br><0.3 | 2<br>0.3-0.6 | 3<br>0.7-1.0 | 4<br>1.1-2.0 | 5<br>2.1-3.0 | Subscore |
| | | 6<br>3.1-4.0 | 7<br>4.1-8.0 | 8<br>8.1-12.0 | 9<br>12.1-24.0 | 10<br>>24.0 | |
| Exudate Amount | 0<br>None | 1<br>Light | 2<br>Moderate | 3<br>Heavy | | | Subscore |
| Tissue Type | 0<br>Closed | 1<br>Epithelial Tissue | 2<br>Granulation Tissue | 3<br>Slough | 4<br>Necrotic Tissue | | Subscore |
| | | | | | | | Total Score |

1. **Area of ulcer:** Area of ulcer was obtained by multiplying the greatest length of ulcer (head to toe) and greatest width of ulcer (side to side) i.e. length × width. Both dimensions were measured by centimeter ruler.
2. **Exudates amount:** Amount of exudates (drainage) present after removal of dressing & before applying any topical agent to the ulcer was estimated as none, light, moderate or heavy.
3. **Ulcer bed / tissue type:** Type of tissue present on ulcer bed was observed whether it is necrotic, slough, granulation tissue, epithelial tissue, closed / resurfaced. Type of tissue on ulcer bed scored as a 4 if there was any necrotic tissue, 3 if there was any amount of slough was present and necrotic tissue was absent, 2 if the wound is clean and contains granulation tissue. A superficial wound that was re-epithelializing was scored as 1, when the wound is closed, scored as 0.

**4-Necrotic Tissue:** Black, brown, or tan tissue that adheres firmly to the wound bed or ulcer edges and may be either firmer or softer than surrounding skin.
**3-Slough:** yellow or white tissue that adheres to the ulcer bed in strings or thick clumps, or is mucinous.
**2-Granulation Tissue:** pink or beefy red tissue with a shiny, moist, granular appearance.
**1-Epithelial Tissue:** for superficial ulcers, new pink or shiny tissue (skin) that grows in from the edges or as islands on the ulcer surface.

**0-Closed/Resurfaced:** the wound is completely covered with epithelium (new skin).

**Pain in ulcer:** Intensity of pain in ulcer was assessed on 4-point scale ranging from 0-3 (0 for no pain, 1 for mild pain, 2 for moderate and 3 for severe pain). Scoring for pain is as follows:
0- None -No pain
1- Mild- Irritating & uncomfortable
2- Moderate- Dreadful & Horrible
3- Severe – unbearable or Agonising

**Depth of ulcer:** Greatest depth of ulcer was measured by using a probe/needle.
Type of exudates: Type of exudates was assessed on 4-point scale ranging from 0-3 scoring was as follows
0- None
1- Serous
2- Sanguineous
3- Purulent

**Tunneling Sinus, Fistula:** These were not found in any case.

**Peri ulcer surface**

**Oedema:** Shiny taut skin or pitting impressions in the skin indicates oedema. Oedema was assessed by pressing firmly with a finger, releasing & waiting 5 seconds and observe for any indentation.

**Colour flow Doppler:** Colour flow Doppler ultra sound was carried out to exclude arterial disease and to determine the patency of vein and a bidirectional flow probe was used to detect venous reflux. This investigation was carried out with the patient standing

**Withdrawal criteria**

- Failure to follow protocol.
- Non-compliance with Leech therapy
- Any adverse effect

