Keywords: Acne, Jalaukawacharana, Leech therapy, Mukhadushika

ABSTRACT
Acne is a very common medical condition and more than 90 percent of world population has been affected by acne in their life. Among various types of acne, acne vulgaris is the most common, with prevalence in 99 percent of the acne cases. Mukhadushika described in Ayurveda texts resemble acne vulgaris of modern science, it is caused by vitiated Kapha, Vata and Rakta. Raktmokshana (bloodletting) is mentioned in Ayurvedic texts as the preferred way of treatment in Raktaja as well as dermatological disorders. Acharya Susruta stated Jalaukawacharana is the preferred method of bloodletting in Sukumara (tender nature person). Jalaukawacharana being a bio-purificatory method removes deep seated toxins by letting out blood, clearing Srotasa and pacifying vitiated Doṣha. Jalaukawacharana possesses high efficacy in both cleansing and healing properties. Leech’s saliva contains a complex mixture of different biologically and pharmacologically active substances which gets secreted into the site. Destabilase, Bdellin, Histamine, Hyaluronidase, Fibrinases and collagenase are important component of leech secretions which has been proved for normalization and improvement of capillary as well as collateral blood circulation, Expressed anti-inflammatory effect, Analgesia and anesthesia effect through saliva, Immuno-stimulation and immuno-modulating effect. In this review, an attempt has been made for reviewing the potentials of leech therapy in treating Mukhadushika w.r.t. acne vulgaris. For this purpose, various researches of Jalaukawacharana carried out at different Ayurveda centers as a monotherapy or in combination with other therapy or drugs were evaluated for their acne treating potential.
INTRODUCTION

Acne is a very common medical condition and more than 90 percent of world population has been affected by acne in their life. Approximately 85% of people between the ages of 12 and 24 years experience at least minor acne.\(^1\) Although acne is a skin disease, it can lead to prominent emotional and psychological impact on any patient, regardless of the severity or the grade of the disease.\(^2\) Adolescent acne usually begins with the onset of puberty, when the gonads begin to produce and release more androgen hormone, and it is then further exacerbated by genetic and other factors. Though it is a common disease of adolescent, it can occur at any stage of life and may continue into one’s 40s. There are various types of acne, such as acne vulgaris, acne rosacea, acne cosmetica, acne mechanaica, and acne fulminans. Among them all, acne vulgaris is the most common, with prevalence in 99 percent of the acne cases. Acne can run in families, and those with family history of acne often develop acne at an earlier age. If both the parents have acne, there is 75% chance that a given child will develop acne. Plugged follicle, increased sebum production, Propionibacterium acnes, and inflammation are thought to promote acne. Acne lesions are divided into inflammatory and non-inflammatory lesions. Non-inflammatory lesions consist of open comedones (blackheads) and closed comedones (whiteheads). Inflammatory lesions consists of red papules, pustules, nodules and cysts.\(^3\) Acne vulgaris typically affects the areas of skin with the densest population of sebaceous follicles (i.e. face, upper chest, back). Local symptoms of acne vulgaris may include pain, tenderness and or erythema.\(^4\)

Ayurveda approach in Mukhadushika (acne)

In Ayurveda, Mukhadushika has been elaborated as one of the Kshudra Rogas (minor ailments) and the symptoms of Mukhadushika resemble acne vulgaris as per modern science. Acharya Vagbhata defined Mukhadushika as, the eruptions like Shalmali thorn, on the face during adolescence caused by vitiated Kapha, Vata and Rakta.\(^5\) Mukhadushika is also termed as Yuvaanpidika or Tarunyapitika by the some Acharyas as the disease is seen in adolescent and young age group prominently. Acharya Charaka has mentioned that the vitiated Pitta in Tvaka (skin) & Rakta produces a reddish swelling called Pidika (pimple or pustule).\(^6\) According to Acharya Vagbhata, this Pidika is filled with Meda, which can be explained with the term Medogarbhita (filled with oil/sebum). We can correlate this with modern science which explains the similar pathology. Obstruction of follicular ducts due to impacted
sebaceous and keratin secretions in accompaniment with Propionibacterium acnes colonization contribute to the pathogenesis of acne vulgaris.\(^7\)

