MANAGING MUTRASHMARI THROUGH AYURVEDIC DRUGS - IV: COMPARATIVE EFFICACY OF KULATTHA, SHWET PARPATI & THEIR COMBINATION

Akshay Suden*

Associate Professor, Shalya Tantra, Kalawati Ayurvedic Medical College, Research Centre & Hospital, Kasganj, Uttar Pradesh.

*Corresponding Author

Akshay Suden

Associate Professor, Shalya Tantra, Kalawati Ayurvedic Medical College, Research Centre & Hospital, Kasganj, Uttar Pradesh.

ABSTRACT

There were 38 calculi, 12 in the Kulattha (K) group, 14 in the Shwet Parpati (SP) group and 12 in the K+SP group, 24 were in the Kidney and 14 in the Ureter. On calculi cure, K+SP out performed with of 41.6 % as against 33.3% in Kulattha and 28.6% in Shwet Parpati alone. The Shwet Parpati, however performed better in markedly improving, followed by Kulattha and K+SP. On overall rating K+SP was the best with 2.0, Kulattha with 1.9 and SP with 1.8. On Kidney stones, the K+SP proved more efficacious followed by Kulattha and Shwet Parpati in completely curing. K+SP responded significantly to each and every Kidney stone. Overall rating for K+SP was 2.1 as against 1.9 in Kulattha and 1.8 in Shwet Parpati. The K+SP therapy resulted in a higher percentage of cured cases in comparison to Kulattha and Shwet Parpati. On Ureter stones, the Kulattha showed higher improved percentage in comparison to the other two. It resulted in a higher overall rating of 2.0 in comparison to 1.8 in each of the other two. All the three types of Ashmari viz. Kaphaja, Pittaja and Vataja were present in the study. There were 21 stones in Kaphaja Ashmari patients, 8 in Kulattha group, 7 in Shwet Parpati group and 6 in K+SP therapy group. K+ SP was the most effective therapy in the complete cure category followed by Kulattha and Shwet Parpati. Overall rating in favour of Kulattha was 2.3 and 2.0 in the other two. There were only 7 stones in Pittaja Ashmari cases, 1 with Kulattha, 3 with Shwet Parpati and 3 with K+SP. No complete cure could take place with any of the therapies. Overall rating was 2.0 in favour of K+SP therapy and 1.7 in favour of Shwet Parpati while 0 for Kulattha. There were 10 stones with Vataja Ashmari, out of which 3 with Kulattha, 4 with Shwet Parpati and 3 with K+SP. Complete cure of 2 stones was achieved

with K+SP, 2 with Shwet Parpati and 1 with Kulattha. Overall rating was 2.0 with K+SP, 1.7 with Kulattha and only 1.5 with Shwet Parpati. The effect of Kulattha, Shwet Parpati and K+SP was significant on most of the Ayurvedic and modern system parameters of Mutrashmari. Cosistently significant effect was recorded on Nabhi Vedana and Mehan Vedana. These two parameters are thus, important in Mutrashmari studies. The K+SP therapy showed highly significant effects on all the modern complaints. Pain, Dysuria, Burning Micturition, Tenderness in Renal angle showed significant effect across the therapies Overall success rates of 63.3 %, 60.0 % and 66.7 % in mitigating the problems of Mutrashmari and removal/disintegration of calculi. K+SP therapy was the most efficacious against Mutashmari followed by K and SP therapies.

INTRODUCTION

Nearly, twelve percent of Indian population is suffering from urinary calculi. It is a global problem, about 6 million Americans suffer from it.

In *Ayurveda* the causes of urinary calculi are mainly the non-adoption of purificatory measures such as emesis, purgation, and medicated enemas in order to eliminate the vitiated *dosas* (toxic materials) and practice of unhealthy diets and lifestyles. These factors are responsible for the formation of calculi.[1,2,5,7,17,18,20] *Mutrashmari* is a disease pertaining to *mutravaha srothas* which comes under *Basti marma*. *Ashmari* gets formed when *vata* dries up the *mutra, sukra, pitta* or *kapha* stored in the urinary bladder, leading to distention of bladder,[17] severe pain in and around it, difficulty in micturation etc.[6] Formation of *Mutrashmari*, according to Sushruta, is due to *Srotovaiguṇya*, resulting from *Dusita Kapha* localized in *Basti*, in conjunction with *Pradusita Vata* and *Pitta*, is responsible for the cause of *Ashmari*. *Ayurvedic* texts have described four types of urinary calculi: *sleshmaashmari, pittaashmari, vataashmari*, and *sukraashmari*.[15]

Responsible factors[16] has been identified and many treatments for its cure are available in the modern medicine system but in spite of all these techniques, surgery in some form remains the treatment of choice, yet the recurrence is inevitable in about 60% of cases.

Alternatively, herbal drugs have proven effects like *imuno-modulation, adapto-genic* and *antimuta-genic*. Also, the overuse of synthetic drugs, which result in higher incidence of adverse drug reactions, has motivated humans, to return to nature, for safe remedies. The

World Health Organization's Canberre conference in 1976, promoted the concept of 'Traditional' medicines for the developing countries.

Accordingly, an attempt has been made in this paper to present the findings of the clinical study conducted on the traditional *Ayurvedic* drugs namely, *Kulattha* – a herbal drug, *Shwet Parpati* – a mineral compound and the combination of these two against *Mutrashmari roga* on a comparative basis while these drugs have been dealt with individually in separate publications[12,13,14]

Aims & Objectives

The aims & objectives of this article is to present the comparative efficacy of the *Ayurvedic* drugs *Kulattha, Shwet Parpati* and their combination on *Mutrashmari roga*, on prominent signs, symptoms and sufferings, prevalent among the patients infested with this *roga,* in the bio-physiological and socio-economic conditions of the suburbs of Jammu (Jammu & Kashmir State). The findings might guide the doctors and researchers to extend its usefulness to other areas infested with this *roga*.