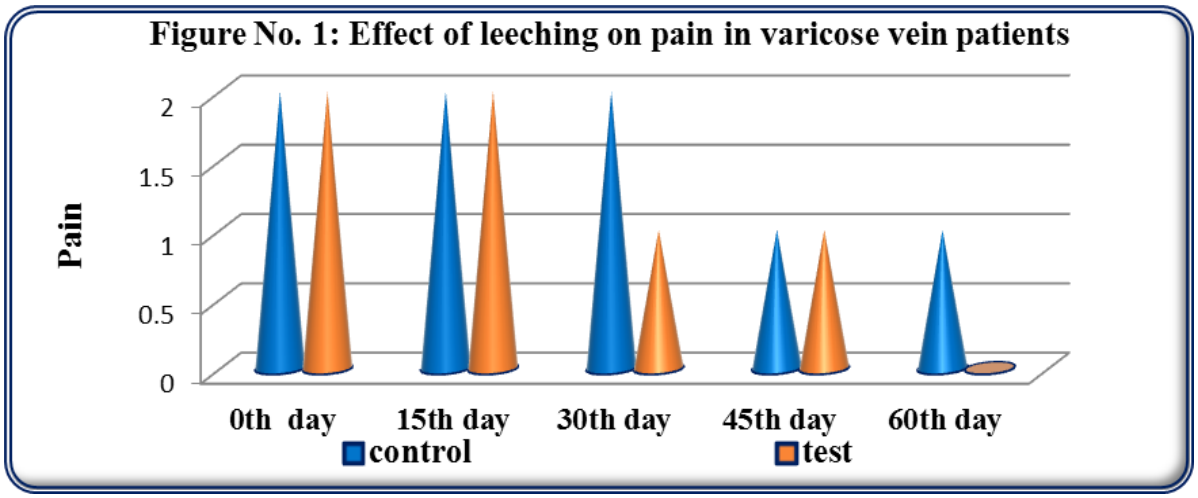
**Safety assessment:** The assessment of the safety of the treatment was done on the following parameters:

- Clinical assessment at every visit of follow up
- Haematological assessment (before and after): Hb%, TLC, DLC, ESR, CT, BT,
- Biochemical assessment (before and after the treatment) – Blood sugar fasting and P.P.

**Documentation:** The case report form and consent forms were submitted to the Dept. Tahaffuzi wa Samaji tib after completion of the study.

**Statistical analysis:** Appropriate statistical tests were carried out to analyze the data using instat graph pad and difference in the treatment groups were considered significant at $p<0.05$.

