



A Conceptual Study on the Impact of Medicinal Leech Therapy in Acne

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ABSTRACT: Skin is the largest organ and covers the entire outer surface of the body. It is largest in terms of surface area and weight. The skin serves three major functions namely; protection, regulation and sensation. During puberty, alteration of the sebaceous lipid profile, called dysseborrhoea, stress, irritation, cosmetics and potential dietary factors lead to inflammation and formation of different types of acne lesions. For many years acne was contributed to dietary patterns but now it has been established that it is a multi-factorial and multi-gene disease.

In Ayurveda, *Mukhadushika* has been elaborated as one of the *Kshudra Rogas* (minor ailments) by various Acharyas and the symptoms of *Mukhadushika* resemble *Acne vulgaris* as per modern science. *Shalmali kantaka* like eruptions on the face of adolescents, due to vitiation of *Kapha dosha*, *Vata dosha* and *Rakta dhatu* are known as *Mukhadushika* or *Yuvana pidika* or *Tarunya pitika*. When this *pidika* gets filled with *Meda*, it is assigned the term *Medogarbha* (filled with oil/sebum) *pidika*. Considering adolescent age group of acne patients, the major age group in which this disease occurs belongs to *Sukumara* category. *Jalaukavacharana* has been mentioned as a technique of *Raktamokshana* especially for the *sukumara*. *Jalaukavacharana* being a bio-purificatory method removes deep seated toxins by letting out blood, clearing *Srotas* and pacifying vitiated *Dosha*. *Jalaukavacharana* possesses high efficacy in both *Shodhana* (cleansing) and *Ropana* (healing) without producing any adverse effects. It is cost effective and easy to apply.

KEYWORDS: *Yuvana pidika*, *Mukhadushika*, *Tarunya pidika*, *Acne vulgaris*, *Jalaukavacharana*, Medicinal Leech.

INTRODUCTION

Skin is the largest organ in terms of surface area and weight and covers the entire outer surface of the body. Protection, regulation and sensation are the three major functions of skin. The skin consists of three major layers i.e. Epidermis, Dermis and Hypodermis. It also serves as the first line of defence against external influences such as microbes, temperature and weather etc. *Acne vulgaris* is a chronic inflammatory disease of the pilosebaceous unit of the skin. The pathophysiology of Acne includes hyperseborrhoea, abnormal follicular keratinization and proliferation of *Propionibacterium acnes* in the pilosebaceous unit.¹

During puberty, alteration of the sebaceous lipid profile, called dys-seborrhoea, stress, irritation, use of cosmetics and potential dietary factors lead to inflammation and formation of different types of acne lesions. Another important factor for triggering of Acne is Dysbiosis, the process leading to a disturbed skin barrier and disequilibrium of the cutaneous microbiome, resulting in the proliferation of *P. acnes* strains.¹

In Ayurveda many *Kshudra Rogas* have been elaborated out of which *Acne vulgaris* is most similar to *Tarunya pidika*, *Mukha dushika*, *Yuvana pidika*.² According to Acharya *Vagbhata*, vitiation of *Kapha*, *Vata* and *Rakta* lead to formation of *Pidika*. When this *pidika* gets filled with *Meda*, it is assigned the term *Medogarbha* (filled with oil/sebum) *pidika*.³

Raktamokshana (bloodletting) has been mentioned in Ayurvedic texts as the preferred way of treatment in *Raktaja Vyadhi* as well as dermatological disorders. As *Rakta Dhatu Dushti* is one of the main pathogenic factors for *Mukhadushika* formation; Acharya *Sushruta* stated *Jalaukavacharana* is the preferred method of bloodletting in *Sukumara prakriti* individuals.⁴

MATERIALS AND METHODS

For the purpose of study, various *Ayurvedic* classical literature was consulted and relevant material was collected and compiled to critically analyze the effect of leech therapy on *Yuvana Pidika*. This was done to analyse and substantiate it as a treatment of choice for young adults suffering from the disease. Modern perspective of *Acne vulgaris* was also taken into record to equate and establish the effect of *Jalaukavacharana* in patients suffering from Acne. Besides this, deep insight has been offered in regard to the modern basis for acne and the chemical effect of leech saliva in resolving the disease.

