Research Article

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THE EFFECT OF KADALIKSHAR IN THE MANAGEMENT OF MUTRASHMARI (UROLITHIASIS)

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ABSTRACT

The present study was done to evaluate the effect of kadalikshar in the management of mutrashmari, to find out whether this drug reduces the size of calculus and promotes its expulsion. Kadalikshar is prepared from single herbal plant of Kadali which is easily available and preparation of Kadalikshar is a simple procedure, there is no chance of adulteration, it is easy to administrate and cost effective. Kadalikshar has antispasmodic, diuretic and Urolithiatic property. Total 60 patients were selected and randomly divided into Trial and Control group. The trial group was treated with Kadalikshar and control group was treated with Gokshuradi Yog. The treatment was given for 28 days to both groups. The subjective criteria- Pain, Burning micturition, Haematuria and objective criteria Size, site and number of stones were observed by USG at each follow up in both groups and the results were encouraging. Finally the clinical assessment was carried out on overall result. In trial group the effect of Kadalikshar in reducing Pain (73.33%), Burning micturition (79.16%), Haematuria (76.46%) was observed and out of 30 patients 16 (53.33%) were completely relieved and 13 (43.33%) patients were improved. Total 16 patients were completely relieved in trial group out of that 9 (56.25%) patients of kidney stones, 5 (31.25%) were of ureteric stones and 2 (12.5%) were of mixed stones (kidney+ureter). Out of total stones 56.60% were expelled/dissolve, and 41.50% were significantly reduced in size. So it can be concluded that the kadalikshar is very effective in the management of mutrashmari

Keywords: Mutrashmari, Urolithiasis, Kadalikshar, *Musa sapientum.*

INTRODUCTION

The Mutrashmari[1] is one of the commonest diseases in our country and the pain due to that is known as worse than that of labour pain. The disease was described one among the Asthamahagadas.[2] Acharya Sushruta and others described it in detailed with its Classification, Aetiology, Pathology, Symptomatology, Complication and its Management.[3] According to modern science it is compared with Urolithiasis. The formation of urinary stone is a complex physio chemical process which involves sequence of events as Urinary saturation- Super saturation- Nucleation- Crystal- growth- Crystal aggravation- Crystalretention- Stone formation.[4] The lifetime prevalence of symptomatic Urolithiasis is approximately 12% in male and 7% in female and the probability of secondary stone formation within 5-10 years is 52%.[5, 20] Various risk factors has been identified for stone formation and these includes hot climate, Vitamin A deficiency, excessive administration of Vitamin D, Metabolic desorders, Hyperthyroidism, Gout, Ideopathic Hypercalciurea, Acidurea, Family history of urinary stone, Geographic area, Dietary factors rich with calcium like red meat, fish, cereals and pulses, Fluoride rich water and recurrent urinary tract infection also plays an important role as a risk factors.[6, 7, 8] Sushruta said asanshodhanshilata and mithaya ahar which causes kapha prakop and by srotovaigunya lead to Mutrashmari.[9]

Now a day's various treatment modalities are available but they are too expensive and available at higher centres only and even after surgical intervention the pathogenesis behind recurrent stone formation cannot be avoided therefore it is necessary to find out economical, effective, easily available and acceptable medicine to treat Mutrashmari. Acharyas described various treatment modalities including surgical intervention for Mutrashmari. Acharya Sushruta said that before going to surgical procedure one should try with Ghrut, Kshar, Kashay and Uttarbasti.[10] Acharya Sushruta said Kshar is pradhantam and shrestha in Shastra and Anushastra[11], due to its Chedan (cutting), Bhedan (splitting), Lekhan (scarification), Mutral (diuretic), Shodhan, Ropan and Tridoshaghana properties.[12, 13] Kadalikshar [14, 15, 16] is one of them. Kadali (*Musa Sapientum*) is easily available and preparation of its kshar is very easy, there is no chance of adulteration and it is economical. So in the present clinical study Kadalikshar (paniya) [12] was selected for management of Mutrashmari.