**RESULTS**



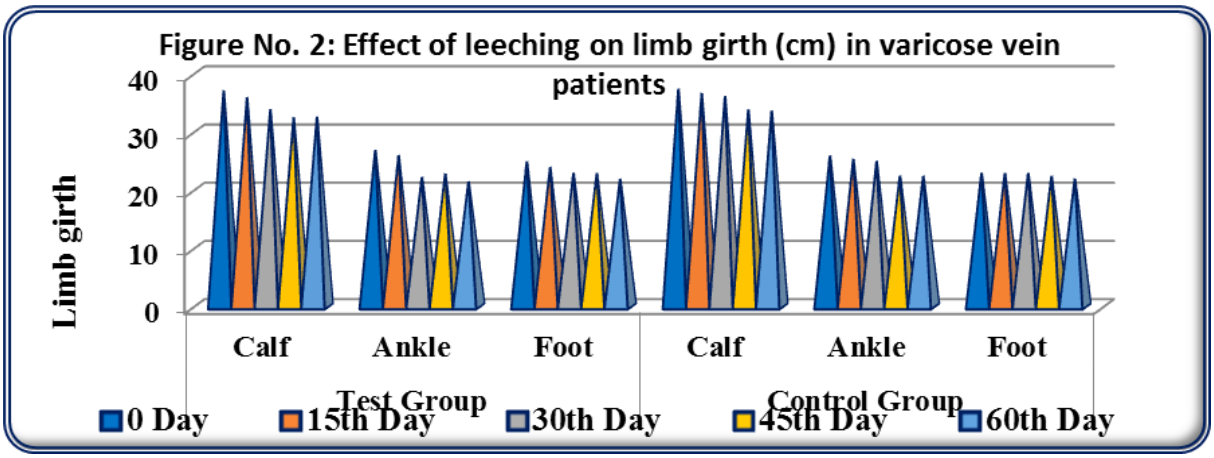



**Figure No. 3: Effect of leeching on pigmentation colour in varicose vein patients**

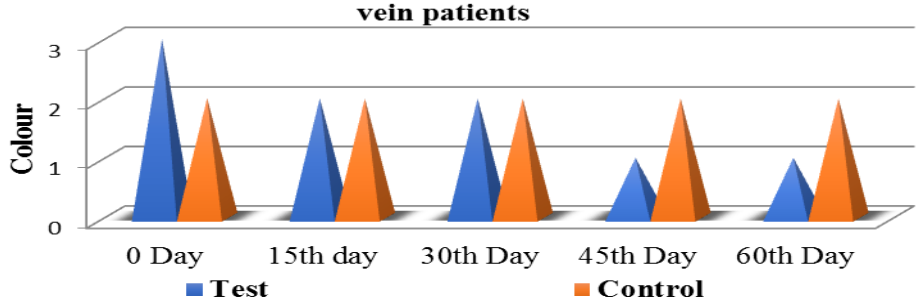



**Figure No. 4: Effect of leeching on pigmentation area in varicose vein patients**

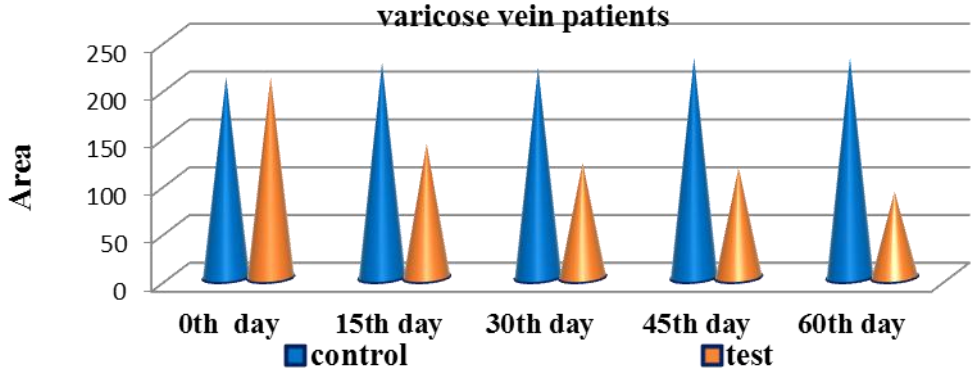
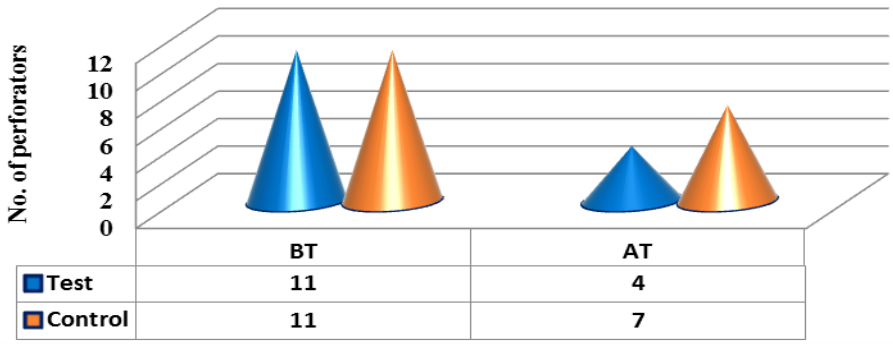