REVIEW OF LITERATURE

Acne vulgaris also known as adolescent acne is one of the most commonly encountered skin condition. It is a chronic inflammatory disease of the pilosebaceous unit and observed equally in both males and females¹⁻³. Adolescent acne usually starts in the adolescence, but may not cease to exist until later ages. The age of onset may be 18–20 years or it may be delayed until 25–30 years in some cases¹⁻⁴. “Acne vulgaris” which does not affect the general health status, which has no vital danger and which appears to be a simple disease may constitute a big and important problem the adolescence during which acne is observed with the highest rate is an age period in which body perception is at the highest level and appearance can sometimes be everything. In addition, acne which may lead to persistent scars in the long term is much more important compared to its function and its objective problems and should absolutely be treated.

Although acne is a disease of pilosebaceous unit, it develops in the middle part of the sebaceous follicle channel and not in the sebaceous glands. There are multiple sebaceous glands in the face and scalp, chest and back. In adults, most of the hair follicles in the face cause to predisposition to acne together with sebaceous glands¹⁻⁸. No particular gene has been found to specifically contribute in acne which is considered a multifactorial and multi-gene disease. Inheritance affects the activity and size of the sebaceous glands. Acne scars in both parents increases the risk of development of Acne in the child manifold¹⁻⁵.

Acne is observed less commonly in Asian and black populations and it may reach up to 70–95% in adolescence in Western populations (general frequency 15–90%). Many a times it has been observed that Acne is more frequently found in western population so it is thought that western life style is also considerably effective together with genetic, familial and ethnic factors as a causative or predisposing factor for development of Acne^{1,4,6,8-12}.

There is no known major triggering factor in the etiology except for partial effects of androgenic hormones which are effective in a limited portion of female patients, especially in accompaniment of polycystic ovary syndrome. But on detailed study, no significant change could be found in the blood hormone levels. Hence, it is thought that the effect is related with increased receptor sensitivity in acne patients compared to normal individuals and this is assumed to be the main triggering factor. In the pre-adolescence period, early acnes which especially begin before the age of 9 years may be a simple sign of adolescence or an indicator of a hormonal problem^{1-3,6,8,10-12}.

Although the effect of food and stress have been discussed intensively, no definite evidence about this could not be found. The relation between foods and acne has been discussed intensively in the last 50 years. A couple of decades after 1950 were the years of food limitations and written diet list years for acne. Fried food, cola, dried fruits, fatty foods were the main culprits. Subsequently, diet was disfavoured for a long time, but in the last couple of years, it has come to the forefront in a more procedural way and for limited products. However, there is ultimately no definite evidence and the place of diet is very controversial. Currently, it seems that diet has no place at all^{1,6,8-12}.

Among external factors, cosmetics as triggering factors have been always blamed. When fat based cosmetics are used frequently and for a long time, they may lead to development of acne or exacerbate present acnes. They are observed mostly on the cheeks and chin¹⁻⁵.

Acne is a chronic inflammatory disease of the pilosebaceous unit. Its pathophysiology includes hyper-seborrhoea, abnormal follicular keratinization and Propionibacterium acnes proliferation in the pilosebaceous unit. Recent research has shed some new light on the involvement of the sebaceous gland, as well as on the pro-inflammatory activity of the cutaneous microbiome. During puberty, alteration of the sebaceous lipid profile, called dys-seborrhoea, stress, irritation, cosmetics and potential dietary factors lead to inflammation and formation of different types of acne lesions. A major cause for proliferation of Propionibacterium acnes strains is Dysbiosis. Dysbiosis is the process leading to a disturbed skin barrier and disequilibrium of the cutaneous microbiome. Propionibacterium acnes activates the innate immunity via the expression of protease activated receptors (PARs), tumour necrosis factor (TNF) α and toll-like receptors (TLRs), and the production of interferon (INF) γ , interleukins (IL-8, IL12, IL-1), TNF, and matrix metalloproteinases (MMPs) by keratinocytes, resulting in the hyperkeratinization of the pilosebaceous unit. Rebalancing the natural microbiome of the skin by restoring the natural skin barrier, limiting the proliferation of P. acnes on the skin by using topical antibacterial which do not cause resistance and regulating quantity and quality of sebum will be the main acne treatment challenges in the future¹³.

