



Evaluation of Three Different Types Kshara Sutra Ligation in *Arsha roga* (Hemorrhoids)

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Abstract

Background: Anorectal disorders are a group of medical disorders that occur at perianal and the junction of the anal canal and the rectum. *Arsha* is enumerated under the heading of *Ashtomahagada* and occurs in *Guda pradesh*, the seat of *Sadyapranahar marma*. Out of available treatments of *Arsha roga*, the *Kshara sutra* ligation is the best one. In the present research work, three different types of *Kshara Sutr*s, *Snuhi* (*Euphorbia neriifolia*), *Guggulu* (*Commiphora mukul*) and *Udumber* (*Ficus racemosa*) were used in *Arsha roga* (Hemorrhoids). **Material and Methods:** Total 33 patients of both genders of *Arsha* (Hemorrhoids) has been selected randomly after taking written consent and treated with three different types of *Kshara Sutra* followed in the “Anorectal clinic” of S.S. Hospital, IMS, BHU. **Result:** It reveals that lowest pain during the entire trial period was experienced by Group C - *Udumber Kshara sutra* with 81.8% and maximum pain was experienced by Group A - *Snuhi Kshara sutra* with 54.5%. Lowest discharge was experienced by Group C - *Udumber Kshara sutra* with 72.7% and average healing time was minimum for group C - *Udumber Kshara sutra* (6.55 ± 1.12) followed by group B - *Guggulu Kshara sutra* (7.18 ± 1.16). Maximum average healing time was seen in group A - *Snuhi Kshara sutra* (7.27 ± 1.10). **Discussion:** All types of *Kshara sutra* have good results in wound healing and prevent infection due to its alkaline pH (pH-10.3) that works as antibacterial at site of ligation. Patients of hemorrhoids feel lowest pain during the entire trial period, minimum average healing time, fewer irritants and good tolerance by the patients by Group C - *Udumber Kshara sutra* and another study also favor this result.

Key words: *Arsha Roga*, Ayurveda, Hemorrhoids, *Kshara Sutra* Ligation

1. Introduction

Hemorrhoid is a common disorder, affecting 4% of the world population which is very specific to human race due to its erect posture. Classification of a hemorrhoid corresponds to its position relative to the dentate line. Internal hemorrhoids lie above the dentate line and are derived from endoderm whereas external hemorrhoid lies below the dentate line and derived from ectoderm¹. Hemorrhoids are dealt rationally under the concept of *Arsha roga*. *Acharya Charaka* as well as *Madhava* mentioned that the *Dushyas* of *Arsha* are *Twak*, *Mamsa* and *Medas*². According to *Ayurveda* the disease comes

under the heading of *Maharogas*³. *Arsha* occurs in *Gudabhaga*, which is undoubtedly a *Marma*, and it is well known for its chronicity and difficult to treat. If neglected or not cured properly, it may turn into complications such as hemorrhage, thrombosis, portal pyaemia, fibrosis, strangulation, suppuration. *Acharya Sushruta* has mentioned four lines of management such as: *Bhaisaja*, *Kshara*, *Agni*, *Shastra*⁴. According to *Acharya Vagbhatta*, *Arsha* is a muscular projection (*Mans-kila*) which troubles the patient like an enemy⁵ and *Acharya Madhava* also followed it⁶. Internal hemorrhoids are classified by the degree of prolapse of the anal canal. External may be classified as acute (hemorrhoidal

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thrombosis) or chronic (anal skin tags). In modern surgery for treatment of hemorrhoids sclerotherapy, infrared, photocoagulation, rubber band ligation laser therapy, Lord's dilatation, hemorrhoidectomy, and stapled hemorrhoidectomy are in practice but these are costly and chance of recurrence is more. Conventional kshara sutra therapy yield better long-term results and chance of recurrence is very less. This clinical research work explores effect of three different type *Kshara sutras* ligation in *Arsha roga* (hemorrhoids).