**Figure No. 5: Effect of leeching on incompetent perforators, colour flow Doppler USG result**




| | BT | AT |
|---|---|---|
| Test | 11 | 4 |
| Control | 11 | 7 |

**Figure No. 6: Number of incompetent valves before & after treatment**

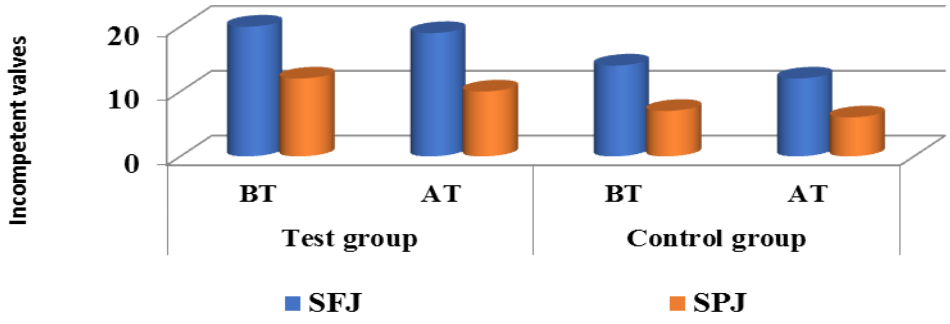


**Table 1: Assessment of Varicose Ulcer- Case series.**

| Groups | Case No. | Variables | 0 day | 15th day | 30th day | 45th day | 60th day |
|---|---|---|---|---|---|---|---|
| **Test** | **1.** | Pain | 3 | 2 | 1 | 0 | 0 |
| | | Exudate type | 1 | 1 | 0 | 0 | 0 |
| | | Ulcer depth (cm) | 1 | 0.5 | 0 | 0 | 0 |
| | | Area of induration ($cm^2$) | 39 | 20.25 | 6 | 5 | 0 |
| | | PUSH Score | 13 | 10 | 6 | 0 | 0 |
| | **2.** | Pain | 2 | 2 | 1 | 1 | 0 |
| | | Exudate type | 2 | 1 | 0 | 0 | 0 |
| | | Ulcer depth(cm) | 2 | 1 | 1 | 0.5 | 0.5 |
| | | Area of induration($cm^2$) | 121 | 90 | 64 | 42 | 24 |
| | | PUSH Score | 15 | 14 | 13 | 10 | 10 |
| | **3.** | Pain | 2 | 2 | 1 | 1 | 0 |
| | | Exudate type | 1 | 1 | 0 | 0 | 0 |
| | | Ulcer depth(cm) | 2 | 1.5 | 1 | 0.5 | 0 |
| | | Area of induration($cm^2$) | 49 | 20 | 12 | 6 | 0 |
| | | PUSH Score | 14 | 12 | 9 | 4 | 0 |
| | **4.** | Pain | 2 | 2 | 1 | 1 | 0 |
| | | Exudate type | 1 | 1 | 0 | 0 | 0 |
| | | Ulcer depth(cm) | 2 | 1.5 | 1 | 0.5 | 0 |
| | | Area of induration($cm^2$) | 72 | 42 | 25 | 16 | 0 |
| | | PUSH Score | 16 | 13 | 11 | 10 | 0 |
| **Control** | **1.** | Pain | 3 | 3 | 3 | 2 | 2 |
| | | Exudate type | 1 | 1 | 1 | 1 | 1 |
| | | Ulcer depth(cm) | 2 | 2 | 1.5 | 1.5 | 1.5 |
| | | Area of induration($cm^2$) | 60 | 40 | 40 | 35 | 28 |
| | | PUSH Score | 14 | 14 | 14 | 11 | 11 |

Exudate Type none -0, serous-1, Sanguineous- 2, Purulent -3

## DISCUSSION

Varicose veins are dilated subcutaneous veins 3 mm in diameter or larger, measured in an upright position.[3] They are usually bilateral affecting both legs (75-76%),[4,5,6,7] and when unilateral they are detected with the same frequency on each leg.[5,6,7] The present study was a randomized controlled open model, embarked to know the effect of *leeching* for secondary prevention of varicose veins. This study was carried out over a period of 12 months from April 2009 to March 2010 in NIUM Hospital. 50 patients were allocated in to 2 groups, Test group & Control group. Test group was treated with leeches alternate day & control group was treated with grade 2 compression stockings & leg elevation for 2 months. The response was assessed on every 15th day up to 2 months. The objective of the study was to prevent complications in order to attain the highest possible degree of physical performance as ultimate goal. In our study maximum no of patients 54 %(27) were of *saudavi mizaj*, 26% (13) were of *balghami*, 14% (7) were of *damvi* and only 6%(3) were of *safravi mizaj*. Our results are in accordance with most of the *unani* physicians.[8,9,10,11,12,113,14,15,16,17,18,19,20,21,22,23,24,25,26]

**Pain:** In present study test group showed significant reduction in median pain score after treatment as compared to before treatment. Median pain score before treatment was 2(1, 3) and after treatment was 0 (0, 1) ($p<0.01$). Whereas in control group median pain score was 2 (2, 3) on 0 day and 1 (1, 2) was on 60th day. When these two groups were compared with each other using Kruskall Wallis test with Dunn's pair comparison test, it was found that median pain score at 60th day test was significantly reduced ($p<0.01$) in comparison to median score at 0-day test and 60th day control. (Figure No.1) The result indicated that both regimens (*Taleeq* and compression stockings with leg elevation) were effective in reducing pain but Taleeq was found more efficacious in comparison to compression stockings & leg elevation.