MATERIALS AND METHODS

The materials and methods of this study have been extensively presented by *Suden*[11-14] recently. It is very briefly sketched in the following:

A research experiment was planned to evaluate the comparative efficacy of

1. K = 50 ml decoction freshly prepared from 2 – 4 gm seed powder of *Kulattha* – a herbal drug *Dolichos biflorus Linn.*

2. SP = 1 gm choorna of *Shwet Parpati* – a mineral compound.

3. K + SP = Combination of K and SP.

on *Ashmari*   under suburbs of Jammu conditions (JIAR & R.S. Pura, Jammu & Kashmir State).

Chemical composition of seeds of *kulattha*

Proteins: 22%, **Carbohydrates:** 57.3%, **Fats:** 0.5%, **Fibre, Phosphorus** and *Navasadara* are also found.

***Guna*:** *Laghu*, *Ruksha*, *Tikshana*; ***Rasa*:** *Kashaya*; ***Vipaka*:** *Amla*; ***Virya*:** *Ushna*; ***Prabhava*:** *Bhedana* **Doshaghanata:** *Kapha Vata Shamak*; ***Dosha*:** *Kaphaghna*, *Vataghna*, *Pittavardhaka*

Thus, *Kulattha* is very suitable for Ashmari, Basti shoola and mootra krichhra etc.

Shwet Parpati's Ingredients: It is prepared adopting *Parpati Kalpana* method with the following ingredients' proportions[8,10] (16: 2: 1)

- **Kalmi shora** (KNO3 - Pottassium nitrate)   **:** 480 g (40*tola*).

- **Spatika** (K_2SO_4 Al_2 $(SO_4)_3$ $24H_2O$ - Double sulphate of potash & Alum) **:** 60 g (5 *tola*)

- **Navasadara** (NH_4Cl **-** Ammonium chloride)   **:** 30 g (2 ½ *tola*)

Rasatarangini[9] has described in detail the medicinal merits of the three constituents of *Shwet Parpati* which are reproduced below :

Suryakshara: *Vidagdhaajeerna* (indigestion), *Asmari* (urinary calculi), *Mutrakrichra* (urinary diseases),

Agnimandya (loss of appetite), *Panduroga* (iron deficiency anaemia), *Prameha* (urinary disorders/diabetis mellitus).

Sphatika: *Visarpa* (erysipelas), *Switra* (vitiligo), *Vranaropana* (heal the wound), *Netraroga* (eye disorders), *Vishamajwara* (chronic fever), *Grahani* (Sprue/IBS), *Rudirasravrodhini* (stops bleeding).

Navasadara: *Gulma* (gaseous tumour of abdomen), *Adhmana* (fullness of abdomen), *Mukhasosha* (dryness of mouth), *Vrishchikavishanashaka* (antidote of poison of scorpion), *Hridroga* (heart disorders), *Netrya* (cures eye ailments), *Kushta* (skin disorders).

Kulattha Plant   **Kulattha Flowers**

Fig. 1   **Fig. 2**

Kulattha seeds
Fig. 3

Sphatika
Fig. 4

Sphatika powder

Fig. 5

Navsadar

Fig. 6

Navsadar powder

Fig. 7

Suryakshar powder

Fig. 8

Weighing of drug

Fig. 9

Packing of drug for patients

Fig.10
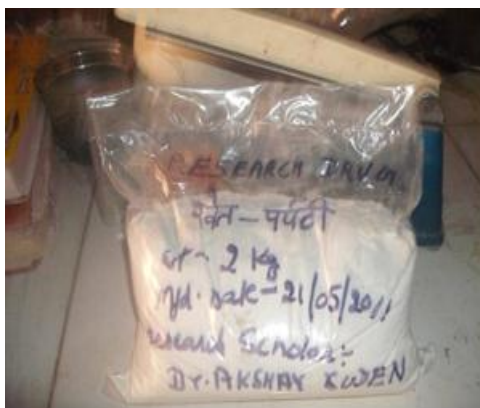
Packing drugs for patients

Fig.11

Kulattha plant, flowers and seed are displayed in Fig.1 – 3. *Shwet Parpati* ingredients are displayed in Figs. 4 – 8. While the preparatory materials are displayed in Figs. 9 – 11.

***Aushada kaala*:** The *Kuluttha kwath* or *Shwet Parpati choorna* capsule or both, depending on the treatment recommended for the patient, has to be taken half an hour before breakfast in the morning and one hour after dinner at bed time daily for consecutive 60 days. Patients recommended with K+SP, have to take freshly prepared *Kulattha Kwath* half an hour before *Shwet Parpati* at both the times. with cold water etc at both the times.

Anupana & dietetics

- Take the *Shwet Parpati* with eithercold water, *Narikel Jala*, *Ikshurasa* (Sugarcane juice), *Mishri yukta dugdha*, *Karpura yukta jala*, or other *mutrala kashaya* (diuretic decoctions) can be taken as *anupana*.
- The patients were advised to observe their normal dietetics
- maintain regular intervals in between two meals
- desist from all the diets which are directly or indirectly contributory to the formation of stone
- observe *Pathya* and *Apathya*
- to take plenty of water

***Pathya*:** *Sheetal ahara- vihara* (cold regimen)

***Apathya*:** *Ushna ahara sewana, Teekshana ahara sewana, Katu ahara sewana, Vidahi ahara sewana* and *Atapa sewana*

Shweta parpati **side effects**

It is contraindicated in children, pregnant and lactating mothers. Over-dosage and long term use may cause poisonous side effects.

Kulattha **side effects**

- Avoid in hyperacidity and gastric ulcers.
- Avoid during menses, it may lead to heavy bleeding.
- Avoid in gout.
- Avoid consuming with medications for anaemia. This might lead to a contraindication.
- Avoid in TB or plethora.
- Its long use may cause impotency.