1.1 Kshara Sutra in Arsha Roga

The ancient writing of Indian medical practitioners like *Sushruta*, *Charaka* and *Vagbhatta* provide an elaborate description of *Arsha Roga* and various modalities of treatment along with brief description of *Kshara sutra* therapy. Complete and detail descriptions of *Kshara sutra* are not available in *Sushruta Samhita*. *Acharya Sushruta* (800 BC) has described four folded line of treatment as *Bhaishaja chikitsa*, *Kshara karma*, *Agni karma* and *Shastra Karma* in management of anorectal disorders⁷. Among all these therapies *Kshara karma* has become very useful and recently modified method of treatment for selected anorectal diseases. *Kshara sutra* has been described in most of the ancient books of Ayurveda as medicated thread. *Kshara sutra* has extensive uses in a number of surgical disorders which often pose problems for the patients and also for the surgeons. This has specific role to play in the common anorectal conditions like hemorrhoids, fistula and fissures etc. Recent modern surgical texts are also accepting the role of *Kshara sutra* in the management of Anorectal disorders. The present form of *Kshara Sutra* therapy was initiated by Dr. P. S. Shankaran and subsequently established by Prof. P. J. Deshpandey through many researches and development in department of *Shalya Tantra* at Banaras Hindu University. The process of development was supported in last few decades by eminent scholars like Prof. K. R. Sharma, Prof. G. C. Prasad, Prof. S. N. Pathak and others from same department⁸. Now *Kshara Sutra* therapy has been accepted globally and has emerged as a gold standard treatment for Anorectal diseases⁹. The Indian Council of Medical Research (ICMR) has validated this unique and effective approach¹⁰.

2. Materials and Methods

2.1 Study Design

In the present study three types of *Kshara sutra*: *Snuhi kshara sutra*, *Guggulu Kshara sutra* and *Udumber Kshara sutra* have been prepared and evaluated clinically on the patients of *Arsha roga* (Hemorrhoids).

2.2 Place of Study

Shalya OPD & I.P.D, S.S. Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi.

2.3 Selection of the Patient

33 patients of both genders suffering from *Arsha* (Hemorrhoids) has been selected randomly after taking written consent. All selected cases were suffering from internal hemorrhoids.

2.4 Ethical Clearance

The study was approved by the ethical committee of IMS, BHU vide letter no. Dean/2011-2012/EC/296, dated 01.11.2011.

2.5 Inclusion Criteria

Patients diagnosed to have Prolapsed rectum and those unwilling for surgery are randomly included in the study irrespective of age, sex, chronicity, *Prakriti* and type of disease.

2.6 Exclusion Criteria

Anemic pt. (Hb < 9 gram %), Malnourish patient, Bleeding disorder, Uncontrolled diabetes mellitus, Tubercular patient, Pregnancy, Malignancy suggested by biopsy, HIV positive patient, HBsAg positive patient.

2.7 Grouping and Design

11 patients of *Arsha roga* (Hemorrhoids) were taken in each groups of *Kshara sutra* (Table 1).

3. Preparation of Three Different Types of Kshara Sutra

3.1 Snuhi Kshara Sutra

The Barbour thread no. 20 has been spread throughout the length and breadth of the hanger which is then

Table 1. Experimental design

Group	Group A	Group B	Group C
Contents	<i>Snuhi Kshara sutra</i>	<i>Guggulu Kshara sutra</i>	<i>Udumber latex Kshara sutra</i>
	Barbour Thread no 20	Barbour Thread no 20	Barbour Thread no 20
	<i>Snuhi kshira</i>	<i>Guggulu extract</i>	<i>Udumber latex</i>
	<i>Apamarga Kshara</i>	<i>Apamarga Kshara</i>
	<i>Haridra powder</i>	<i>Haridra powder</i>

mounted over a hanger stand. Each hanger is then smeared with *Snuhi Ksheer* or latex with the help of clean gauze piece soaked in latex. The hanger was then replaced into the cabinet in order to dry the threads. The same process was repeated the next day. Eleven such coatings with *Snuhi Kshara* alone were accomplished. The 12th coating was done by first smearing the thread with latex and then passing the wet thread through a heap of finely powdered *Kshara*. When all the threads were smeared with *Kshara*, the hanger was gently shaken so that all the excess particles of *Kshara* fall down. It was again placed into the cabinet for drying. This process was repeated till seven coatings of *Snuhi Ksheer* and *Kshara* were achieved, thus the total number of coatings being 18. The remaining three coatings were finally completed with the latex of *Snuhi* and the fine powder of turmeric in the same way. Thus, twenty one coatings over the thread were completed. When all the 21 coatings were completed, each thread measuring about 30-31 cm was cut away from the hanger and sealed in a glass tube.