In case of venous stasis, the pathogenesis of the pain not only involves the concept of pain receptors but also the appearance of algogenic metabolites at the site of the microcirculatory units to which endothelial cells are particularly sensitive.[27] When leech bite the skin it sucks the stagnated blood thereby reduces the mechanical pressure. It also injects secretions containing anticoagulant, antithrombotic, vasodilating & anaesthetic agents from the salivary ductules by pumping action.[28,29] Hirudin, Calin & Factor Xa inhibitor present in leech saliva are anticoagulant. Hirudin is a most potent natural inhibitor of thrombin. It binds to and inhibits only the activity of thrombin with a specific activity on fibrinogen.[30] Therefore Hirudin prevents & dissolves the formation of clots, thrombi and has therapeutic value in superficial varicose veins. Calin is another anticoagulant compound present in leech saliva, it works by prohibiting the Von Willebrand factor to bind itself to collagen, and it is also an effective inhibitor of platelet aggregation

caused by collagen. Factor Xa inhibitor present in leech saliva block the action of the coagulation factor Xa. Enzyme Destabilase has thrombolytic effect; it breaks up any fibrin that has formed. Leech saliva has 3 compounds that act as a vasodilator agent; they are the histamine like substance, the acetylcholine and the carboxypeptidase A inhibitor, widen the vessels and increases the flow of blood to the bite site.[31] Anticoagulant, thrombolytic and vasodilating substances present in leech saliva prolong bleeding and causes hypovolumic haemodilution which reduces pressure of blood and also remove the metabolites at the site of the microcirculatory units, in combination of these, anaesthatic substances present in leech saliva deaden pain on the site.[31,32]

**Limb girth:** Limb girth was measured at 3 points i.e. at calf, at ankle & at foot. It is the measure of oedema. Reduction in limb girth showed reduction in oedema. Test group showed significant reduction in mean limb girth at calf after *Taleeq* as compared to before *Taleeq*. Mean calf girth before *Taleeq* was 37.17±0.83 cm & after *Taleeq* was 32.67±0.78 cm. When two groups were compared with each other by using one-way ANOVA with Tukey Kramer pair comparison test, it was found that test group showed significant reduction at 45$^{th}$ day in comparison to 0-day control (Figure: 2).

In test group mean limb girth at ankle showed significant reduction after *Taleeq* as compared to before *Taleeq*. Mean ankle girth before *Taleeq* was 26.93 ± 0.54 and after *Taleeq* was 21.55±0.55. Control group also showed significant reduction in mean limb girth at ankle after treatment as compared to before treatment. Mean limb girth at ankle before treatment was 26 ± 0.70 & after treatment was 22.5 ± 0.68. When these two were compared by applying Tukey Kramer pair comparison test, it showed significant reduction in mean limb girth at ankle in comparison to 0-day test & 60$^{th}$ day control. (Figure No. 2)

Median foot girth also showed significant reduction after *Taleeq* as compared to before *Taleeq*. Median limb girth at foot before *Taleeq* was 25 (20, 27) and after *Taleeq* median limb girth at foot was 22 (19, 26). In control group, median limb girth at foot before treatment was 23 (21, 29) and after treatment was 22 (20, 27). The median foot girth when compared in test and control group at various assessment days and between each other showed reduction in foot girth but it was not statistically significant ($p>0.05$) (Figure No. 2). The result indicates that both regimens are effective in reducing limb girth (oedema) but Taleeq is more efficacious in reducing oedema than compression & leg elevation.

In case of varicose veins, the movement of blood toward heart is decreased due to incompetent valves and patient may develop stasis (pooling) of blood which contributes to oedema.[33] Biochemicals present in leech saliva due to their anticoagulant, thrombolytic & vasodilating effects cause hypovolumic haemodilution, thus reducing stasis or blood pooling.

**Pigmentation:** In this study the effect of leech therapy on pigmentation was assessed by change in colour & area of pigmentation. In test group median score of colour of pigmentation was significantly reduced after *Taleeq* as compared to before *Taleeq*. Median score of pigmentation colour before *Taleeq* was 3 (0, 3) & after *Taleeq* was 1 (0, 2) in control group the colour of pigmentation before treatment was 2 (0, 3) and after treatment was 2 (0, 3). Control group showed no significant reduction ($p>0.05$) in pigmentation colour when compared with 0-day control. When both groups were compared, it was found that median rating for pigmentation colour at 60$^{th}$ day test was significantly reduced ($p<0.01$) (Figure No. 3). When compared with 0-day control. These results indicate Taleeq reduces pigmentation colour but control group has no effect on pigmentation colour.