For the treatment of Acne the topical treatment has been considered as the most important part. Topical treatment may be used alone or in combination with systemic treatment. Topical treatment has been found sufficient in maintenance treatment for Acne. Topical treatment agents include antibiotics, antiseptics, comedolytics and keratinolytics. Non-inflammatory acnes with only comedon or acnes with mild and moderate inflammation may be in this group⁵⁻⁸. Regular washing may decrease development of acne to a certain extent. But, avoiding irritant products or irritation by excessively frequent washing and rubbing and preferring soft cleaners are beneficial. Since antiseptic soaps and solutions can not enter into the follicles, they are not effective on P. Acnes and increase the risk of gram negative folliculitis. The main principle in topical treatment is application of the drugs on the whole face preserving the surroundings of the eyes and the corners of the mouth and nostrils, because all areas where acnes are present or where

acne may develop should be under treatment. The most commonly used treatment agents include retinoic acids, benzoyl peroxide, antibiotics and azelaic acid^{3,4,6,8,9,14-17}.

Topical antibiotics prevent development of inflammation by inhibiting growth of *P. acnes*. They are used alternately with other antibiotics or antiseptics, since resistance to antibiotics may occur. In addition, they also have direct anti-inflammatory effects but have weak effects on old lesions. The most commonly used ones among these include erythromycin, clindamycin, nadifloxacin and tetracycline^{3,4,6-9,14-17}.

Topical antiseptics also act in the same way. Resistance to these agents does not develop and it has been reported that they have similar effects as antibiotics. The most commonly used antiseptics include benzoyl peroxide (which is the most widely used), azelaic acid and sodium sulfacetamide. They also have mild comedolytic action. Their use in combination with antibiotics increases both the action and decreases the risk of resistance^{3,4,6-9,14-17}.

Also, nowadays Retinoids are one of the most commonly used drugs in acne. They have very good keratolytic and comedolytic effects. Currently no drug has been found better than retinoids in treatment of comedon (up to 70% reduction in the number of blackheads in 2 months). They have a very strong action on open and closed blackheads; they provide removal of the old ones and prevent production of new ones. An indirect antibacterial action occurs for *P. acnes* with decrease in stasis and anaerobic setting. They also decrease the number of inflammatory lesions. Growth of *P. Acnes* stops indirectly and inflammation is inhibited. Their use in combination with antibiotics and antiseptics gives a very good result. They may cause irritation in the first 20–30 days, but later the skin develops tolerance and irritation decreases. The most commonly used agents in this group include tretinoin and adapalene^{3,8,15-17}.

Alpha hydroxy acids (5–10%) may also be used as supportive products in treatment. Among classical keratolytics, salicylic acid (2–5%) and resorcin are used with a low rate at the present time (3%). In pregnant women, all topical products including mainly retinoids should be discontinued. Only azelaic acid is allowed^{3-9, 15-17}.