The orders of 21 coatings are as:

- *Snuhi Kshara* = 11
- *Snuhi Kshara* + *Kshara* = 7
- *Snuhi Kshara* + *Haridra* = 3

3.2 Guggulu Kshara Sutra

Similarly *Guggulu Kshara sutra* was prepared.

- *Guggulu* resin dissolved in ethyl alcohol = 11
- *Guggulu* resin + *Kshara* = 7
- *Guggulu* resin + *Haridra* = 3

3.3 Udumber Latex Kshara Sutra

For *Udumber latex Kshara sutra* only 11 coatings of *Udumber Ksheer* is coated.

- *Udumber Kshara* = 11

When dried the last coating, each thread removed from the hanger, kept in a sterile tube which is gently sealed and stored in an incubator at 37°C. By doing so, *Kshara sutra* did not get contaminated inspite of passage of time, indicating that the ingredients do not allow the growth of bacteria even over longer periods of time.

4. Investigations

- Blood: Hb%, TLC, DLC, ESR, FBS, PPBS, CT, BT, Blood urea, S. Creatinine
- Urine: Routine and microscopy
- Stool: Ova and Cyst; occult blood.
- HIV & HBsAg
- Chest X-Ray, ECG: as and when required.

5. Method of Kshara sutra Application

5.1 Preoperative Procedure

- Well written inform consent of patient was taken.
- Cleaning of bowel was done at prior night.
- Part preparation of the perianal area was done.
- Xylocaine sensitivity to be done.
- Inj. T.T 0.5 ml was given by I.M. route.

5.2 Operative Procedure

Patient was kept in lithotomy position on operation table. The part is cleaned with aseptic solutions and then after local anesthesia is given with 1% xylocaine injection under the advice of anesthetics and draping was done. Later on position of various pile masses were assessed. The pile mass was hold with the help of pile holding forceps. Then the slight pull is exerted over the

pile mass, so that its base is clearly demarcated along with the blood vessels.

5.3 Transfixation

Pile mass has been transfixed by passing the curved round body needle with *Kshara sutra* at its base. The transfixation was made horizontally or vertically according to the suitable position of hemorrhoid mass, preferably horizontal then stab cut is made on the budge of transfixed hemorrhoid mass to prevent strangulation. Then warm water irrigation was done following to T bandaging (Figure 1).

5.4 Post Kshara sutra Regime

The patient was advised to have sitz bath (Luke warm water) twice a day. Ambulation of the patients was made as a routine to encourage all the patients to remain as active as possible and to lead a normal life. The patients were advised to take easily digestible diet along with adjuvant therapies if required.

5.5 Follow-up of the Patient

The patients of hemorrhoids were asked to attend the OPD on days 1, 3, 7, 15, 30 after *Kshara Sutra* ligation, then every fortnightly for 3 months then monthly till six month.

6. Assessment Criteria

The patients of *Arsha roga* (Hemorrhoids) were assessed on the basis of subjective and objective parameters such as Pain, Discharge, Bleeding and Sphincter tone. The total information of subjective or objective assessment

pre-operatively or post-operatively has been done in a systemic and scientific manner on regular weekly information. The treatment effect has assessed on the basis of the relief of signs and symptoms of the major symptoms of the disease (Table 2-6).

6.1 Subjective Parameter

The patients were assessed on the basis of following parameters before and after treatment as follows:

6.1.1 Pain on VAS (*Visual Analogue Scale*)

Pain was recorded on Visual Analog Scale on days 1, 3, 7, 15 and 30 after operation.

6.1.2 Grading of Discharge

Grading of discharge amount was based on this table.

