HAEMATOLOGICAL STUDY IN PATIENTS OF CELLULITIS TREATED BY LEECH THERAPY

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Abstract: Cellulitis is a spreading type of inflammation of subcutaneous tissue. It is very painful condition. Cellulitis characterized by pain, redness, tenderness, local temperature and fever with chills. If ignored, it may switch over to an ulcer. This condition is more or less similar to *Vranashopha* in Ayurveda in terms of symptoms or pathogenesis. Bloodletting is prime remedy to manage *Vranashopha* according to Ayurveda. Leech is a bloodletting device which sucks the blood from affected area. A clinical and haematological study on 42 patients of cellulitis treated with leech therapy suggests positive results in terms of efficacy and non toxicity.

Keywords: Cellulitis, *Vranashopha*, Bloodletting, Leech therapy, Haematological study.

Introduction

Vranashopha is a prodromal symptom or earlier stage of *Vrana*.[1] Sign and symptoms of *Vranashopha* are more or less similar to cellulitis.[2] Non treated cellulitis changes to an ulcer. Cellulitis means "inflammation of cell" but exact definition of cellulitis is spreading type of inflammation of subcutaneous tissue generally associated with bacterial infection. Characteristic features of inflammation i.e. pain, redness, tenderness, swelling are landmarks of cellulitis.[3] Antibiotic and anti-inflammatory drugs are used to control this condition, with their limitations and adverse effects. According to Ayurveda *Vranashopha* is easily treated with *Visravana* (bloodletting).[4] There are many methods of *visravana* i.e. *Siravedha*, *Pracchanna*, *Shring*, *Jaluaka*, *Alabu* etc. *Jalaukawacharana* (Leech therapy) is very easy and useful method.[5] Patients of cellulitis were selected for the study and divided into three groups, one treated with antibiotic and analgesic, second one treated by leech therapy and some Ayurvedic formulations and third one is treated by only leech therapy. Calculated number of leeches were applied on affected area in two or more sittings. Pain, redness, tenderness, swelling and discharge are clinical criteria of assessment and some blood investigation are the diagnostic criteria of assessment. We observed significant improvement in clinical and diagnostic parameters. The results suggest that leeches have strong anti inflammatory action and it is a safe therapy.

Leech application has been studied on scientific parameters to evaluate its therapeutic effect on various stages of *Vranashotha*,[9] pyogenic abscess,[10] chronic ulcers,[11] thrumbosed piles,[12] *granthi* and *arbuda*.[13]

Materials and Methods
(A) Selection of patients

All patients with cellulitis were registered from Shalya OPD / IPD of Sir Sunder Lal Hospital I.M.S., B.H.U., Varanasi. Random selection was made irrespective of age, sex, occupation, duration of disease, economic status or any associated disease.

Inclusion criteria

Patient of cellulitis with classical signs and symptoms i.e. pain, tenderness, redness, local heat, and fever.

Exclusion criteria

Patients with diabetes, anemia, malignancy, AIDS, septicemia, bleeding disorder and malnourishment.

History : A detail history of each patient was taken. Chief complaints with duration, mode of onset and sequential changes, associated disease, previous treatment history, history of past illness, surgical

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history, family history, occupation, personal history was also asked and noted.

Systemic Examination

Systemic examination of each patient was done for cardiovascular, respiratory, digestive, nervous system and genito-urinary system. Specific investigation of any system if required was carried out.

Local examination

It was carried out under following heading-

Inspection : In inspection site of cellulitis, size, shape, redness, swelling and any discharge were recorded.

Palpation : Local temperature, tenderness, consistency of surrounding tissue. After collecting all above information, leech application was performed in multiple settings.

(B) Methods

Fresh leeches, storage pot, purification trays, turmeric powder, rice, *Saindhava* salt, sterile needle, dressing materials are basic requirements for leech therapy.