Ayurveda texts such as *Sushruta Samhita*, *Ashtanga Hrudaya* (by Acharya vagbhata), *Sharangadhara Samhita*, *Chakradatta* etc., have stated the pathophysiology and treatment of acne. According to Acharya Sushruta, vitiation of *Kapha* dosha, *Vata* dosha and *Rakta* Dhatu (blood) lead to the formation of acne.\(^8\) Acharya Kashyapa mentioned that *Shukra Dhatu* (*Semen*) development occurs in the young age and there is changes in sexual characters along with formation of acne.\(^9\) In Sharangadhara Samhita, it has been mentioned that acne is caused due to *Shukradhatumala* (waste products of semen).\(^10\)

Regarding the treatment, Ayurveda texts have mentioned *Shamana* and *Shodhana* therapy in the treatment of *Mukhadushika*. *Shamana* therapy (conservative treatment) includes use of internal and external medication. Many formulations for external application such as *Lepa* (paste) and *Taila* (oil) have been mentioned in Ayurveda classics. *Shamana* therapy aims towards the balancing of vitiated *Doshas*. Several Ayurveda formulations and herbs have been used to treat acne. These herbs help to eliminate various toxic elements and functions as topical antiseptic too. These formulations are mentioned in table 1.\(^11\)
Table No. 1: Ayurveda formulations and herbs described in Ayurveda texts to treat acne.

<table>
<thead>
<tr>
<th>S N</th>
<th>Herbs</th>
<th>Lepa (Pastes)</th>
<th>Taila (Oil)</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lodhra Symlocos racemosa</td>
<td><em>Marichadi Lepa</em></td>
<td><em>Kumkumadi TAILA</em></td>
<td><em>Khadirastaka Kashya</em></td>
</tr>
<tr>
<td>2.</td>
<td>Yashtimadhuka Glycyrrhiza glabra</td>
<td><em>Varunadi Lepa</em></td>
<td><em>Majishthadi TAILA</em></td>
<td><em>Mahamanjishtadi kwatha</em></td>
</tr>
<tr>
<td>3.</td>
<td>Dhanyaka Coriandrum sativum</td>
<td><em>Vatankuradi Lepa</em></td>
<td><em>Haridradi TAILA</em></td>
<td><em>Sarivadyasava</em></td>
</tr>
<tr>
<td>4.</td>
<td>Vacha Acorus calamus</td>
<td><em>Siddharthadi Lepa</em></td>
<td><em>Kanaka TAILA</em></td>
<td><em>Guduchyadighanavati</em></td>
</tr>
<tr>
<td>5.</td>
<td>Shalmali Salmalia malabarica</td>
<td><em>Shalmali Kalkadi Lepa</em></td>
<td><em>Sarshapa TAILA</em></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Manjishtha Rubia cordifolia</td>
<td><em>Arjunadi Lepa</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Jatiphala Myristica fragrans</td>
<td><em>Manjishthadi Lepa</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Daruharidra Berberis aristata</td>
<td><em>Lodhradi Lepa</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Nimba Azadirachta indica</td>
<td><em>Jatiphaladi Lepa</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Khadira Acacia catechu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Sariva Hemidesmus indicus</td>
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<td></td>
</tr>
<tr>
<td>12.</td>
<td>Kakamachi Solanum nigrum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Guduchi Tinospora cordifolia</td>
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<td></td>
</tr>
</tbody>
</table>

*Shodhana* therapy (cleansing or purification) includes *Vamana Karma* (stated by Sushruta and Vagbhata), *NasyaKarma* (stated by Vagbhata) and *Raktamokshana* (stated by Vagbhata and Chakradatta). Almost in all texts *Vamana* is the main treatment for Mukhadushika.
Vamana procedure is specially indicated in Kaphaja diseases in which Doshas are eliminated through mouth. Virechana procedure is also practiced by Ayurveda physicians as it is choice of treatment in Raktaja and dermatological disorders. Nasya therapy is mostly indicated in Urddhwa-jatrugata (disease occurring above clavicle) diseases in which medicines are introduced through nasal route. It is another type of Shodhana Chikitsa elaborated by Vagbhata for the treatment of acne.\textsuperscript{12}