Selection of patients: The selection of ten *mutrashmari* patients on random basis, was made out of patients coming to the OPD's at the Department of *Shalya Tantra*, JIAR, and at Community Health Centre (District Hospital), RS Pura, Jammu, for medical advice, adopting the following Inclusion and Exclusion criteria:

Inclusion criteria

- The *Mutrashmari* patients (diagnosed radiologically and micro-biologically) suffering from calculi, but of size not greater than 8 mm
- Patients in the age group : 21-60 years
- Patients ready to undertake all the radiological and other diagnostic tests
- Patients ready to report to OPD at times when required
- Patients ready to regularly take the recommended medicines and observing the recommended dietetics & *anupana*
- observe *Pathya* & *Apathya* as a long term practice

Exclusion criteria

- Patients suffering from other serious ailments like tuberculosis, asthma, impending renal failure, staghorn calculus, severe haematuria, immediate surgical requirement and complications, etc.
- Patients having stone size larger than 8 mm
- Patients outside the age group : 21-60 years

The following diagnostic tests were conducted before initiation and conclusion of the study : *TLC, DLC, Hb* and *ESR*; *Blood urea*, *serum creatinine*, *S. fasting blood sugar*, *S. cholesterol*, presence of *RBC*, *pus cells, epithelial cells, renal casts* and *crystals* in urine; *X-ray* and *ultrasonography* of *KUB* region to confirm the presence and measure of the size of calculi.

Treatment details: The treatments were given orally twice daily for 60 days with a follow up at every successive 15 days by an *Ayurvedic* doctor till the end of three months.

Statistical design: The clinical trial was conducted as a Completely Randomised Design with *Mutrashmari* patients, allocated 10 to each of the K, SP and K+SP treatments randomly. The selection was made out of the patients coming to the OPD at RS Pura, District Hospital, for medical advice. The *Mutrashmari* patients (diagnosed radiologically and microbiologically) suffering from calculi of size less than 8 mm were randomly selected for the study. They were confirmed to be not suffering from other serious ailments like tuberculosis, asthma, etc. The following diagnostic tests were conducted before initiation and conclusion of the study : *TLC, DLC, Hb and ESR; Blood urea, serum creatinine, fasting blood sugar, S. cholesterol; Presence of RBC, pus cells, epithelial cells, renal casts* and *crystals in urine; X-ray* and *ultrasonography* of KUB region to confirm the presence and measure of the size of calculi. The patients were in the range: 21- 60 years of age.

To introduce objectivity into the signs and symptoms of a disease, the concept of scoring or scaling was adopted.

Subjective criteria: Assessment of *Mutrashmari* was done on a increasing symptom severity graded 5-point scale (0 – 4).

Pain degree score: 0 = No pain ; 1 = Occasional pain, did not require treatment ; 2 = Occasional pain but, required treatment; 3 = Constant dull ache pain, required treatment;   4 = Severe constant pain, but did not show relief even after treatment

Burning micturition degree score: 0 = Burning micturition; 1 = Occasional burning micturition; 2 = Occasional burning micturition, requiring treatment; 3 =   Constant burning micturition requiring treatment; 4 =   Constant severe burning micturition but no relief even after treatment

Dysuria score: 0 = No dysuria; 1 = Occasional dysuria; 2 = Occasional dysuria requiring treatment; 3 = Constant dysuria which requiring treatment; 4 = Constant severe dysuria but show no relief even after treatment

Tenderness in renal angle score: 0 = No tenderness; 1 = Mild tenderness; 2 = Moderate tenderness; 3 = Severe tenderness; 4 = Acute tenderness.

Haematuria : 0 = No RBC/Hpf ; 1 = 0–5 RBC/Hpf ; 2 = 6–10 RBC/Hpf ; 3 = 11–15 RBC/Hpf ; 4 = >16 RBC/Hpf.

Pus cells: 0 = No pus cells/Hpf; 1 = 0–5 pus cells/Hpf; 2 = 6 –10 pus cells/Hpf; 3 =1–15 pus cells/Hpf; 4 = >16 pus cells/Hpf.

Criteria for Measuring Total Effect of a Therapy: For assessing the total effect of therapy viz. BT, AT (before, after treatment data), following 4-point graded scale was adopted for scoring the symptoms

o **3=Cured :** 76 - 100 % relief
- Complete relief in subjective signs and symptoms.
- Absence of any calculus in urinary tract with radiological evidence
o **2=Markedly Improved:** 51 – 75 % relief
- Relief in subjective signs and symptoms
- Downward movement or partial disintegration of *Mutrashmari* with radiological evidence.
o **1=Improved:** 26 – 50 % relief
- Relief in signs and symptoms
- Without any change in size of stone confirmed with radiological evidence.
o **0=Unchanged:** 0 – 25 % relief
- Relief in subjective sign and symptoms

Measurement of the effect of therapies: The Effect or Relief from a therapy is defined as follows

Effect   = **(BT – AT),**

Relief (%)   = **(Effect x 100) / BT,**

where BT and AT are the disease symptoms (scored or rated adopting an appropriate graded scale) before and after the therapy. These are in fact the weighted averages, especially in this paper.

Overall rating = is the weighted average (in this article), weights being the observed scores, by adopting a suitable graded scale. This is an excellent objective method developed and used in this study. Similarly, other clinical symptoms were allotted the scores on the basis of severity. Some attributes were easily understandable in their presence (1) or absence (0). The results were also often presented as frequency, number, percentage etc. for better acceptance in these formats.

Overall success rate of a therapy (%) = overall rating x 100/maximum grade point of the scale.

Overall complete cure (%) = percent cured cases.

Overall no cure (%) = percent unchanged cases.

Statistical analysis: Proper statistical analysis of the data generated from the clinical trial was carried out while considering the Completely Randomized Design. Specifically, the following analysis was carried out.

- **CD (0.05)** or **CD (5%):** Critical difference at 5 % level of significance to test the significance of the difference between two means. It is, in fact a practical form of the *Student's t-test*.

RESULTS AND DISCUSSION

Results

Suden[11-14] has adequately described the results for *Kulattha, Shwet Parpati* and their combination, individually and separately. The presentation would mainly concentrate on the relative efficacy of these three *Ayurvedic* drugs for managing *Mutrashmari roga*.