6.1.3 Post-Operative Bleeding Per Rectum

Recorded on days 1, 3, 7, 15, 30 postoperatively

6.1.4 Grading of Sphincter Tone

Grading of sphincter Tone was based on this table

7. Objective Parameters

7.1 Complete Healing Time

Complete healing time is the total time taken for the entire treatment. This is recorded in the patients who are on the follow up regimen. The patients of hemorrhoids were asked to attend the OPD on days 1,3,7,15,30 after *Kshara Sutra* ligation, then every fortnightly for 3 months then monthly till six month.

7.2 Pain Relief Day (P.R.D.)

This is the day when the patient is totally relieves or free from post-operative pain. Due to irritation effect of *Kshara* on the local tissue there will be burning and scalding type of pain often encountered. However the pain is relieved after dissolving of the *Kshara* generally after 3rd or 4th day in different conditions. The pH value of *Kshara sutra* and type of tissue probably effect the reaction. Therefore in this study it is recorded as the pain relief day i.e. (P.R.D.).

Haemorrhoids

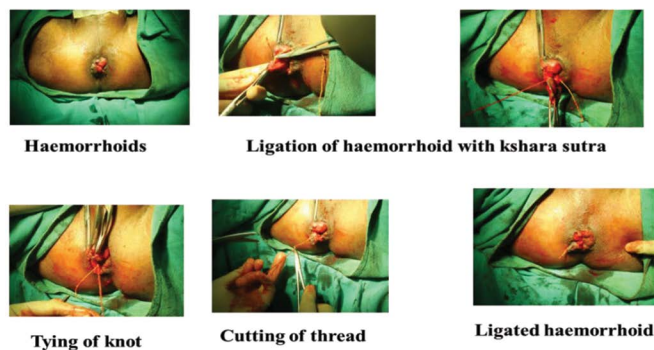


Figure 1. Method of *Kshara sutra* application.

Table 2. Subjective and Objective parameters for assessment

Subjective Parameter	Objective Parameters
Pain by VAS (VAS Analogue Scale)	Complete healing time
Grading of discharge	Pain relief day (P.R.D.)
Post-operative bleeding per rectum	Time taken for sloughing out of hemorrhoid masses (in days)
Grading of sphincter Tone	Serial photography.

Table 3. Visual Analogue Scale¹¹

Grade	Mark	Pain	Explanation
0	0 mark	No	Absence of pain/ no pain.
1	1-3 mark	Mild	Mild pain that can be easily ignored.
2	4-6 mark	Moderate	Moderate pain that cannot be ignored and needs treatment.
3	7-10 mark:	Severe	Severe pain which needs constant attention.

Table 4. Grading of Discharge¹²

Grade	Discharge	Explanation
0	No	No discharge/dry dressing
1	Mild	Patient requires changing up to 1 pad of 4x4 cm gauze.
2	Moderate	Patient requires changing up to two pad of 4x4 cm gauze.
3	Severe	Patient requires changing more than two pad of 4x4 cm gauze.

Table 5. Grading of post-operative bleeding per rectum

Grade	Bleeding per rectum	Explanation
0	No	No bleeding.
1	Mild	Patient requires change up to 1 pad of 4x4 cm gauze.
2	Moderate	Patient requires change up to two pad of 4x4 cm gauze.
3	Severe	Patient requires change more than two pad of 4x4 cm gauze.

Table 6. Grading of sphincter tone¹³

Grade	Explanation (DRESS)
0	No discernable pressure at anus
1	Loose
2	Slightly loose
3	Normal
4	Tight
5	Extremely tight

8. Results and Observations

8.1 Postoperative Pain

It reveals that in the patients of hemorrhoids, the lowest

pain during the entire trial period was experienced by Group C - *Udumber Kshara sutra* with 81.8% were experienced no pain on 5th Postoperative day followed by Group B - *Guggulu Kshara sutra* with 63.6% were experienced no pain on 5th Postoperative day, Whereas

maximum pain was experienced by Group A - *Snuhi Kshara sutra* with only 54.5% were experienced no pain on 5th Postoperative Day. Pain was seen maximum immediately after *Kshara sutra* ligation (Table 7).