\textit{Jalaukawacharana Approach in Mukhadushika (Acne)}

Raktamokshana (bloodletting) is mentioned in Ayurvedic texts as the preferred way of treatment in Raktaja (blood born disease) as well as dermatological disorders. Rakta Dhatu Dushti is one of the main pathogenic factors of Mukhadushika formation. In Mukhadushika, Acharya Vagbhata and Chakradatta have indicated Siravedha (phlebotomy) as the preferred Raktamokshana method. But considering adolescent age group of acne patients, the major age group in which this disease occurs belongs to Sukumara category (tender nature) and Siravedha being a Shastra Karma (surgical method) is not accepted easily. Vamana Karma also is an exhaustive and time consuming procedure due to its pre and post therapeutics implementations. Acharya Susruta stated Jalaukawcharana is the preferred method of bloodletting in Sukumara (tender nature).\textsuperscript{13} Therefore for Raktamokshana, Jalaukawcharana (leech therapy) can be more suitable Shodhana procedure as compared to Vamana and Siravedha in acne patients. Jalaukawcharana is much safer, less complicated and an almost painless procedure.

Ayurveda believes in treating the root cause by Shodhanachikitsa. Raktamokshana removes the vitiated blood and clears the Strotovarodha (blockage in channels), thus breaking the Samprapti (pathogenesis). Jalaukawcharana being a bio-purificatory method removes deep seated toxins by letting out blood, clearing Srotasa(channels) and pacifying vitiated Doṣha. Jalaukawcharana possesses high efficacy in both Shodhan (cleansing) and Ropana (healing), without producing any adverse effects. It is cost effective and easy to apply. Hence, it can be used as an alternative approach for management of acne. Therefore, Jalaukawcharana being the easiest and almost painless method can be used as a preferred way of Raktamokshana in acne.

\textbf{Hirudotherapy;} The treatment of disease conditions with medicinal leeches (Jalaukawcharana) is termed as Hirudotherapy, a Latin term.\textsuperscript{14} Hirudotherapy (Leech
Hirudotherapy (therapy) is one of the oldest practices in medicine; In July 2004, the FDA approved leeches as a medical device in the area of plastic and reconstructive surgery.\textsuperscript{15} Hirudotherapy is used in dermatology for treating diseases of the epidermis, such as psoriasis, lichen planus and scleroderma. Local oxygenation was increased in patients receiving leech therapy for these disorders. In patients with lichen planus derma, decreased inflammation and lesion number found with hirudotherapy.\textsuperscript{16}

Many studies have found that leeches have various bioactive molecules in their secretions. More than 20 molecules and their modes of action have been identified. The components of these secretions are thought to play important role in breaking pathogenesis of acne. Destabilase is a component in leech secretions which has glycosidase activity and shows both antibacterial and fibrinolytic actions.\textsuperscript{17} Bdellin is an enzyme that inhibits activities of trypsin, chymotrypsin, and plasmin, it can be used as plasmin inhibitor to control bleeding.\textsuperscript{18} It also have anti-inflammatory role. Histamine by its vasodilatation property improves microcirculation replacing old stagnant blood with fresh blood. Hyaluronidase which is also known as spreading factor facilitates the penetration and diffusion of pharmacologically active substances into the tissues and has antibiotic properties.\textsuperscript{19,20} Fibrinases and collagenase in saliva reduces the density of scar tissue and it helps to reduce fibroblast formation in scars.\textsuperscript{21}

**Procedure of Jalaukawacharana**\textsuperscript{13}

Leech is kept in solution of turmeric for a 45 min till they regained their motility. This Leech is applied on roughened desired spot. If Leech refuses to stick on the desired spot, then drop of milk is applied on the spot. On sticking to the affected part from the suckers, Leech assumes the shape of a horseshoe in the raised and arched position. Leech then is covered with a piece of thin and wet cotton and drops of water were frequently dropped on cotton piece. An attachment period lasts 20 to 45 minutes, during which the leech sucks between 5 and 15 ml of blood.\textsuperscript{27} Generally, after 30-40 minutes, leech automatically detaches from the site. Turmeric powder is then sprinkled over the leech’s mouth for inducing vomiting. Sometimes gentle squeezing of the leech is required from its posterior end toward anterior end to expel out the sucked blood. After satisfied vomiting of sucked blood, leech becomes active again and stored in freshwater.
WHY THIS REVIEW