Aim

To study the effect of Kadalikshar in the management of mutrashmari (Urolithiasis)

Objectives

1. To find out the efficacy of kadalikshar in the management of mutrashmari.
2. To find out whether this drug reduces the size of calculus and promotes its expulsion .

MATERIALS AND METHODS

1. Kadalikshar
2. Gokshuradi Yog - Gokharu, Erandmul, Wagharimul, Bruhatimul, Talimkhana churna, Honey and Curd

Kshar nirman vidhi

The stems of fully developed Kadali plants were cropped and cut them into small pieces and dried completely, and then all dried pieces were burned and converted to ash. Then ash was collected and filtered through fine sieve. After that as per the ratio (1:6) described in samhita[18] the cleaned water was added in ash in a big size aluminium vessel. The mixture was stirred well and put for settle down of ash at the base of vessel. After 24 hours the saturated water was filtered in another vessel with four fold white cotton cloth. The settle down ash at the base of container was thrown away. The process of filtration was done daily for 21 days, finally the clear liquid was obtained which was evaporated on low flame with continuous stir, and at the end of the process whitish coloured kshar was obtained. The obtained kshar was dried in sunlight and grinded in mixture and converted into fine powder and kept in an air tight jar.

The standardization and Atomic absorption spectrophotometry study of drug was done in laboratory. (Table 1)

Standardization

Moisture content - 03.09%
Total ash - 93.13%
Acid insoluble ash - 04.80%
PH value - 12.2
Water solubility - 62.80%

Table 1: Atomic absorption spectrophotometry study

Elements	Concentration of BP (mg/kg)	± SD	Composition of elements (%)
Ca	76.86	±0.00 SD	17.50
Mg	32.33	±0.01 SD	07.36
K	181.99	±0.00 SD	41.45
Na	03.18	±0.00 SD	00.72
Mn	23.74	±0.00 SD	05.41
Fe	99.18	±0.02 SD	22.58
Cu	01.67	±0.00 SD	00.38
Zn	19.74	±0.00 SD	04.50
Pb	00.02	±0.00 SD	00.005
Cr	00.04	±0.00 SD	00.009
Cd	00.00	±0.00 SD	00.00
Pd	00.05	±0.02 SD	00.01
Ni	00.05	±0.02 SD	00.011
Ag	00.02	±0.00 SD	00.005
B	00.19	±0.01 SD	00.04
Al	00.019	±0.01 SD	00.044

BP-Banana Plant

After the above study the capsules of 500mg of kadalikshar were prepared.

The study was randomized controlled trial, 60 well diagnosed patients were selected and equally and randomly divided in trial and control group. Ethical Clearance number-GAC/IEC/62/2013(21.03.2013)

Intervention

A) Trial group- Kadalikshar -500 mg capsule orally, twice a day, before meal for 28 days.
B) Control group- Gokshuradi Yog- Each churna 1gm, honey 10 gm, and curd 20 gm orally, twice a day, before meal for 28 day.

Pathayapathya

Pathayapathya was given according to Ayurvedic texts and modern medical science for both groups.

Follow-ups

- 0th, 7th, 14th, 21st, 28th and 45th day.
- Subjective criteria- Pain, Burning micturition and Haematuria were observed at each Follow up in both groups.
- Objective criteria Size and site was observed by USG at each follow up in both groups.

Inclusion criteria

- Patient of either sex.
- Age group between 16 to 60 years.
- Urolith of size up to 20 mm.

Exclusion criteria

- Patients having similar symptoms associated with renal function impairment.
- Female patients with pregnancy and lactation.
- Patients suffering from HTN, DM, IHD, CCF, TB, Asthma.

Investigations

1. X-ray KUB after preparation. 2. USG Abdomen and pelvis 3. Hb%, TLC, DLC, ESR, BSL(R)
4. Urine- Albumin, Sugar, Microscopy. 5. Serum Creatinine, Blood urea.