8.2 Postoperative Discharge

It reveals that in the patients of hemorrhoids, the lowest Discharge during the entire trial period was experienced by Group C - *Udumber Kshara sutra* with 72.7% and Group B - *Guggulu Kshara sutra* with 72.7% patients reported complete relief from any type of discharge on 5th Postoperative day, Whereas higher Discharge was experienced by Group A - *Snuhi Kshara sutra* with 63.6 % patients reported complete relief from any type of discharge on 5th Postoperative Day. It was observed that sloughing and serous discharge was present in all type of *Kshara sutra* ligation varying from 2nd to 7th Postoperative day but in group A - *Snuhi Kshara sutra*, it was found that the discharge from anus was more number which may lead anal infection and wound contamination due to fecal matter. However there was 45.5% patients experienced purulent discharge in group A, while

only 27.3% patients experienced purulent discharge in group B and group C. The purulent discharge found in less number of cases in group C & group B proving its advantages over the group A (Table 7).

8.3 Postoperative Hemorrhage

It reveals that in the patients of hemorrhoids, the lowest Bleeding during the entire trial period was experienced by Group C - *Udumber Kshara sutra* with 90.0% patients reported complete relief from bleeding on 5th Postoperative day, followed by Group A - *Snuhi Kshara sutra* with 81.8% and Group B - *Guggulu Kshara sutra* with 81.8% patients reported complete relief from bleeding on 5th Postoperative Day (Table 7).

It was seen that average sloughing off was minimum for group A (3.27 ± 0.10) followed by group B (4.39 ± 0.30). Maximum average sloughing off was seen in group C (5.07 ± 0.16). But it was seen that average healing time was minimum for group C - *Udumber Kshara sutra* (6.55 ± 1.12) followed by group B - *Guggulu Kshara sutra* (7.18 ± 1.16). Maximum average healing time was seen in group A - *Snuhi Kshara sutra* (7.27 ± 1.10). According to

Table 7. Comparison between pain, discharge and bleeding

Symptoms	Group	Between the group comparison Wilcoxon Signed Ranks test						
		Mean	Std. Deviation	% Relief	Z	p-value	Significant	
Pain	Group A	F0	2.45	0.522	54.5	Z=2.976	p=0.003	HS
		F4	0.45	0.522				
	Group B	F0	2.27	0.786	63.6	Z=2.994	p=0.003	HS
		F4	0.36	0.505				
	Group C	F0	2.09	0.831	81.8	Z=2.980	p=0.003	HS
		F4	0.18	0.405				
Discharge	Group A	F0	1.55	1.036	63.6	Z=2.565	p=0.010	S
		F4	0.36	0.505				
	Group B	F0	1.55	0.820	72.7	Z=2.913	p=0.004	HS
		F4	0.27	0.467				
	Group C	F0	2.50	0.527	72.7	Z=2.842	p=0.004	HS
		F4	0.30	0.483				
Bleeding	Group A	F0	1.45	1.128	81.8	Z=2.640	p=0.008	HS
		F4	0.27	0.467				
	Group B	F0	1.09	1.044	81.8	Z=2.271	p=0.023	S
		F4	0.36	0.505				
	Group C	F0	1.82	0.874	90.9	Z=2.850	p=0.004	HS
		F4	0.18	0.405				

One way ANOVA test applied for comparison between the groups A, B, C, result is non-significant with $p > 0.05$ (Table 8; Figure 2).

9. Discussion

Anorectal disorders are very common among all ages. Hemorrhoids (*Arsha*) are one of the most common ano rectal diseases in which varicosity of haemorrhoidal vein occurs, may be internal or external. It is manifested due to improper diet, prolonged standing and faulty habits of defecation causing derangement of *tridosha*, mainly *Vata dosha*. Hemorrhoids have many distressing symptom such as pain, bleeding, prolapsed piles, discharge per anum, its treatment is targeted at elimination of symptoms, improvement of quality of life and patient satisfaction. Many studies prove that *Kshara sutra* ligation show better result on many parameters as compared other treatment modalities as rubber band ligation etc. in the parameter of patient satisfaction, Time taken for sloughing off of hemorrhoidal masses, Return to day to day activities; Postoperative pain and hospital stay *Kshara sutra* ligation is better than any modern therapy