Systemic treatment in acne is indicated only in moderate and severe types of acne (above the mild acne class which remains in the limit of comedonal disease or less than 20 papules) in which topical treatment can not be efficient. Systemic treatment consists of antibiotics, hormones, isotretinoin and very rarely corticosteroids. Principally, the priority of antibiotic and their character of being the most commonly used drug (92%) have not changed currently, but the rates might have changed a little with wide and more encouraged use of especially isotretinoin^{3-9, 14, 18,19}. The actual action of systemic antibiotics is inhibition of growth of *P. acnes*. They also indirectly prevent inflammation caused by *P. acnes*. however, they also have direct anti-inflammatory action. 20% improvement may be expected in 2 months, 60% improvement may be expected in 4 months and 80% improvement may be expected in 6 months. Among systemic antibiotics, tetracyclines are the most commonly preferred ones because of their efficiency and few side effects. Recently, doxycycline has come to the fore. Other commonly used and efficient antibiotics include trimethoprim and erythromycin. Many others have been tried with different success rates. While systemic antibiotic treatment could be continued for 3–6 months until recently, it is thought that systemic treatment should not be used longer than 1–2 months in recent years. It is recommended that topical antibiotics should not be used when a systemic antibiotic is used to prevent development of resistance and antibiotics should not be used alone in treatment^{3-9, 14, 18-21}.

Hormonal therapies decrease androgen levels in the circulation and tissues. The cells of the pilosebaceous unit which metabolize androgen including follicular keratinocytes and sebocytes and the androgenic effects on them are inhibited and a decrease of 12.5–65% occurs in sebum secretion. Antiandrogens are an option only for female patients and their use is limited. They may be preferred when hyperandrogenism (polycystic ovary) is present or when there is no response to classical treatment^{3-10, 22-24}.

Retinoids (isotretinoin) is the only drug which acts on the four main factors in acne and is considered a revolution in treatment of acne. While is used commonly especially in problematic types like classical acnes, it may also be currently used in persistent moderate classical acnes which lead to psychological problems. They decrease production of sebum, inactivate sebaceous glands with active inflammation and reduce them. They change the structure of lipids. They indirectly reduce the number of bacteriae by decreasing the amount of sebum. In addition, they prevent development of comedon in two ways by regulating keratinization. If they are used at an appropriate dose and for an appropriate time, they provide permanent action with a rate of 80–90% without recurrence. On the other hand, they may increase liver enzymes, triglyceride and cholesterol levels. In addition to other rare side effects including tendency to depression and problems in the bones, their most important side effect is teratogenic action when used during pregnancy. Therefore, one should be very careful in female patients. Both retinoids and antiandrogens should be definitely prescribed by dermatologists^{3-10, 25,26}.

Acharaya Sushruta first described *Yuvana Pidika* under the heading of *Kshudra Roga* in *Nidana Sthana*. It occurs due to vitiation of *Kapha Dosh*, *Vata Dosh* and *Rakta Dhatu*²⁷. *Acharaya Charaka* described *Pidika* in *Raktapradoshaja Vikara*²⁹. *Yogaraj Nidana* has mentioned it under the group of *Kshudra Roga*³⁰. It has been established that *Yuvan Pidika* occurs due to *Strotorodha* of the *swedavaha strotas* and leads to formation of *pidika* over the affected areas of skin.

In *Ayurveda*, *Mukhadushika* has been elaborated as one of the *Kshudra Rogas* (minor ailments) by various *Acharyas* and the symptoms of *Mukhadushika* resemble *Acne vulgaris* as per modern science. In *Ayurveda* classics, *Acharaya Sushruta*

was the first and foremost to mention a whole group of such disease of the skin *Kshudra Roga*³¹ which have an adverse effect on the appearance of an individual. *Shalmali kantaka* like eruptions on the face of adolescents, due to vitiation of *Kapha dosha*, *Vata dosha* and *Rakta dhatu* are known as *Mukhadushika* or *Yuvana pidika* or *Tarunya pitika*³². These *Pidikas* destroy the beauty of the face and cause disfigurement of the face therefore are called as *Mukhadushika*³³. *Yuvan pidika* and *Tarunya pitika* means that the disease majorly manifests in adolescent and young age group prominently.