Calculi in the cases: In total there were 38 calculi, 12 (32%) in the *Kulattha* group, 14 (37 %) in the *Shwet Parpati* group and 12 (32%) in the *Kulattha+Shwet Parpat*i group, thus each therapy group had nearly equal number of calculi for demonstrating its efficacy (Table-1). Of these stones, 24 (63%) were in the Kidney and 14 (37) in the Ureter. Thus, *Mutrashmari roga* was primarily located in kidney and ureter organs of the sample patients. . Incidentally, the

sample did not represent any case of bladder stone. None of the registered (OPD) bladder stone patients met the inclusion criteria, particularly pertaining to the size of the calculi, so none of them could be inducted into this Clinical Trial.

Uni-lateral and Bi-lateral stones: Out of 38 stones, 22 (58%) were uni-lateral and single, 4 sites (21%) were multiple (double) but unilateral, while the remaining 4 (21%) were bi-lateral and single but one in each kidney (Table-1).

Table-1: Calculi in the different Sites[*]																				
Site	*Kulattha* (K)					*Shwet Parpati* (SP)					K+SP					Total				
	S	**M**	**B**	**T**	**%**	**S**	**M**	**B**	**T**	**%**	**S**	**M**	**B**	**T**	**%**	**S**	**M**	**B**	**T**	**%**
Kidney	5	1	1	9	75	4	1	1	8	57	5	1	0	7	58	14	3	2	24	63
Ureter	3	0	0	3	25	2	1	1	6	43	3	0	1	5	42	8	1	2	14	37
Total	8	1	1	12	-	6	2	2	14	-	8	1	1	12	-	22	4	4	38	-
*: S=Single & Unilateral, M=Multiple(double) & Unilateral, B=Bilateral & Single in each Kidney, T=Total																				

Size range of calculi: Calculi were classified into two size ranges namely   < 4 mm & 4 – 8 mm. Further, if a patient was having calculi at more than one site, he was included in the study (Table–2) for his largest calculi size only. On overall basis, most of the calculi cases i.e. 93.3 % were in the size range of 4 – 8 mm and the remaining 6.7 % cases were in the range of < 4 mm**.** The three therapies' groups did not differ significantly in calculi size allocation.

Table 2: Calculi Size in K, SP & K+SP therapy groups.							
Calculus Size (mm)	**K**		**SP**		**K+SP**		**Overall**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
<4	1	10	0	0	1	10	2	6.7
4 - 8	9	90	10	100	9	90	28	93.3

Major complaints

A. *Ayurvedic* **system:** Information on a number of major *Ayurvedic* complaints was recorded. The results are presented in Table–3. On overall basis*, Ati Avilamutrata, Nabhi Vedana, Mutradhara Sanga* and *Basti   Vedana* were the most common problems prevalent in   about 80–90 % of the patients. *Sevani Vedana* was common in 60 % cases . *Sarudhira Mutrata, Mehan Vedana* and *Gomeda Prakasam* were present in about 35-45 % of the patients. *Mutra Vikirana, Sasikitam, Visirnadhara*, and *Mrudanti Medhara* were present in about 10 % of the cases and were relatively insignificant in importance.[11]

Effect on *mutrashmari*: The three therapies had nearly equal number of calculi (12, 14,12) to show their efficacies. The combination therapy K+SP out performed with a cure percentage of 41.6 % as against 33.3 % in *Kulattha* and 28.6 % in *Shwet Parpati* therapies (Table-3). The *Shwet Parpati* therapy, however recorded a higher i.e. 35.7 % in markedly improving, followed by *Kulattha* therapy (33.3 %) and K+SP therapy (25.0 %). The therapies behaved similarly in the improved and unchanged categories. On overall rating K+SP was the best with 2.0 value followed by *Kulattha* 1.9 and SP 1.8.

Table-3: Effect of Therapies on *Mutrashmari*

Grade of Cure	*Kulattha* (K)		*Shwet Parpati* (SP)		K+SP		Total	
	No.	%	No.	%	No.	%	No.	%
Cured	4	33.3	4	28.6	5	41.6	13	34.2
Markedly Improved	4	33.3	5	35.7	3	25.0	12	31.6
Improved	3	25.0	3	21.4	3	25.0	9	23.7
Unchanged	1	8.4	2	14.3	1	8.4	4	10.5
Total	12	100.0	14	100.0	12	100.0	38	100.0
Overall Rating	1.9		1.8		2.0		1.9	

Effect on kidney stones: The *Kulattha, Shwet Parpati* and K+SP therapies had nearly equal number of Kidney stones in their patients' groups viz 9, 8 and 7 respectively. The K+SP therapy (Table-4) proved more efficacious (42.8%) in comparison to *Kulattha* therapy (33.3 %) followed by *Shwet Parpati* therapy (25%) in completely curing the Kidney stones. In the markedly improved category, *Shwet Parpati* therapy (37.5%) was followed by *Kulattha* therapy (33.4 %), and K+SP therapy (28.6%). In the improved category, again K+SP (28.6 %) was better than SP therapy (25.0%) and *Kulattha* (22.2%). K+SP therapy responded significantly to each and every Kidney stone case as there was no case in the Unchanged category unlike the other two therapies. Overall rating for K+SP therapy was 2.1 as against 1.9 in *Kulattha* therapy and 1.8 in *Shwet Parpati* therapy.

Effect on ureter stones: The *Kulattha* therapy group had only 3 Ureter stones in comparison to 6 in *Shwet Parpati* and 5 in K+SP therapy groups (Table-5). The K+SP therapy (40.0%) resulted in a higher percentage of cured cases in comparison to *Kulattha* and *Shwet Parpati* therapies, each with 33. 3%. In the markedly improved category, Both K & SP, each at 33.3 %, performed better than 20.0 % in K+SP therapy. The *Kulattha* therapy, however showed higher improved percentage (33.4%) in comparison to the other two therapies. *Kulattha* therapy resulted in a higher overall rating of 2.0 in comparison to 1.8 in each of the other two.

Table 4: Effect of therapies on kidney stones

Grade of Cure	K		SP		K+SP		Total	
	No.	%	No.	%	No.	%	No.	%
Cured	3	33.3	2	25.0	3	42.8	8	33.3
Markedly Improved	3	33.4	3	37.5	2	28.6	8	33.3
Improved	2	22.2	2	25.0	2	28.6	6	25.0
Unchanged	1	11.1	1	12.5	0	0.0	2	8.4
Total	9	100.0	8	100.0	7	100.0	24	100.0
Overall Rating	1.9		1.8		2.1		1.9	

Table 5: Effect of therapies on ureter stones.