Criteria for assessment

Size and Site and number of stones were assessed by USG.

Criteria for assessment of overall result

1. Completely relieved - Absent of urolithiasis
2. Improved - Change in size and Site of urolithiasis
3. Not Cured - No change in size and site of urolithiasis

OBSERVATIONS

The present study was entitled to study the effect of kadalikshar in the management of mutrashmari (Urolithiasis). The study was controlled trial, the trial group was treated with kadalikshar and control group was treated with Gokshuradi Yog. The study on gokshuradi yog was carried out in 2005-2008 in the same department and results were found significant[19]. After screening, total 60 patents were selected and equally divided 30 patients in each group. The treatment was given for 4 weeks and the observations of objective and subjective criteria were recorded at each follow up of 7 days interval. All cases of both group were analysed in relation to Age, Sex, Diet, Source of drinking water, Addiction, Occupation, Opacity, Presenting complaints, size, site and Number of stones present, dissolved and expelled out. The peak incidence of urolith was found in in 16-30 years of age group (58.33%), and in male (81.66%), in non vegetarians (60 %), in patients having source of drinking water is bore well (58.33%), in Addicted peoples (88.33%), in labours (60 %), the incidence of kidney stone was (74.52%), and percentage of radio opaque stone was (78.33 %), the common presenting complaint Pain, Burning maturation, Haematuria were 100%, 73%, and 58% respectively.

Objective criteria

Table 2: Effect of treatment on size of Urolith

Follow ups	Trial Group		Control Group	
	Mean	SD	Mean	SD
0th day	6.423	2.799	6.394	2.570
7th day	5.506	2.984	5.406	3.136
14th day	4.419	3.472	4.634	3.232
21st day	3.724	3.753	4..002	3.047
28th day	2.189	3.448	3.102	3.158

Table 3: Effect on size of stone in Trial group

Follow ups	Mean	SD	SE	t	P
00–07 day	0.971	1.556	0.214	4.290	P<0.05
07-14 day	1.087	1.363	0.187	5.803	P<0.05
14-21 day	1.145	2.005	0.275	4.159	P<0.05
21-28 day	1.085	1.562	0.215	5.057	P<0.05
00-28 day (BT-AT)	4.234	2.776	0.381	11.104	P<0.05

Table 4: Effect on size of stone in Control Group

Follow ups	Mean	SD	SE	t	P
00–07 day	0.989	1.912	0.263	3.764	P<0.05
07-14 day	0.772	1.666	0.229	3.372	P<0.05
14-21 day	0.632	0.976	0.134	4.713	P<0.05
21-28 day	0.900	1.475	0.203	4.442	P<0.05
00-28 day (BT-AT)	3.292	2.456	0.337	9.759	P<0.05

Mean-Difference of mean, SD-Difference of standard deviation, SE-Difference of standard error, BT-Before treatment, AT-After treatment

Table 5: Effect of treatment on size of urolith in both groups before and after Treatment

Groups	Mean	SD	SE	t	P
Trial (BT-AT)	4.309	2.655	0.365	2.014	P<0.05
Control (BT-AT)	3.311	2.444	0.336		

Table 6: Site wise number of patients completely relieved, improved and not cured

Site	Groups	Completely relieved	Improved	Not relieved	χ^2	P
Kidney	Trial	9	10	1	6.705	P<0.05
	Control	1	14	1		
Ureter	Trial	5	0	0	0.5983	P>0.05
	Control	8	1	0		
Kidney+ Ureter	Trial	2	3	0	0.4762	P>0.05
	Control	1	4	0		

Table 7: Number of stones remains at each follow up

Site	Groups	0th day	7th day	14th day	21st day	28th day
Kidney	Trial	40	38	33	29	22
	Control	39	37	37	35	31
Ureter	Trial	13	12	10	4	1
	Control	14	10	6	5	2