for hemorrhoid such as rubber band ligation etc¹⁴. All type of *Kshara sutra* have good result in wound healing and prevent infection due to its alkaline pH (pH-10.3) that works as antibacterial at site of ligation¹⁵. In this research work patients of hemorrhoids feel lowest pain during the entire trial period, minimum average healing time, fewer irritants and good tolerance by the patients by Group C - *Udumber Kshara sutra* and another study also favor this result¹⁶. *Kshara sutra* ligation creates pressure effect that cause mechanical strangulation of the blood vessels and tissue and, ultimately, forces falling out of the pile mass during defecation¹⁷. The *Guggulu Kshara sutras* have minimum post-operative discharge and minimum average healing time due to its anti-inflammatory, antibacterial property which helped in wound healing^{18,19}.

10. Conclusion

Kshara sutra therapy is a radical cure in the treatment of Hemorrhoids (*Arsha*) without complications and recurrence. Post-operative pain was lowest experienced by *Udumber Kshara sutra* after that *Guggulu Kshara sutra* and maximum pain was experienced by *Snuhi Kshara sutra*. Post-operative discharge was lowest experienced by *Udumber Kshara sutra* after that *Guggulu Kshara sutra* whereas higher discharge was experienced by *Snuhi Kshara sutra*. Post-operative hemorrhage was lowest experienced by *Udumber Kshara sutra* followed by *Snuhi Kshara sutra* and *Guggulu Kshara sutra*. Average healing time was minimum for *Udumber Kshara sutra* followed by *Guggulu Kshara sutra* and maximum average healing time was seen *Snuhi Kshara sutra*. There was no adverse effect of any of the drugs observed during the course of study.

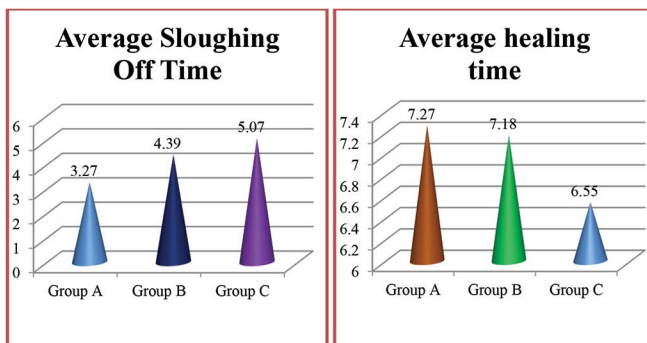


Figure 2. Comparison between times taken for Sloughing off of the mass & Average healing time

Table 8. Comparison between times taken for Sloughing off of the mass & Average healing time

Groups	Average sloughing off time	Average healing time
	Mean \pm SD	
Group A (<i>Snuhi Kshara sutra</i>)	3.27 \pm 0.10	7.27 \pm 1.10
Group B (<i>Guggulu Kshara sutra</i>)	4.39 \pm 0.30	7.18 \pm 1.16
Group C (<i>Udumber latex Kshara sutra</i>)	5.07 \pm 0.16	6.55 \pm 1.12
Between the group comparison	F = 1.936	F = 1.344
One way ANOVA Test	p = 0.162	p = 0.276
	NS	NS