Ayurveda texts such as *Sushruta Samhita*, *Ashtanga Hridayam*, *Madhava Nidana*, *Sharangadhara Samhita* etc., have stated the pathophysiology and treatment of acne. According to *Acharya Vagbhata*, vitiation of *Kapha*, *Vata* and *Rakta* leads to formation of *Pitika*, this *Pitika* is filled with *Meda*, which can be explained with the term *Medogarbha* (filled with oil/sebum)²⁸. *Acharya Kashyapa* mentioned that *Shukra Dhatu* (semen) development occurs in the young age and there are changes in sexual characters along with formation of acne³⁴. *Acharya Madhava* says *Mukhadushika* is a disease that occurs as papules resembling the sprout on the bark of the *Shalmali* tree appearing on the face and is caused by vitiated *Kapha*, *Vata dosha* and *Rakta dhatu* together which makes the face ugly and also known as *Yuvana pidika*³⁵. In *Sharangadhara Samhita*, it has been mentioned that acne is caused due to *Shukradhatu mala* (waste products of semen)³⁶.

Raktamokshana (bloodletting) is mentioned in Ayurvedic texts as the preferred way of treatment in *Raktaja Vyadhi* (blood borne disorder) as well as dermatological disorders. *Rakta Dhatu dushti* is one of the main pathogenic factors of *Mukhadushika* formation. *Acharya Sushruta* stated *Jalaukavacharana* is the preferred method of bloodletting in *Sukumara* (tender nature)⁴. Considering adolescent age group of acne patients, the major age group in which this disease occurs belongs to *Sukumara* category. *Jalaukavacharana* being a bio-purificatory method removes deep seated toxins by letting out blood, clearing *Srotas* and pacifying vitiated *Dosha*. *Jalaukavacharana* possesses high efficacy in both *Shodhana* (cleansing) and *Ropana* (healing) without producing any adverse effects. It is cost effective and easy to apply. Therefore, *Jalaukavacharana* being the easiest and almost painless method can be used as a preferred way of *Raktamokshana* in *Mukhadushika*³⁷.

The saliva of medicinal leech has many therapeutic chemical constituents such as Hirudin, Calin, Destabilase, Hirustatin, Bdelins, Hyaluronidase, Eglins, Factor Xa inhibitor, Carboxypeptidase A inhibitors, Leech derived trypsin inhibitor, histamine like substances, Acetyl choline, anaesthetic substances. Besides acting on the local blood circulation, these chemical substances also act on the host cells for resolution of the disease³⁸.

Leeches are carnivorous or blood sucking annelid worms with pronounced ability to extend or contract their bodies. They are hermaphrodite in nature and are distributed all over the world, except the polar zones, deserts and altitudes exceeding 3,700 m. In India, about 45 species belonging to 22 genera occur³⁹. The common Indian species are *Hirudinaria granulosa*, *H. viridis*, *H. javanica*, and *H. manillensis*. These species are also common in Burma, Pakistan, Bangladesh and Sri Lanka. *Haemadipsa* is a land leech of the hills of Southern India⁴⁰.

The medicinal leech (*Hirudo medicinalis*) is a European species which has been introduced into certain ponds and streams of the eastern portion of the United States. It is relatively large leech often growing to 10 or more centimeters in length. It feeds upon blood of a vertebrate to which it periodically attaches itself⁴¹. Among Indian leeches, *Hirudinaria granulosa* has got medicinal properties. It is a common leech found in freshwater tanks, ponds lakes, swamps, and slow streams. It prefers shallow water and remains concealed under weeds, logs and stones. It is sanguivorous (blood-sucking), sucking the blood of fishes and frogs and also of cattle or human beings when they enter the pond⁴⁰⁻⁴². It is abundantly found in the states of Tamilnadu, Kerala, Madhya Pradesh, Uttar Pradesh and Punjab³⁸⁻⁴³.