Test group showed significant reduction in median area of pigmentation. In test group the median area of pigmentation before *Taleeq* was 210 (56, 1110) $Cm^2$ & after *Taleeq* was 90 (4, 380) $cm^2$. Control group showed no significant reduction in median area of pigmentation. In control group median area of pigmentation before treatment was 210 (72, 754) sq cm and after treatment median areas of pigmentation was 230 (62, 350) sq cm. when these two were compared with each other by using Kruskall Wallis test with Dunn's pair comparison test, test group showed significant reduction in area of pigmentation with respect to 0 day control & control 60$^{th}$ day ($p<0.01$) (Figure No. 4).

Pigmented lesions in stasis dermatitis are caused by deposition of haemosiderin in the dermis. Haemosiderin is formed from the decomposition of haemoglobin within the cytoplasm of phagocytic cells in association with post inflammatory pigmentation that induces pigment in continence. Dermal haemosiderin deposition has a stimulatory effect on melanogenesis.[34]

Macrophages of reticulo-endothelial system play the major role in relieving iron, from catabolism of erythrocyte haemoglobin to plasma for reuse in haem synthesis, part of this iron is rapidly returned to plasma and part is exchanged with shortage iron in macrophages and is reutilize slowly. Hypovolumic haemodilution caused by Biochemicals present in leech saliva improves circulation of skin on the affected site, thus the haemosiderin deposited in skin is reutilized as a source of Iron.[35]

**Ulcer:** In test group 4 (13.3%) patients had varicose ulcer. In 3 cases at 0-day pain score was 2 & in one case pain score was 3. In all 4 cases pain score was reduced to 0 at 60$^{th}$ day. In 3 cases exudates at ulcer was serous and in 1 case exudate was sanguineous at 0 day, on 60$^{th}$ day there was no exudation. The ulcer depth in 3 cases was 2

cm & in 1 case was 1 cm before treatment. In 3 cases the ulcer depth was reduced to 0 & in 1 case it reduced to 0.5 cm from 2 cm. In case 1, area of induration was 39 $cm^2$ in case 2, area of induration was 121 $cm^2$, in case 3, area of induration was 49 $cm^2$ and in case 4 area of induration was 72 $cm^2$ before treatment. In case 1, 3 & 4 area of induration was reduced to 0 & in case 2 it was reduced to 24 $cm^2$ from 121 $cm^2$ after treatment. In case 1 PUSH Score was 13, in case 2 PUSH Score was 15, in case 3 PUSH Score was 14 & in case 4 PUSH Score was 16 before treatment. In case 1, 3 & 4 PUSH Score was reduced to 0 and in case 2 it reduced to 10 (Table No.1). Thus, in our study, out of 4 cases 3 cases of the ulcers was completely healed. Venous congestion or haemeostasis compromises circulation and inhibits perfusion. In the absence of perfusion, congested tissues become ischaemic and tissue necrosis can occur. Leeching provides a medium for drainage & thus increases perfusion until adequate venous flow is established. This occurs due to the anticoagulant effect of hirudin, which prevent other molecules from binding to the saturable sites of thrombin & thereby inhibits both the release of platelet activating factor and the conversion of fibrinogen to fibrin. Inhibition of coagulation continues even after the initiation of clot formation as this small 65 amino acid polypeptides can penetrate beneath the clot surface while remaining active. A number of other compounds within the saliva can also prolong bleeding. Destabilase digest fibrin cross linkages & converts the D-dimmer fragments of cross-linked fibrin into D-monomers. Destabilase has been shown to be antithrombotic. Factor Xa is an effective antithrombotic agent for both arterial & venous thrombosis. This potent inhibitor of coagulation drastically reduced the time of thrombolysis compared to hirudin.[36,37] Fibrinolytic compounds have also been found in leech saliva[38] as have inhibitor of plasma kallidrein.[39] Other substances in salivary secretions are noted for their ability to inhibit haemeostasis and affect blood flow. Apyrase impedes adenosine 5- diphosphate (ADP) induced platelet aggregation as well as thrombin induced aggregation.[40] Calin, a protein collegenase, also inhibits platelet aggregation and adhesion as well as collegen induced thrombin formation and collegen binding to Von Willebrand factor.[41,42] Colligenase & Hyaluronidase can degrade extracellular matrix components and may thereby also act as permeability & spreading factor of blood.[36] This might allow deeper penetration of leech secretions, vasodilatation by histamine like product increases blood flow to the region of the bite, increasing the amount of blood lost. Finally, the proteinase inhibitors bdellin & eglin prolong the effect of all these secreted agents.[43] Fibrinolytic property of leech saliva may be maintaining tissue viability and combating intravascular coagulation.