Subjective criteria

Table 8: Follow up wise effect of treatment on pain

Follow up	Group	No	Yes	Total	χ^2	P
7th day	Trial	08	22	30	0.8868	P>0.05
	Control	05	25	30		
14th day	Trial	11	19	30	1.270	P>0.05
	Control	07	23	30		
21st day	Trial	16	14	30	2.443	P>0.05
	Control	10	20	30		
28st day	Trial	22	08	30	2.584	P>0.05
	Control	16	14	30		

Table 9: Follow up wise effect of treatment on Burning micturition

Follow up	Group	No	Yes	Total	χ^2	P
7th day	Trial	06	18	24	0.670	P>0.05
	Control	03	17	20		
14th day	Trial	14	10	24	2.381	P>0.05
	Control	07	13	20		
21st day	Trial	17	07	24	3.012	P>0.05
	Control	09	11	20		
28st day	Trial	19	05	24	1.104	P>0.05
	Control	13	07	20		

Table 10: Follow up wise effect of treatment on Haematuria

Follow up	Group	No	Yes	Total	χ^2	P
7th day	Trial	07	10	17	0.2304	P>0.05
	Control	06	12	18		
14th day	Trial	10	07	17	0.7237	P>0.05
	Control	08	10	18		
21st day	Trial	12	05	17	0.3485	P>0.05
	Control	11	07	18		
28st day	Trial	13	04	17	0.4118	P>0.05
	Control	12	06	18		

Over all result

Table 11: Number of patients' completely relieved /Improved/Not relieved after treatment

Result	Trial Group	%	Control Group	%
Completely relieved	16	53.33	10	33.33
Improved	13	43.33	19	63.33
Not relieved	01	03.33	01	03.33
Total	30	100	30	100

DISCUSSION

Objective criteria

Size-As per findings, the reduction in size of urolith was observed and it was found significant in both group. The 't' value of trial group was 11.104 and of control group was 9.759 both are significant so unpaired 't' test was applied and it was found significant so it concluded that trial drug is more effective in reducing the size of stone than control drug.(Table 2,3,4 and 5).

Site-As per the USG findings the chi square test was applied to kidney, Ureteric and kidney+Ureteric (mixed) stones. It was significant in kidney stones where as the test was insignificant in Ureteric as well as in kidney+Ureteric (mixed) stones. In ureteric and in ureteric+kidney stones in trial group 100% and 40% patients were completely relieved where as in control group 88.88% and 20% patients were completely relieved respectively. (Table 6)

Number of stones-The total number of stones were observed and it was found that in trial group 33.96% stones were dissolved, 22.64% were expelled out and 41.33% stones were significantly reduce in size. Where as in control group 11% stones were dissolved, 09% were expelled out and 60.37% stones were significantly reduce in size (Table 2, 7)

It indicates that the kadalikshar is more effective in dissolution as well as in expulsion of stone than Gokshuradi Yog.

Subjective criteria

Pain-Pain was observed at each follow up the chi square value is insignificant at each follow up so it concluded that both drugs are effective in reducing the pain. But in trial group 73.33% patients were relived from pain where as in control group only 53.33% patients were relived from pain (Table 8)

Burning micturition- Burning micturition was observed at each follow up the chi square value was insignificant at each follow up so it concluded that both drugs are effective in reducing the burning micturition. But in trial group 79.66% patients were relived from burning micturition where as in control group only 65% patients were relived from burning micturition (Table 9)

Haematuria- Haematuria was observed at each follow up the chi square value was insignificant at each follow up so it concluded that both drugs are effective in reducing the haematuria. But in trial group 76.46% patients were relived from haematuria where as in control group only 66.66% patients were relived from haematuria (Table 10)