Grade of Cure	K		SP		K+SP		Total	
	No.	%	No.	%	No.	%	No.	%
Cured	1	33.3	2	33.3	2	40.0	5	35.7
Markedly Improved	1	33.3	2	33.3	1	20.0	4	28.6
Improved	1	33.4	1	16.7	1	20.0	3	21.4
Unchanged	0	0.0	1	16.7	1	20.0	2	14.3
Total	3	100.0	6	100.0	5	100.0	14	100.0
Overall Rating	2.0		1.8		1.8		1.9	

Effect of the therapy on *ashmari* types: All the three types of *Ashmari* viz. *Kaphaja, Pittaja* and *Vataja* were present in the study. The results are reported in Table–6. *Kaphaja Ashmari* was present in 16 (53 %) of the patients, followed by   8 (27 %) in *Vataja* and 6 (20 %) in *Pittaja Ashmari* conforming to the   *Prakrti* and *Nidanas* of the patients. This shows the dominance of *Kaphaja* type of *Ashmari* in the study area.

Table-6: *Ashmari*   Types present in the cases.

Type	K	SP	K+SP	Total	%
Kaphaja	6	5	5	16	53
Pittaja	1	2	3	6	20
Vataja	3	3	2	8	27

***Kaphaja ashmari*:** There were 21 stones in *Kaphaja Ashmari* patients, out of which 8 (38 %) were in *Kulattha* therapy group, 7 (33 %) in *Shwet Parpati* group and 6 (29 %) in K+SP therapy group. K+ SP (59 %) was the most effective therapy in the complete cure category followed by *Kulattha* therapy (37.5 %) and *Shwet Parpati* therapy (28.6 %). In the markedly improve category, *Kulattha* therapy led with 50 % followed by *Shwet Parpati* therapy. But K+SP again showed its superiority with 50 % in the improved category, followed by *Shwet Parpati* therapy with 28.6 %. Overall rating remained in favour of *Kulattha* therapy with 2.3 against 2.0 in the other two therapies.

Table 7: Effect of therapies on *kaphaja ashmari*.

Grade of Cure	K		SP		K+SP		Total	
	No.	%	No.	%	No.	%	No.	%
Cured	3	37.5	2	28.6	3	50.0	8	38.1
Markedly Improved	4	50.0	3	42.8	0	0.0	7	33.3
Improved	1	12.5	2	28.6	3	50.0	6	28.6
Unchanged	0	0.0	0	0.0	0	0.0	0	0.0
Total	8	100.0	7	100.0	6	100.0	21	100.0
Overall Rating	2.3		2.0		2.0		2.1	

***Pittaja ashmari*:** There were only 7 stones in *Pittaja Ashmari* cases, of which 1 (14%) with *Kulattha* therapy, 3 (43%) with *Shwet Parpati* therapy and also 3 (43%) with K+SP therapy (Table-8). No complete cure could take place with any of the therapies. K+SP therapy markedly improved all its stones viz 3 (100%) followed by *Shwet Parpati* therapy with 2 (66.7%). *Shwet Parpati* therapy also improved 1 (33.3%) stone case. *Kulattha* therapy failed to produce any positive results, probably due to merely one stone allocation to its trial. Overall rating was 2.0 in favour of K+SP therapy and 1.7 in favour of *Shwet Parpati*.

***Vataja Ashmari*:** There were 10 stones with *Vataja Ashmari*, out of which 3 (30%) were with *Kulattha* therapy, 4 (40%) with *Shwet Parpati* therapy and 3 (30%) with K+SP therapy. Complete cure of 2 (66.7%) stones was achieved with K+SP followed by 2 (50.0%) stones with *Shwet Parpati* therapy and 1 (33.3%) stone with *Kulattha* therapy. *Kulattha*, however recorded improvement in 2 (66.7%) stones. No significant improvement was noticeable in 2 (50.0%) stones with *Shwet Parpati* therapy followed by 1 (33.3%) stone with K + SP therapy. Overall rating was 2.0 with K+SP, 1.7 with *Kulattha* and only 1.5 with *Shwet Parpati* therapies (Table-9).

Table 8: Effect of therapies on *pittaja ashmari*.

Grade of Cure	K		SP		K+SP		Total	
	No.	%	No.	%	No.	%	No.	%
Cured	0	0.0	0	0.0	0	0.0	0	0.0
Markedly Improved	0	0.0	2	66.7	3	100.0	5	71.4
Improved	0	0.0	1	33.3	0	0.0	1	14.3
Unchanged	1	100.0	0	0.0	0	0.0	1	14.3
Total	1	100.0	3	100.0	3	100.0	7	100.0
Overall Rating	0.0		1.7		2.0		1.6	

Table 9: Effect of therapies on *vataja ashmari*.

Grade of Cure	K		SP		K+SP		Total	
	No.	%	No.	%	No.	%	No.	%
Cured	1	33.3	2	50.0	2	66.7	5	50.0
Markedly Improved	0	0.0	0	0.0	0	0.0	0	0.0

Improved	2	66.7	0	0.0	0	0.0	2	20.0
Unchanged	0	0.0	2	50.0	1	33.3	3	30.0
Total	3	100.0	4	100.0	3	100.0	10	100.0
Overall Rating	1.7		1.5		2.0		1.7	

Net effect of *kulattha, shwet parpati* & K+SP therapies

***Ayurvedic* Parametres:** For in depth evaluation of *Kulattha* therapy, its effect was studied on the following 8 important *Ayurvedic* parametres associated with *Ashmari* (Table-10). The effect of a therapy was measured on each of these parametres, singly and collectively by the method described under Methodology.