Pre-application preparation (Poorvkarma)

First of all, leeches were purified by putting in the solution of turmeric powder and normal water for some time (till leeches move here and there- *Vigataklama)*, then rinsed by normal water. Before the application of leeches, diseased area should be prepared by scrubbing with fresh gauze piece soaked with normal water.[5,6,7]

Leech application (Pradhankarma)

Leech should be held with a dry gauge piece. First try to stabilize it with it's posterior sucker then attach it's mouth on target spot. If it does not bite, a few drops of milk, *ghee*, butter or fresh blood should be poured at that site. If then also it does not bite, perform *Pracchana karma* or take a prick with a sterile needle. After accertaining that leech has started to suck the blood it should be covered with wet gauge except the mouth and the gauge should be kept wet by continuously pouring water on it. When the patient complains of pricking pain and itching at the site of bite, leech should be removed from the site. Generally leech leaves the site by itself but if it does not, then some honey or powder of *Saindhava* salt is applied at its mouth.[5,6,7]

Post-application care (Pashchatkarma)

After leech application, leech should be massaged by rice and its mouth should be bathed with common salt added oil. Its tail should be held by left hand in between thumb and index finger, then squeeze the leech by opposite hand slowly and gently. Put the leech in storage pot and do not reuse same leech before 7 days. If bloodletting is proper – clean the bite (application) site with cold water, apply *Shatdhaut ghrita* and honey locally.[5,6,7]

Follow up

All the patients were instructed to attend the OPD or ward on every 2nd day for leech application and follow up.

(C) Plan of study

Present study was carried out in 42 cases of cellulitis. All cases were randomly divided in three groups containing equal number of patient i.e.14 in each group **A, B** and **C.** Group patients who served as control.

Group A- Treated by antibiotic (according to culture and sensitivity) and analgesic.

Group B- Treated by Leech application with Ayurvedic formulation (*Shigru guggulu* 500 mg BD).[8]

Group C- Treated by only Leech application.

Criteria of Assessment

There were two main criteria of assessment in this study.

(A) Clinical criteria

Swelling, pain, redness, tenderness and discharge.

(B) Diagnostic Haematological criteria- pre and post leech application or therapy

Hb, TLC, DLC, ESR ; BU; Serum Creatinine ; LFT ; BT, CT ; HIV.

Table showing symptom score and criteria for assessing clinical feature.

Symptom	Score			
	No	Mild	Moderate	Severe
Pain	1	2	3	4
Swelling	1	2	3	4
Redness	1	2	3	4
Tenderness	1	2	3	4
Discharge	1	2	3	4

Observation and Results

Observation of clinical criteria - pain, tenderness, redness, swelling revealed that all are reduced significantly after treatment. In hematological study - hemoglobin level slightly increases in group A while reduced in group B and C after treatment. Statistical analysis revealed non significant result. Total leucocyte counts and polymorphs decreased in all groups after treatment. Statistical analysis also showed highly significant result. Lymphocyte counts increases after management in all group. Statistical analysis also support with highly significant results. Observation of ESR suggested that it is increased slightly in all groups. But statistically it is non significant. Blood urea level decreased in group A and C while slightly increases in group B. Statistical analysis revealed the non significant changes. Serum creatinine level decrease in all groups after management. Statistical analysis suggested non significant changes. Bilirubin level slightly increased in group A while in group B and C it reduced but now significantly it remain in the normal range, after treatment. Statistical analysis suggestive of non significant result. SGOT level decreased in group A and C but increased in group B after treatment. Statistical analysis non significant change in group A and B while in group C it is significant. SGPT level reduced after treatment in group B and A, while increased in group C. Statistical analysis suggests non significant result. Alkaline phosphatase level increased after treatment in group C while reduced in group A and B. Statistically these changes are non significant. Serum protein level is unchanged in group A, slightly reduced in group B and slightly increased in group C after treatment. Statistical analysis revealed non significant result. Serum albumin level is slightly increased in group A and B, while reduced in group C after treatment. Statistical analysis showed non significant changes. Bleeding time increased after treatment in all groups. Statistically it is highly significant in group A, significant in group C, non significant in group B. Clotting time increased after treatment in all groups more in group B and lesser in group A. Statistical analysis showed non significant changes in all groups **(Tables 1-19).**

Table 1. Statistical analysis of Pain within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		3.9286 ± .267	3.6429 ± .497	3.6429 ± .633
After treatment (mean ± sd)		1.0714 ± .267	1.0714 ± .267	1.1429 ± .363
Comparison within groups	t	29.44	18.73	12.32
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 2. Statistical analysis of Redness within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		3.9286 ± .267	3.4286 ± .646	3.6429 ± .633
After treatment (mean ± sd)		1.0000 ±.000	1.0000 ± .000	1.0000 ± .000
Comparison within groups	t	41.00	14.06	15.61
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 3. Statistical analysis of Swelling within groups.