DISCUSSION

Acne vulgaris which has been equated with *Mukhadushika* / *Yuvana pidika* in Ayurveda has been established to impact the youth majorly. Various causes such as dietary changes, increased stress, hormonal changes and environmental factors have been found to be responsible for development of the disease in young adults. Ayurvedic classics have considered *Rakta dhatu* as the *dushya* in case of *Yuvana pidika*. *Rakta* or bloodstream being the major carrier of hormones, toxins and stress related chemical stimulants plays a major role in the development, spread and maintenance of Acne vulgaris. Also reduced blood supply due to blocked *srotas* caused by *Vata* and *Kapha dosha* leads to reduced skin defences and greater proliferation *Propionibacterium* acnes which in-turn is another established cause of development of Acne.

The modern principles of treatment for Acne are increasingly stressing on local treatment for clearing the blocked channels of the pilosebaceous unit. These include various topical antibacterial and cleansing agents that can lead to betterment of the lesions. *Jalaukavacharana* as suggested by *Ayurveda* is a technique that has immediate local as well as long term systemic effects on the lesions of the patient. *Jalauka* not only causes letting out of the vitiated blood but also the chemical constituents provide blood thinning, improved circulation, anti-bacterial action, anti-inflammatory and other effects that lead to quick and long lasting results.

The above mentioned *samprapti* as in case of this disease cause changes in skin thereby causing changes in appearance of the particular patient. As *yuvaavastha* is the stage where the body is undergoing changes owing to added secretions of sex hormones so under influence of these hormones, the patient may become worried by the appearance of pimples or acne over the skin. *Yuvana*

pidika affects not only the physical but also causes mental and emotional stress for the patient. Thus, though the disease may seem meagre but it affects the patient at multiple levels.

Acharya Sushruta has mentioned *Jalaukavacharana* as one of the techniques for *Raktamokshana* especially in case of *sukumara* patients. This technique is considered *saumya* yet effective in causing *Rakta shuddhi* in patients with *Raktaja/ Pittaja* disorders. As in case of *Yuvana pidika*, *Rakta* is the main *dushya* hence *Jalaukavacharana* proves to be very effective in this condition.

If we look into the chemical constituents of Leech saliva, it can be established that leech saliva can have various systemic actions, besides acting on the local tissues. Hirudin inhibits blood coagulation by binding to thrombin, Calin inhibits blood coagulation by blocking the binding of von Willebrand factor to collagen Inhibits collagen-mediated platelet aggregation, Destabilase shows monomerizing activity, dissolves fibrin and has thrombolytic effects, Factor Xa inhibitor inhibits the activity of coagulation factor Xa by forming equimolar complexes. Thus these chemicals act by making the blood thinner so that blood supply can enter the finer capillaries of skin and thereby improve supply of nutrients and removal of debris from the pilosebaceous unit of the skin.

Besides this, Hirustasin inhibits kallikrein, trypsin, chymotrypsin and neutrophilic cathepsin G. Bdelins show anti-inflammatory effect and inhibits trypsin, plasmin and acrosin. Hyaluronidase increases intestinal viscosity and has an antibiotic effect. Eglins are anti – inflammatory substances that inhibit the activity of α -chymotrypsin, chymase, subtilisin, elastase, and cathepsin G. These constituents act by providing various antibiotic, anti-inflammatory, proteolytic and other effects on the local tissues thereby reducing chances of proliferation of *Propionibacterium acnes* in the pilosebaceous unit of the skin.

The above mentioned facts stand out to chiefly suggest *Jalaukavacharana* as a treatment of choice for cases of *Acne vulgaris* based on Ayurvedic principles and as highlighted on chemical basis as well.

CONCLUSION

Jalaukavacharana or Leech therapy as told by the *Acharyas* as a highly effective therapy for *sukumara* individuals in *twaka gata roga* i.e. *Yuvana pidika / Mukha dushika*. *Jalaukavacharana* is easy to apply, cost effective and acts by resolving the disease by disintegrating the disease- causing complex. *Jalaukavacharana* can be effectively done in an OPD set-up and is also a cosmetologically safe intervention for the treatment of *Acne vulgaris* or *Yuvana Pidika/ mukha dushika*.

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