Table 10: *Ayurvedic* parametres	
1. *Nabhi Vedana*	5. *Mutradhara Sanga*
2. *Basti Vedana*	6. *Sarudhiramutrata*
3. *Sevani Vedana*	7. *Gomeda Prakasam*
4. *Mehan Vedana*	8. *Atiavila Mutrata*

The effect of Kulattha therapy was highly significant (Table-11) on *Mehan Vedana* (55.6%), *Gomeda Prakasam* (54.5%) and *Nabhi Vedana* (4.5%). Significant effect was observed in *Sarudhiramutrata* (75.0%). While *Basti Vedana* (53.8%), *Mutradhara Sanga* (50.0%) and *Atiavila Mutrata* (50.0%) showed non-significant effects.

The effect of *Shwet Parpati* therapy was highly significant in *Nabhi Vedana* (58.0%), *Basti Vedana* (58.3%), *Mehan Vedana* (55.6%), *Mutradhara Sanga* (47.4%) and *Atiavila Mutrata* (50.0%). The effect was significant in *Sarudhiramutrata* (71.4%). Non-significant effect was noticed in *Gomeda Prakasam* (66.7%), *Sevani Vedana* (8.3%).

The K+SP therapy revealed highly significant effects in *Sevani Vedana* (54.5%), *Atiavila Mutrata* (54.5%) and in *Nabhi Vedana* (4.5%). Significant effect was observed in *Gomeda Prakasam* (75.0%) and *Mehan Vedana* (55.6%) and *Mutradhara Sanga* (45.5%). While non-significant effect was noticed in *Basti Vedana* (53.8%) and *Sarudhiramutrata* (50.0%).

Thus**,** only *Nabhi Vedana* showed consistently highly significant effect in all the three therapies. Similarly, *Mehan Vedana* recorded consistently either highly significant or significant effect in all the three therapies. These two *ayurvedic* parameters may, thus be considered as very important in comparing efficacies of *mutrashmari* therapies.

Table 11: Pre & post-therapies' mean scores (*Ayurvedic* system)* of *mutrashmari* patients.

Parametre	*Kulattha*(K)				*Shwet Parpati* (SP)				K+SP			
	BT	AT	%	CD	BT	AT	%	CD	BT	AT	%	CD
Nabhi Vedana	2.0	1.1	4.5	0.56^1	2.4	1.0	58.0	0.69^1	2.0	1.1	4.5	0.56^1
Basti Vedana	1.3	0.6	53.8	0.76^{ns}	1.2	0.5	58.3	0.35^1	1.3	0.6	53.8	0.76^{ns}
Sevani Vedana	1.1	0.5	54.5	0.38^1	1.2	1.1	8.3	0.38^{ns}	1.1	0.5	54.5	0.38^1
Mehan Vedana	0.9	0.4	55.6	0.37^5	0.9	0.4	55.6	0.30^1	0.9	0.4	55.6	0.37^5
Mutradhara Sanga	0.6	0.3	50.0	0.35^{ns}	1.9	1.0	47.4	0.23^1	2.2	1.2	45.5	0.58^5
Sarudhiramutrata	0.8	0.2	75.0	0.60^5	0.7	0.2	71.4	0.38^5	0.6	0.3	50.0	0.35^{ns}
Gomeda Prakasam	2.2	1.0	54.5	0.30^1	0.9	0.3	66.7	0.69^{ns}	0.8	0.2	75.0	0.60^5
Atiavila Mutrata	0.6	0.3	50.0	0.35^{ns}	1.8	0.9	50.0	0.41^1	2.2	1.0	54.5	0.30^1

*: BT, AT: Before, After treatment. Superscript 1, 5 indicate significant differences (BT-AT) at 1 % & 5% P values respectively. Superscript ns indicate non-significant differences (BT-AT) at P=5%. The difference (BT-AT) which is less than CD (5%) value is non-significant (P>0.05). CD values are at 5 % level of significance.

Modren parametres: The performance of the therapies was evaluated on the 7 parametres of the modern system (Table-12). Nausea & Vomiting and Fever parametres did not affect the sample cases. Therefore, they are excluded in the further presentation of results. The results are presented in Table-13.

Table 12: Modern system parametres

1. Pain	5. Nausea & Vomiting
2. Burning Micturition	6. Fever
3. Haematuria	7. Tenderness in renal angle
4. Dysuria	

Table 13: Pre & post-therapies' mean scores (Modren system)* of *mutrashmari* patients.

Parametre	*Kulattha*(K)				*Shwet Parpati* (SP)				K+SP			
	BT	AT	%	CD	BT	AT	%	CD	BT	AT	%	CD
Pain	3.1	1.3	58.1	0.30^1	2.7	1.4	48.1	0.35^1	3.4	1.8	47.1	0.50^1
Burning Micturition	1.7	1.1	35.3	0.30^5	1.8	0.6	66.7	0.30^1	2.3	0.5	78.3	0.37^1
Haematuria	1.8	1.0	44.4	0.30^1	1.0	0.7	30.0	0.51^{ns}	1.1	0.5	54.5	0.37^1
Dysuria	1.3	0.5	61.5	0.45^1	1.7	0.9	47.1	0.45^1	1.9	1.0	47.4	0.23^1
Nausea & Vomiting	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Fever	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Tenderness in Renal angle	0.8	0.3	62.5	0.38^5	1.0	0.4	60.0	0.51^1	1.1	0.5	54.5	0.37^1

*: BT, AT: Before, After treatment. Superscript 1, 5 indicate significant differences (BT-AT) at 1 % & 5% P values respectively. Superscript ns indicate non-significant differences (BT-AT) at P=5%. The difference (BT-AT) which is less than CD (5%) value is non-significant (P>0.05). CD values are at 5 % level of significance.

Kulattha therapy: The effect was highly significant on Dysuria (61.5%) followed by Pain (58.1%) and Haematuria (44.4%). Significant effect was found on Tenderness at Renal Angle (62.5%) and Burning Micturition (35.3%).

Shwet Parpati therapy: Highly significant effect was noticed in Micturition (66.7%), Tenderness in Renal angle (60.0%), Burning Pain (48.1%) and Dysuria (47.1%). Non-significant effect was found in Haematuria (30.0%).

The K+SP therapy: Highly significant effects were found in all the modern complaints viz Burning Micturition (78.3%), Haematuria (54.5%), Tenderness in Renal angle (54.5%), Dysuria (47.4%) and Pain (47.1%).