		Group A	Group B	Group C
Before treatment (mean±sd)		3.9286 ± .267	3.8286 ± .265	3.6429 ± .497
After treatment (mean±sd)		1.0714 ± .267	1.1222 ± .313	1.1429 ± .363
Comparison within groups	t	29.44	23.78	18.03
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 4. Statistical analysis of Tenderness within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		3.9286 ± .267	3.6429 ± .497	3.6429 ± .497
After treatment (mean ± sd)		1.0000 ± .000	1.0000 ± .000	1.0000 ± .000
Comparison within groups	t	41.00	19.89	19.89
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 5. Statistical analysis of Discharge within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		1.3571 ± .745	2.0714 ± .997	2.0714 ± 1.141
After treatment (mean ± sd)		1.0000 ± .000	1.0000 ± .000	1.1429 ± .363
Comparison within groups	t	01.79	04.02	03.48
	p	0.096	0.001	0.004
Remarks		NS	HS	HS

t= T value, p=P value

Table 6. Statistical analysis of Heamoglobin within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		11.4000 ± 1.880	12.6929 ± 1.106	11.9571 ± 1.532
After treatment (mean ± sd)		11.6357 ± 2.029	12.4286 ± 1.336	11.9000 ± 1.617
Comparison within groups	t	-2.056	1.123	0.338
	p	00.06	0.282	0.741
Remarks		NS	NS	NS

Table 7. Statistical analysis of TLC within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		13064.3 ± 1509.8	13628.6 ± 914.5	14278.6 ±2343.3
After treatment (mean ± sd)		7507.1± 1223.8	7935.7 ± 1247.5	7028.6 ±1391.4
Comparison within groups	t	13.77	7.918	8.707
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 8. Statistical analysis of Polymorphs within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		78.5000 ± 3.737	78.7143 ± 4.999	78.0000 ± 5.857
After treatment (mean ± sd)		55.5714 ± 6.618	53.2143 ± 4.710	57.8571 ± 5.021
Comparison within groups	t	9.569	20.504	9.820
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 8a. Statistical analysis of Lymphocyte within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		18.1429 ± 2.931	18.8571 ± 3.348	18.4286 ± 5.402
After treatment (mean ± sd)		36.0000 ± 6.702	37.7857 ± 5.899	33.5000 ± 6.035
Comparison within groups	t	-7.736	-11.54	6.707
	p	0.000	0.000	0.000
Remarks		HS	HS	HS

Table 9. Statistical analysis of ESR within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		20.7143 ± 5.413	20.6429 ± 7.121	20.0714 ± 3.772
After treatment (mean ± sd)		22.0714 ± 6.833	21.9286 ± 5.677	20.7143 ± 4.921
Comparison within groups	t	-0.674	0.583	-0.398
	p	0.512	0.568	0.697
Remarks		NS	NS	NS

t= T value, p=P value

Table 10. Statistical analysis of Blood Urea within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		26.0429 ± 9.347	26.1143 ± 8.545	26.4071 ± 9.610
After treatment (mean ± sd)		25.0429 ± 3.528	26.7571 ± 5.015	23.7857 ± 4.954
Comparison within groups	t	0.381	-0.246	1.069
	p	1.836	0.809	0.305
Remarks		NS	NS	NS

Table 11. Statistical analysis of Sr. Creatinine within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		1.1000 ± 328	.8571 ± .295	.9286 ± .322
After treatment (mean ± sd)		.9500 ± .145	.8143 ± .183	.8429 ± .195
Comparison within groups	t	1.836	0.504	1.522
	p	0.089	0.622	0.152
Remarks		NS	NS	NS