11 Source of Support:

Nil

12 Conflict of Interest:

None Declared

13. References

- Zhifei Sun, John Migal. Review of Hemorrhoid Disease: Presentation and Management. *Clinics in Colon and Rectal Surgery*. 2016 Mar; 29(1):22-9. Doi: 10.1055/s-0035-1568144 <https://doi.org/10.1055/s-0035-1568144> PMID:26929748 PMCID:PMC4755769
- Agnivesha. *Charaka Samhita*, English translation by Sharma RK, Dash B. Vol-II, Chikitsa Sthan (14/6), Chaukhambha Sanskrit series office, Varanasi. 2010.
- Sushruta. *Sushruta samhita*, English translation by Sharma P.V, Vol I, Sutra sthana 33/4-5, Chaukhambha Vishvabharati, Varanasi. 2005.
- Sushruta. *Sushruta samhita*, English translation by Sharma P.V, Vol II, Chikitsa sthana 6/3, Chaukhambha Vishvabharati, Varanasi. 2005.
- Vagbhata. *Astanga Hridaya*, English translation by Srikantha Murty KR, Vol-II, Nidana sthana (7:1), Chaukhambha, Krishnadas Academy Varanasi. 2015.
- Madhava Nidana of Sri Madhavakara with the "Madhukosha" Sanskrit Commentary by Sri Vijayarakshita Madhukosh Tika 1/5. Chaukhambha Sanskrit Sansthan, Varanasi.
- Panigrahi HK, Rani R, Padhi MM, Lavekar GS. Clinical Evaluation of Kshara sutra therapy in the management of Bhagandara (Fistula-in-Ano)- A prospective study. *Ancient Science of Life*. 2009; 28(3):29-35. PMID:22557318 PMCID:PMC3336315
- Saxena V, Singh L. A Comparative Study of Three Different Types of Kshara Sutras in the Management of Bhagandara (Fistula in Ano). *International Journal of Ayurveda & Medical Sciences*. 2017; 2(3):54-8.
- Sahu M. A Manual on Fistula in Ano and Ksharasutra therapy. First edition published by National resource: Centre on Ksharasutra therapy 2015. 2015; 1(1).
- Multicentric randomized controlled clinical trial of Ksharasutra (Ayurvedic medicated thread) in the management of fistula-in-ano. *Indian Council of Medical Research. The Indian Journal of Medical Research*. 1991 Jun; 94:177-85.
- Sarkar PK, Ballantyne S: Management of leg ulcers. *Postgraduate Medical Journal*. 2000; 76:674-82. <https://doi.org/10.1136/pmj.76.901.674> PMID:11060140 PMCID:PMC1741806
- Copper D. *The physiology of wound healing: An Overview in Chronic Wound care*. Wayne, PA: Health Management publications. 1990; p. 1-11.
- Orkin Bruce A, Sinykin Svethana B. Lloyd P C DRESS. *LWW Journal American society of Colon & Rectal Surgeon*. 2010 Dec; 53(12):1656-60.
- Rakhi Singh, Ramesh C Arya, Satinder S Minhas and Anil Dutt. A comparative study of Barron's rubber band ligation with Kshar Sutra ligation in hemorrhoids. *International Journal of Ayurveda Research*. 2010 Apr-Jun; 1(2):73-81. Doi: 10.4103/0974-7788.64407
- Kohli K, Ali J, Ansari MJ, Raheman Z. Curcumin: A natural anti-inflammatory agent. *Indian Journal of Pharmacology*. 2005; 37(3):141-7. <https://doi.org/10.4103/0253-7613.16209>
- Manju Rani, Riju Agarwal, Sijjoria KK. Preparation of different types of Kshara sutra. *International Journal of Research in Ayurveda and Pharmacy*. 2016 Mar-Apr; 7(Suppl 2):176-80. <http://dx.doi.org/10.7897/2277-4343.07281>
- Meva Lal Gupta SK. Gupta and Chaturbhujia Bhuyan: Comparative clinical evaluation of Kshara Sutra ligation and hemorrhoidectomy in Arsha (hemorrhoids); *Ayu*. 2011 Apr-Jun; 32(2):225-9. Doi: 10.4103/0974-8520.92591. <https://doi.org/10.4103/0974-8520.92591> PMID:22408307 PMCID:PMC3296345
- Arora RB, Kapoor V, Gupta SK and Sharma RC. Isolation of a crystalline steroidal compound from *Commiphora mukul* & its anti-inflammatory activity. *Indian Journal of Experimental Biology*. 1971; 9(3):403-4. PMID:5144347
- Saeed MA and Sabir AW. Antibacterial activities of some constituents from oleo-gum-resin of *Commiphora mukul*. *Fitoterapia*. 2004; 75(2):204-8. <https://doi.org/10.1016/j.fitote.2003.12.003> PMID:15030926