**Colour flow Doppler USG:** Colour flow Doppler USG was done in all patients of both groups before & after treatment. In test group SFJ incompetency was detected in 20 patients before treatment as compared to 19 after treatment. In control group SFJ incompetency was detected in 14 patients before treatment as compared to 12 after treatment. When both groups were compared with each other by using Chi square test, there was no significant difference ($p>0.05$). In test group SPJ incompetency was detected in 12 patients before treatment as compared to 10 patients after treatment. In control group 7 patients detected with SPJ incompetency before treatment as compared to 6 after treatment. Inter group comparison showed there was no significant difference ($p>0.05$) (Figure No. 6). This result may be attributed to the degeneration of valve cusps.[44]

Test group showed significant reduction in number of perforators before *Taleeq* as compared to after *Taleeq*. In test group median number of incompetent perforators before treatment was 11 (10, 13) & after treatment was 4 (3, 6). Control group also showed significant reduction in number of perforators as compared to before treatment. In control group number of incompetent perforators before treatment was 11 (9, 13) & after treatment was 7 (4, 8). When both groups were compared with each other by using Kruskall Wallis test with Dunn's pair comparison test. Test group showed significant reduction in number of perforators (Figure No. 5).

**Safety parameters:** Safety parameters are within normal range before and after treatment in both groups. Thus, our regimens are considered to be safe

**Control group:** In present study the control group showed significant reduction in median pain score after treatment as compared to before treatment. Control group showed effect on pain reduction from $45^{th}$ day whereas test group showed reduction in pain score from 30th day. In control group mean limb girth (at calf, ankle & foot) showed significant reduction after treatment as compared to before treatment. Both groups showed significant reduction in limb girth at calf & ankle from $15^{th}$ day; in limb girth at foot from $45^{th}$ day. Control group showed no reduction in colour of pigmentation and area of pigmentation.

In our study only 1 Patient with venous ulcer was in control group. Pain score at ulcer site was 3 before treatment; it was reduced to 2 after treatment. In this case exudate was serous at 0 day, and showed no change on completion of protocol duration. Ulcer depth was 2cm before treatment and 1.5cm after treatment. Area of induration was 60 $Cm^2$ before treatment and 28$cm^2$ after treatment. PUSH score was 14 before treatment & 11 after treatment.

Graduated compression stocking is a mechanical method of prophylaxis against varicose vein & DVT used in various settings. Their mechanism of action is multifactorial. Graduated compression stocking exerts graduated circumferential pressure from distal to proximal segments of lower limbs increasing venous out flow and reducing stasis within the leg veins.[45] The

graduated compression stockings work by increasing the ejection fraction, decreasing reflex & reducing the residual volume fraction & heightening the linear velocity of venous outflow, which prevent stasis & venous distension and enhance emptying of the valvular cups.[46] Improve the muscle function & venous pressure in limbs with chronic venous insufficiency.[47] The beneficial hemodynamic effects of elastic compression stoking have been demonstrated in chronic venous insufficiency with various kinds of compression[17] & different levels of pressure.[18] using ambulatory venous pressure measurements & various methods of plethysmography.[48,49,50,51,52,53,54,55]