Thus, Pain and Dysuria showed consistently, highly significant effect in all the three therapies. Similarly, Burning Micturition and Tenderness in Renal angle consistently showed either highly significant or significant effects across the therapies. So these four modern system parameters are very important in studying the efficacy of *Mutrashmari* therapies.

Table 14: Laboratory tests of *mutrashmari* cases.

Parametres	*Kulattha* (K)			*Shwet Parpati* (SP)			K+SP		
	AT	BT	Increase or decrease (%)	AT	BT	Increase or decrease (%)	AT	BT	Increase or decrease (%)
*Neutrophils**	56.7	54.5	-3.9	57.9	56.9	-1.7	58.8	57.0	-3.1
*Lymphocytes**	34.4	32.0	-7.0	30.8	29.7	-3.6	33.3	31.7	-4.8
*Eosinophils**	4.1	3.9	-4.8	4.2	4.1	-2.4	3.9	3.8	-2.6
*Monocytes**	6.0	6.1	+1.7	6.9	6.9	0.0	6.3	6.6	.+4.8
*TLC**	8390	8640	+3.0	8640	8780	+1.6	8010	8210	+2.5 P < 0.05
ESR	14.8	15.3	+3.4	16.5	16.4	-0.6	19.8	17.7	-10.6
Hb gm%	10.3	10.4	+1.0	9.9	10.1	+2.0	10.3	10.5	+1.9
Blood Urea L	29.7	26.9	-9.4	27.6	26.8	-2.9	30.0	28.5	-5.0
S. creatinine	0.94	0.95	+10.6	0.94	0.98	+4.2	0.95	0.99	+4.2
S. cholesterol	195	183	-6.2 P < 0.05	190	186	-2.1	198	194	-2.0
S. chloride	102	101	-0.1	101	101	0.0	102	0.0	102
S. calcium	9.2	9.2	0.0	9.4	9.1	-3.2 P < 0.05	9.3	-2.1P < 0.05	9.5
S. phosphate	3.7	3.6	-2.7	3.4	3.3	-2.9	3.5	0.0	3.5
S. albumin	4.2	4.2	0.0	4.2	4.3	+2.3	4.3	+2.3	4.2
S. globulin	2.7	2.8	+3.7	2.3	2.4	+4.3	2.6	+4.0	2.5
S. uric acid	4.3	4.4	+2.3	4.2	4.1	-2.4	4.7	0.0	4.7
F. Blood Sugar	80.1	85.0	+6.1	82.5	82.3	-0.2	91.5	+3.5	88.4
pH	4.7	4.78	+0.8	5.4	5.18	-4.6	5.04	-4.0	5.3
*RBC**	1.4	1.2	-14.3	1.9	1.5	-21.1	1.4	-26.3	1.9
*Pus Cells**	0.9	0.6	-33.3	1	0.8	-20.0	0.5	-37.5	0.8
*: Count.									

III. Effect of *kulattha, shwet parpati* & K+SP therapies on laboratory investigations

The results for Hematological Bio-chemical and Urological Parameters are presented in theTable–14. The Post-therapy results in comparison to Pre-therapy results showed an increasing trend in certain parametres while a decreasing trend in the others. The parametres, however, remained within their normal limits both in the Pre & Post-therapy observations.

The magnitudes of increase or decrease of AT values over the corresponding BT values were very small and are, practically of little clinical significance.

DISCUSSION

K+SP: it out performed *Kulattha* and *Shwet Parpati* alone in almost all aspects of the *Mutrashmari* viz. overall calculi cure, Kidney calculi cure, *Kaphaja & Vataj Ashmari*, effect on *Ayurvedic* and modern system parameters, overall success rate in mitigating the problems of *Mutrashmari* and removal/disintegration of calculi. But this combination therapy was not that much receptive by the patients. They often complained that it is very hot i.e. "*sharir mein jaida garmi lagti he*".

Kulattha: *Guna, Rasa, Vipaka, Virya, Prabhava, Doshaghanata* and *Dosha* properties of *Kulattha* make it highly suitable for *Ashmari, Basti shoola* and *mootra krichhra* etc. Its Diphoretic Action - carminative, purgative, anthelmintic, uterine stimulant, diuretic and lithotripsic, antipyretic, *lekhaniya*, *shukranashana* and anti-inflammatory action make it very useful in urinary diseases. It is also effective in respiratory and circulatory systems.

Shwet parpati: it is also called *Shital Parpati, Kshar Parpati* and *Vajra Kshar*, as all its ingredients are *Kshariya* i.e. Alkaline in nature.[19] On the basis of the contents and preparation method [*Parpati Kalpana*[19]] of *Shweta parpati,* it has unique features like diuretic, analgesic, anti-inflammatory and urinary supportive action which accelerate blood flow to kidneys, promoting their functionality and increasing urine output. These salts and their alkaline pH would act as deterrent to bacterial survival within the Urinary tract, it has, thus multi-modal curative effects on *mutrashmari*, *mutrakrichra* as diuretics, alkalizer etc (Gurjar *et al*).[4] It, therefore, balances *Vata* and *Pitta*. *Suryakshara* and *Sphatika* drugs contribute K+ ions which act as alkalinizer suitable in dysurea. Urinary tract alkalinizer produces an alkaline load that increases urinary pH and raises urinary citrate by augmenting citrate clearance without measurably altering ultra filterable serum citrate. This produces urine that is less conducive to crystallization of stone-forming salts (Geethubalakrishnan *et al*).[3] In diuresis, potassium depletion, present in other diuretics, is missing in *Shwet parpati*, as two of its constituents *Kalmi sora* & *Sphatika* are potassium based. Since, all the three constituents of *Shwet Parpati* are diuretic i.e. *mutrala*, it is, therefore very effective against urinary calculi and other urinary disorders.

Probable mode of action: The ingredients in these therapies are having specific mode of action due to the presence of different types of signs and symptoms described in Table-15.