In this modern era, beauty is the soul of physical appearance. Acne is affecting large population of world at the age of adolescence, when they are most conscious about their looks. Treating acne with antibiotics and modern treatment sometimes is not enough. In Ayurveda literatures, various treatments are available for acne, but still not authenticated scientifically. In this review, an attempt has been made for reviewing the potentials of leech therapy in treating Mukhadushika w.r.t. acne vulgaris. For this purpose, various researches of Jalaukawacharana carried out at different Ayurveda centers were evaluated for their acne treating potential. Raktamokshana through leech therapy in acne needs to explore with more studies as a monotherapy or in combination with other therapy or drugs. This review helps new researcher to select their topic of interest about leech therapy in acne.

MATERIALS AND METHODS

In this review work, the clinical studies carried out at different Ayurved centres and published in the indexed and referred (ISSN numbered journals) were included. The research articles and case reports were searched in Google, PubMed, DHARA online and AYUSHPORTAL (A research portal of Govt. of India.) in the month of February 2020. In these review keywords Mukhadushika, tarunyapidika, acne, Jalaukawacharana, leech therapy were used for searching the research data on acne.

RESULT AND DISCUSSION

Previous Research Work

1. Role of Jalaukawacharana in Mukhadushika (Acne Vulgaris) 22

In this clinical study 30 patients of 16-30 years, ages were taken and treated with Jalaukawacharana weekly once for four weeks. Here author concluded that anticoagulant, anti-inflammatory, analgesic property of leech saliva helps in relieving the symptoms such as inflammation, pain, papules, pustules, comedones, nodules etc. Results were highly significant and encouraging and Jalaukawacharana proved to be an easy and less invasive treatment without causing any adverse effect.

2. A clinical study to evaluate the efficacy of Jalaukawacharana and Siddarthakadi Lepa in the management of Mukhadushika w.s.r. acne vulgaris 23
In the study, 15 patients of Acne Vulgaris were treated with Jalaukawacharana of four sittings with seven days of interval. Siddarthakadi Lepa was also applied daily in between four sittings of Jalaukawacharana. Assessment was done on the basis of subjective parameters i.e. Pidika (Acne lesions) grading and associated complaint grading, as well as objective parameters i.e. count of lesions. Intervention was found to be significantly effective (p<0.05) in reducing Acne grading as well as associated symptoms i.e. Vedana (Pain), Daha ( Burning), Paka (Inflammation), Kandu (Itching), Vaivarnyata (Discolouration) and Snigdhata (Oily). Intervention also showed significant result in reducing count of lesions too. However, no significant effect was seen on the number of scars. After follow-up period, only 13.33% showed relapse in grading of acne.

3. Clinical study to evaluate the efficacy of Jalaukawacharana and Sarivadyasava in Yuvanpidika (acne Vulgaris)  
A study by Rathod Motilal et al in 2012, total no. of 20 patients of acne were subjected to Raktamokshana with Jalauka weekly once and Sarivadyasava in dose of 25 ml three time a day orally for a period of 28 days, established the efficacy of leeching in acne with a p<0.001 in symptoms of Size, Tenderness, swelling and severity of lesions, which shows very significant results.50% patients showed complete relief and 40% patients showed moderate relief in symptoms.

4. Role of Jalaukawacharana and Mahamanjishtadi Kwatha in the Management Of Mukhadushika w.s.r to Acne Vulgaris- A Case Study.  
Author selected a case of 25-year-old female acne patient; she was given four sittings of Jalaukawacharana with 7 day interval along with the 10 ml Mahamanjishtadi Kwatha internally after meal continuously for 28 days. This remedy was given for 3 months. During complete duration of treatment, patient was instructed to follow Pathya and Apathya as advised strictly. After four setting of Jalaukavacharana there was complete disappearance of acne, complete relief in itching, burning sensation and pain. Significant improvement was observed in discoloration over face from grade 3 to 1.