## CONCLUSION

Prevalence of varicose veins is 15%. Incidence of varicose veins increases with advancing age. It is assumed that aetiology of varicose vein is multifactorial. Complications of varicose veins like venous eczema, venous pigmentation, lipodermatosclerosis, superficial thrombophlebitis, venous ulceration which is more troublesome, distressing and painful condition. Health related quality of life is significantly impaired in individuals with vascular disease. Since bloodletting has great importance in rehabilitation (prevention of complication) of varicose vein patients in Unani Medicine. So, keeping the fact a randomized controlled open trial was conducted in NIUM Hospital to evaluate the effect of *Taleeq* in *Dawali* for secondary prevention. Test group was treated with *Taleeq* on alternate day and control group was treated with grade 2 compression stockings & leg elevation for 2 months. Test group showed significant reduction in pain (discomfort in legs), limb girth i.e. oedema (at calf, ankle & foot), pigmentation (area & colour) as compared to control group. PUSH Score in ulcer is reduced to 0 in 3 cases out of 4 cases. Ulcer depth was reduced to 0 cm in 3 cases & 0.5 cm in 1 case. In control group pain score was reduced to 2 from 3, PUSH Score was reduced to11 from 14, ulcer depth was reduced to 1.5 cm from 2.0 cm. Colour flow Doppler showed significant reduction in number of perforators after *Taleeq* in test group but there is no effect on status of SFJ & SPJ after treatment in test group as well as in control group.

*Taleeq* has significantly positive effect on the course of superficial phlebitis; patients perceive a noticeable improvement of symptoms right after treatment due to potent anti-inflammatory, blood thinning and lymph flow accelerating effect of leech secretion. Compression stockings and leg elevation also showed significant improvement but less than *Taleeq*. Thus, from the above result we conclude that *Taleeq* was safe & well tolerated and has encouraging potential in prevention of complications of varicose veins. We must stress that leech therapy should be administered in combination with compression stockings and other effective treatment modalities like weight normalization for obese patients, physical therapy, dietary modification, etc for optimal result.

## SUMMARY

Varicose Veins is a disease in which veins of legs and feet become dilated, elongated, tortuous and greenish in colour. The aetiology of varicose vein is still incompletely understood despite the fact that it is a very common disease affecting all ages from teenagers to elderly people. Greeko-Arab physicians postulated that it is caused by accumulation of non-purulent *balghami*, *saudavi* or *damvi* matter in leg veins or due to weakness. The patient may report aching & restless leg, itching, swelling in leg, pigmentation, venous ulceration, lipodermatosclerosis, eczema etc. health related quality of life is significantly impaired in individuals with varicose veins. Approximately 15% adults have varicosity of veins. Present study is randomized controlled open study conducted to know the effect of *Taleeq* for secondary prevention of varicose veins. 50 patients were randomly assigned in 2 groups, 30 in test group & 20 in control group. Test group was treated with *Taleeq* alternate day & control group was given grade 2 compression stockings for wearing and also advised limb elevation for 2 months. The response was measured by assessment of pain, pigmentation, limb girth (at calf, ankle & foot), assessment of ulcer healing by pain, ulcer depth, periulcer surface, PUSH Score, Hb% on every 15$^{th}$ day and colour flow Doppler USG at before & after treatment. Hb% was assessed to check anaemia. According to *mizaj* 54% (27) were of *saudavi mizaj*, 26% (13) were of *balghami*, 14% (7) were of *damvi mizaj*, and 6% (3) were of *safravi mizaj*.

**Pain:** both groups showed significant reduction in median pain score after treatment as compared to before treatment. On inter group comparison the difference in pain reduction was also statistically significant.

**Limb girth:** Was measured at 3 points (at calf, ankle & foot), all showed statistically significant reduction after treatment as compared to before treatment and also on inter group comparison.

**Pigmentation:** In test group median score of pigmentation was significantly reduced after treatment whereas control group did not show reduction in colour of pigmentation. Area of pigmentation was significantly reduced in test group but not in control group.

**Ulcer healing:** In our study 4 patients with ulcer were in test group and 1 patient in control group. In test group, ulcer was completely healed in 3 patients, the PUSH Score in case 1$^{st}$ 3$^{rd}$ & 4$^{th}$ was 13, 14 & 16 on 0 day respectively and 0 on 60$^{th}$ day. In case 2$^{nd}$ PUSH Score at 0 day was 15 and on 60$^{th}$ day was 10. Ulcer depth was also reduced in all 4 cases. Pain score was reduced to 0 in all cases. In control group there was only 1 case with ulcer. PUSH Score was 14 at 0 day & 11 at 60$^{th}$ day. Ulcer depth was reduced from 2 cm to 1.5 cm. pain score was reduced to 2 from 3. Area of induration was reduced from 60 cm$^2$ to 28 cm$^2$. Colour flow Doppler USG shows not significant reduction in number of incompetent

valves (SFJ & SPJ) but shows significant reduction in number of perforators. All safety parameters are within normal range before & after treatment.

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