RESULT

Finally the clinical assessment was carried out on overall result. In trial group out of 30 patients 16 (53.33%) were completely relieved, 13 (43.33%) patients were improved and 1 (3.33%) was not relieved. Where as in control group out of 30 patients 10(33.33%) were completely

relieved, 19 (63.33%) were improved and 1 (3.33%) was not relieved. Total 16 patients were completely relieved in trial group out of that 9 (56.25%) patients of kidney stones, 5 (31.25%) of ureteric stones and 2 (12.5%) of mixed stones (kidney+ureter) were completely relieved. In control group total 10 patients were completely relieved out of that 1 (10 %) patients of kidney stones, 8 (80 %) of ureteric stones and 1 (10 %) of mixed stones (kidney+ureter) was completely relieved. (Table 11)

Probable Mode of Action

The various theories of mutrashmari formation described in Ayurveda. Acharya Sushruta said asanshodhanshilata and mithaya ahar vihar which causes kapha prakop and by srotovaigunya lead to mutrashmari. It is formed mainly due to the kaphavataj sanghat [9].

The kadalikshar has ushana, tikshana, pachan, daran, mutral, shodhan and ropan properties[12]. Acharya Sushruta said kshar is pradhantam and shrestha in shastra and anushastra due to its Chedan (cutting), Bhedan (splitting), Lekhan (scarification) and mutral (diuretic), tridoshaghna properties[13]. Kadalikshar breaks the kaphavataj sanghat which is the main doshdushya sammurcchana in the samprapti of mutrashmari formation.

The ushana and tikshana gunas of drug has kaphavataghana properties it helps in breaking the kaphavataj sanghat and reducing the pain. The pachan and daran gunas of the drug helps in breaking the sanghat of mutrashmari and helps in dissolution and disintegration of stone i.e. urolithiatic property. The shodhan and mutral gunas helps to expelled out the stones from urinary tract and reduces the burning micturition i.e. diuretic property the ropan guna of drug helps in reducing the haematuria by healing property.

According to modern science various risk factors have been identified for stone formations and these includes hot climate, vitamin. A deficiency, excessive administration of vitamin D, Metabolic desorders, hyperthyroidism, Gout, Ideopathic hypercalciurea, Acidurea, family history of urinary stone, Geographic area, Dietary factors rich with calcium like red meat, fish, cereals and pulses, fluoride rich water and recurrent urinary tract infections also plays an important role as a risk factors[6,7,8]. The Kadalikshar is alkaline in nature and the pH value of kadalikshar is 12.2 so it is strong alkalise as it changes the pH of urine this helps in lowering the saturation of urine and helps in dissolution of the calculi. Due to the diuretic property it increases the formation and volume of urine which helps in flushing the urinary tract and reduces the chances of deposition and increase in size of stone. The kadalikshar contains the potassium which lowers the level of phosphate and carbonate in urine which are the causative factors in the formation of oxalate and phosphate stones. The high concentration of uric acid in urine favours the formation of calcium oxalate and uric acid stones. As an alkaliser the drug reduces the level of uric acid and formation of stone.

Kadalikshar is prepared from single herbal plant of Kadali which is available easily and prepration of Kadalikshar is a simple procedure in which there is no chance of adulteration. Kadalikshar is easy to administrate and cost effective. Whereas the Gokshuradi Yog contains many herbal ingredients and they are not easily available. It is more expensive also and there are chances of adulteration and due to high dose of drug it is difficult to administer.

CONCLUSION

It was found that Kadalikshar as well as Gokshuradi Yog both are effective in reducing the clinical features Pain, Burning micturition, Haematuria and size of stone and promotes to its expulsion. But the Kadalikshar is more effective than Gokshuradi Yog in dissolution and expulsion of kidney stone (Nephrolithiasis) as well as ureteric stone (Ureterolithiasis). So it can be concluded that the kadalikshar is very effective in the management of mutrashmari (Urolithiasis).

Abbreviation

BP - Banana plant
SD - Standatd deviation
SE –Standard error
t - Paired t test, unpaired t test
χ^2- Chi square test
% - Percentage

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