Vata	Pitta	Kapha	Dusya (Rasa– Mutra)	Agnimandya	Srotodusti	Mutravaha Srotodusti
Vedana Sthapana	Daha Prasamana	Bhedana	Mutrala	Deepana	Sanga	Mutrala
Vatanulomana	Trsahara	Sothahara	Mutra Virechaniya	Pachana	-	Mutra Virechaniya
Sulaprasamana	-	Medohara	-	-	-	-

Table 15: Probable mode of action of ingredients of *kulattha* and *shwet parpati*.

The following properties of the *Ayurvedic* drugs *Kulattha, Shwet Parpati* explain their efficacy in the management of *Mutrashmari*

- The *Vatanulomana, Sothahara* and *Mutrala* properties of ingredients help to relieve pain and *Sthanika Sotha*.
- *Deepana* property of drugs helps to increase the *Agni*, which further check the formation of *Ama* at *Jatharagni* level itself.
- *Pachana* property of ingredients help in assimilation of drugs in the body in case of *Jatharagnimandya*.
- Stone might be dissolved due to the *Ashmari Bhedana* or *Ashmarihara* property of ingredients present in the herb and in the mineral compound.

CONCLUSION

K+SP out performed Kulattha and Shwet Parpati alone in almost all aspects of the Mutrashmari viz. overall calculi cure, Kidney calculi cure, Kaphaja & Vataj Ashmari, effect on Ayurvedic an modern system parameters. Kulattha and Shwet Parpati and K+SP recorded Overall success rates of 63.3%, 60.0% and 66.7% in mitigating the problems of Mutrashmari and removal/disintegration of calculi. Overall complete cure % for K, SP & K+SP were: 33.3, 28.6 & 41.6 respectively. Overall no cure % for K, SP & K+SP were: 8.4, 14.7 & 8.4 respectively. So it can be concluded that Kulattha, Shwet Parpati and their combination, therapies possess the properties regarding improvement, downward movement, disintegration and expulsion of stones and can produce almost total relief in sign and symptoms of both Ayurvedic and Modern systems of medicine of Mutrasmari, though K+SP therapy was the most efficacious against Mutashmari followed by K and SP therapies. The present study, however could not present conclusive results on Pittaja Ashmari for want of adequate data, thus indicating more elaborate studies on this aspect. Lastly and most

importantly, seeing the wonderful properties of Shwet Parpati, which make it highly suitable for urinary diseases, including mutrashmari, it is suggested that a project based original study should be conducted collaboratively by the leading national Ayurvedic institutes, universities on multi-locations (at least three) with three doses viz. Ayurvedic recommended dose, 25% below it and 25% above it, so that the recommendations could be passed on for adoption with full confidence and trust.

REFERENCES

1. Agnivesha. Charaka Samhita. In: Charaka and Dridhabala (Revised), Chakrapanidatta, TVJ and Pandurang, S (Commentary), Nirnaya Sagar Press, Bombay, India: 1941; 3: 599.

2. Das, G. Bhaishjya Ratnavali. In: Shastri, KA (Commentary), Chowkhamba Sanskrit Sansthan, Varanasi, India, 1983; 506.

3. Geethubalakrishnan, Vineeth P K, Ramesh N V. Effect of Swetha Parpati in Mutrakrichra. JMPAS, 2017; 1(1): 588-595.

4. Gurjar JS *et al*. A pharmaceutical review study of *shweta parpati* on *mutrakrichra.* WJPR, 2019: 8(7): 441-447.

5. Jivaka, V. Kashyapa Samhita. In: Vatsya (Revised), Chowkhamba Sanskrit Series, Varanasi, India, 1953; 120.

6. Madhavakara Madhavanidhanam. In: Srikant, MKR (Ed), English, Varanasi, India, 2000; 3: 113.

7. Madhavakara Madhavanidhanam.In: Srikant, MKR (Ed), English, Varanasi, India, 2000; 3: 113.

8. Shri Sadanand Sharma, Rasatarangini, Translated by Pandit Kashinath Shastri, Motilal Banarasidas Publication, Delhi, 2004; 11: 326-330, 330-331.

9. Sri Sadanandasharma. Ksharavisheshadi Vigyaniya Chaturdasha Taranga .In :Kashinathshastri (Ed.) Rasatarangini. Motilalbanarasidas, Varanasi, 1971; 5-7(36): 181-183.

10. Shri Vagbhatacharya Virachit, Rasratna Samucchaya Translated by Ambikadatta Shastri, Chaukhamba Publication, Varanasi, 1995; 9(42): 61-66.

11. Suden, A. The Bio-Physiological and Socio-Economic Profile of *Mutrashmari* Patients. IRJAY; 2020; 3(1): 59-79.

12. Suden A. Managing *Mutrashmari* through *Ayurvedic* Drugs − I: *Kulattha* (*Dolichos biflorus Linn*). IJAMY, 2020; 13(1): 9-15.

13. Suden A. Managing *Mutrashmari* through *Ayurvedic* Drugs - II: *Shwet Parpati*. IRJAY, 2020; 3(3): 1-18.

14. Suden A. Managing *Mutrashmari* through *Ayurvedic* Drugs - III: *Kulattha + Shwet Parpati*. WJPR, 2020: 9(3): 979-990.

15. Suden A. Managing *Mutrashmari* through *Ayurvedic* Drugs - III: *Kulattha + Shwet Parpati*. WJPR, 2020: 9(3): 979-990.

16. Tiselius, H.G, Ackermann, P, *et al*. Guidelines on urolithiasis, Eur. Urol., 2001; 40: 363.

17. Vagbhata. Ashtangahridaya. In: Tripathi, I and Tripathi, S (Eds), Krishnadas Accademy, Varanasi, India, 1994; 1: 118.

18. Vagbhatta. Astanga Hridayam. In: Kunte, AM and Atri, KR (Colated), Pradkar, HS and Panduranga, J Nirnaya Sagar Press, Bombay, India, 1939; 6: 498.

19. Vaidya Yadavji Trikamji Acharya, Virachit Siddhayoga Sangraha, Baidyanath Ayurved Bhavan Publication, 2007; 6: 96 -97.

20. Yogaratnakara. Yogaratnakar. In: Shastri SS (Ed), Chowkhamba Sanskrit Sansthana, Varanasi, India, 1939; 506.