Table 12. Statistical analysis of Sr. Bilirubine within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		.6714 ± 227	.7286 ± .233	.6929 ± .256
After treatment (mean ± sd)		.7500 ± .416	.7071 ± .234	.6500 ± .235
Comparison within groups	t	-0.951	0.444	1.385
	p	0.359	0.664	0.189
Remarks		NS	NS	NS

Table 13. Statistical analysis of SGOT within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		45.4571 ± 35.231	33.6429 ± 9.572	39.0929 ± 19.261
After treatment (mean ± sd)		33.6071 ± 6.855	34.0714 ± 6.615	31.7857 ± 10.040
Comparison within groups	t	1.319	-0.222	2.219
	p	0.210	0.827	0.045
Remarks		NS	NS	NS

Table 14. Statistical analysis of SGPT within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		55.3500 ± 21.801	46.0714 ± 11.612	52.5286 ± 25.069
After treatment (mean ± sd)		47.5357 ± 9.084	50.5714 ± 10.188	44.4429 ± 15.090
Comparison within group	t	1.499	-1.274	1.979
	p	0.158	0.225	0.069
Remarks		NS	NS	NS

t= T value, p=P value

Table 15. Statistical analysis of A. Phosphatase within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		85.9143 ± 13.808	106.2643 ± 50.907	93.8714 ± 48.561
After treatment (mean ± sd)		78.7643 ± 14.528	103.3643 ± 47.665	108.4643 ± 63.665
Comparison within groups	t	1.386	0.507	-1.185
	p	0.189	0.621	0.257
Remarks		NS	NS	NS

Table 16. Statistical analysis of Sr. Protein within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		7.0071 ± .582	7.4214 ± .844	7.3143 ± .763
After treatment (mean ± sd)		7.0071 ± .514	7.4000 ± .666	7.3357 ± .680
Comparison within groups	t	0.000	0.193	-0.205
	p	1.000	0.850	0.841
Remarks		NS	NS	NS

Table 17. Statistical analysis of Sr. Albumin within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		3.6000 ± .398	3.5143 ± .532	3.7929 ± .465
After treatment (mean ± sd)		3.6286 ± .373	3.5429 ± .455	3.6714 ± .375
Comparison within groups	t	-0.434	-0.373	1.669
	p	0.671	0.715	0.119
Remarks		NS	NS	NS

Table 18. Statistical analysis of Bleeding time within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		70.9286 ± 7.301	82.1429 ± 16.119	80.3571 ± 17.113
After treatment (mean ± sd)		77.5000 ± 8.026	84.2143 ± 16.154	82.9286 ± 15.973
Comparison within groups	t	-3.247	-0.992	-2.409
	p	0.006	0.339	0.032
Remarks		HS	NS	S

Table 19. Statistical analysis of Clotting Time within groups.

		Group A	Group B	Group C
Before treatment (mean ± sd)		299.57 ± 34.39	300.35 ± 49.082	272.57 ± 42.871
After treatment (mean ± sd)		304.85 ± 30.85	326.50 ± 72.605	282.78 ± 40.175
Comparison within groups	t	-0.903	-1.793	-1.593
	p	0.383	0.096	0.139
Remarks		NS	NS	NS

t= T value, p=P value

Figure 1. Status of foot with cellulitis before treatment.

Photographs of one case of cellulitis (before, during and after treatment) are shown in **figure 1 to 3** to illustrate leech application.

Figure 2. Status of foot with cellulitis during treatment.

Figure 3. Status of foot with cellulitis after treatment.

Conclusion

From this study it can be concluded that leech application provide -

- Significant relief in patients of cellulitis.
- It provide immediate relief to pain, burning sensation and swelling due to inflammation.

- There is no alteration in heamoglobin level after leech therapy.

- It has effect in lowering total leucocyte count so leech application act, as strong anti inflammatory procedure.

- In initial phase of leech therapy bleeding time, clotting time increases but become normal after few weeks of cessation of leech therapy.

- Leech therapy is a safe mode of therapy, no toxic effect on kidney or liver was noticed.

- Leech therapy is very effective in initial phase of disease, early intervention is more fruitful, so patients education and awareness is very important.

- This therapy should be included in rural health program because Leech therapy is less costly and it is easily available and can be implemented in every part of India.

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