5. The efficacy of Jalaukawacharana (leech therapy) in Mukhadushika (acne) 
A study by Asutkar et al in 2015 established the efficacy of leech therapy in acne with a p<0.05 and a reduction in symptoms of Size, Tenderness, Redness which was significant at
5% significance. It was a clinical study and leech application was done every fourth day for total five settings. Out of 30, 29 patients got satisfactory results.


In this study, a total 17 patients of age group between 14-40 years were registered out of which 15 patients completed the whole trial. Statistically Extremely significant results (p<0.001) were found in tenderness (68.91%), Itching (77.77%), burning (55.96%), size (82.11%), extent of lesion (72.42%), significant result (p<0.05) was found in discoloration (91.66%). Statistically nonsignificant results (p>0.05) was found in discharge (81.82%). Author concluded that Jalaukawacharana alone is very significant in relieving the associated complaints of acne like itching, burning, pain due to Sroto Shodhana effect, due to improving local blood circulation, due to various bioactive substances released by leech.

7. Management of Mukhadushika (Acne vulgaris) with Jalaukawacharana (Leech Therapy): A Case Study  

A 20 year’s old female patient of acne on both cheeks associated with itching, burning sensation for 2 years. Three sittings of Jalaukawacharana were done (on Day 1, Day 5, and Day 10). Results were encouraging with its simple methodology achieved by Sthanik Shodhana (local cleansing effect).

8. Leech therapy in Dermatology,  

In this paper, author concluded that skin disorders primarily of autoimmune kind make the dermis thick with poor tissue perfusion. The leech saliva prevents inflammatory mediators, decreases tissue thickness, accelerates reperfusion and increases permeability of the tissue making it more acceptable to therapeutics. Hence making leech therapy an ideal mode of treatment in dermatology.

The prevalence of acne vulgaris globally was 681.2 million in 2016. This was an increase of 10 percent from 612 million in 2006. By the end of 2026, the number of people affected by acne in India is estimated to reach 23 million at a compound annual growth rate (compound average growth rate) of 0.5 percent.
In Ayurveda texts, acne has been described as one of the Kshudra Rogas (minor ailments) caused by the vitiation of Vayu, Kapha and Rakta in the pathology of the disease. Ayurveda believes in expelling the root causes of acne by advising Shodhana Chikitsa. Raktamokshana among the Shodhana may give better relief particularly when Rakta is vitiated. Raktamokshana not only purifies the channels of the area of application but also lets the other parts of the body become free from disease and action is fast than other shaman remedies. As in Yuvanapidaka vitiated Dosha, Dhatu and Mala (basic bio-elements) gets accumulated in Srotasa (channels), causing blockages and leads to Pidaka formation. Jalaukawacharana being a bio-purificatory method removes deeply seated toxins by letting out blood, clearing Srotasa and pacifying vitiated Dosha. Among the Anushastras Vagbhatta considers Jalaukas (leeches) as the best as all places of the body for all the persons. Leech application not only removes blood from the site but also injects biologically active substances which help to manage various ailments. Leech’s saliva contains a complex mixture of different biologically and pharmacologically active substances which gets secreted into the wound. So Jalaukawacharana has been proved for normalization and improvement of capillary as well as collateral blood circulation, Expressed anti-inflammatory effect, Analgesia and anesthesia effect through saliva, Immuno-stimulation and immuno-modulating effect.

Complications of Hirudotherapy

Excessive bleeding can occur with leech therapy; it can be controlled by applying direct pressure or topical thrombin. These properties permit the wound to ooze up to 50 ml of blood for up to 48 hours. Leech bites usually bleed for an average of six hours. Another serious complication of leech therapy is infection.

CONCLUSION

By thorough review of article related to use of Jalaukawacharana (leech therapy) in Mukhadushika (acne) it can be concluded that Jalaukawacharana as a monotherapy and combination with other Ayurveda shaman drugs gives satisfactory results and for its validation, RCTs on more number of patients is required.

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