

## A Comparative Clinical Study on Renal Calculi – An Ayurvedic Perspective

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**Abstract:** From the study of ancient surgical text Sushruta samhita, it becomes evident that the urological problems form an important part of medical sciences. Among all the urinary problems described in Ayurveda texts, there is one variety where both the medicinal and the surgical treatments are advised and agreed upon by all the Surgeons and this entity is the Renal Calculi. Further according to modern science the formation of stone in urinary system is one of the main problems of urology. The cause and mechanism of their formation is still uncertain. On one hand surprisingly stone does not always form when such factors are present and on the other hand stones may develop when factors are apparently absent too. Furthermore renal calculus occurs in both the sexes at all the ages but commonly in the 3rd and 4th decades, stone in kidney or in ureter is probably little more frequent in men than women. Renal calculi an agonizing complex disorder presenting with severe colicky pain radiating to loin to groin, burning micturition, dysuria. Sushruta (800BC), Father of Indian Surgery considered this Renal Calculi, one among Ashta Mahagada, the eight incurable diseases on globe. The average prevalence rate in India ranging around 3.4% at Mean age group of 20-40 years. Available modern treatment procedures like Forcible Diuresis and Lithotripsy solve the problems temporarily but still recurrences are very common after stopping the treatment. The Purpose of this Paper is an attempt to pave for a solution in breaking the nut for resolving the Clinical Barrier. Probably this development makes the Researchers and Clinicians of this Speciality to adopt a Standard mode of Regimen in conquering this Renal Disorder.

**Keywords:** Renal calculi, Alkali preparation of Barley, PM Compound.

### I. Introduction

Āyurveda, the System of Indian medicine and science of life deals with the wellbeing of mankind. The three great authors namely Charaka, Suśruta and Vāgbhata followed the scientific methods of study to enhance the perception of Āyurveda towards humanity. Renal Calculi is known to mankind since times immemorial. Clinical features of the disease are described even in Vedās, the oldest repositories of human knowledge. Suśruta the father of surgery explained urinary calculus under the heading of Ashmari in details including etiological factors, classification, symptomatology, pathology, complications and its management in a most scientific manner. This disease is dreadful and hence considered one of the 'Mahāgadās' by Suśruta, may be owing to its potentiality to disturb the anatomy and physiology of urinary system. Suśruta, the pioneer in the art of surgery have practiced extensive operative surgery on all the system of the body. Hirschberg also mentioned that "the Indians knew and practiced the indigenous operation which always remain unknown to the Greeks and which we the Europeans learn only from them with surprise". The old bladder stone is reported at "ELAMARAH" in Upper Egypt, dated about 4800 BC, shows that humans of ancient time were undoubtedly affected with the disease Aśmari just as humans are now. Ṛgveda and Atharavaveda (2000 – 5000 BC) also mentioned the stone and advise people not to ride a horse, Charaka has advised medical management and Suśruta advised both conservative and surgical removal of stone through perineal root cystolithotomy.

The urinary stone have peculiar tendency of recurrence despite of their surgical removal. Once a stone formed, is always stone former. Therefore, surgery can only be a part of treatment, but not the sheer treatment. To avoid the incidence of recurrence after surgical removal of stone and in search of an effective conservative treatment the present work has been undertaken. An alarming rise in the incidence of urolithiasis coupled with a motivation provided by W.H.O. (World Health Organization) to explore the possibility of discovering cure on traditional line has created an impetus for further research in the light of Āyurvedic knowledge. As far as Renal Calculi (urolithiasis) is concerned Department of Śalya, S.V. Ayurvedic college and Hospital, Tirupati is putting efforts to come with a positive answer to this disease.

### II. Aims Of The Study

- 2.1 To study the LITHOTRIPSIC ACTIVITY of Alkali preparation of Barley given in Paaneyakshara form [internally].

2.2 To study the disease Renal Calculi in terms of its etiopathogenesis, clinical manifestations with possible correlation to the description available in modern and Ayurveda medicine for Urolithiasis.

2.3 To find out the efficacy of trial drug in the management of Renal Calculi.

### **III. Settings And Design**

All the patients in the present study have been divided into two groups, each group containing 10 patients.

Group I: 10 patients (Alkali preparation of Barley -Yava kshara in paneeya kshara form) - TEST DRUG

Group II: 10 patients (PM Compound) - STANDARD CONTROL

### **IV. Methods And Material**

Total 20 patients were taken up for study from P.G. Department of Ayurveda General Surgery, S.V. Ayurveda Medical College Tirupati, after subjecting to selection criteria based on Inclusion and Exclusion criteria. 10 patients were given Alkali preparation of Barley 400mg twice in a week internally mixed with 200ml of Sterile Water, before food in the morning in a span of 4-6 weeks. Remaining 10 patients were given P.M Compound (A compound prepared out of Punarnavadi mandoora, Gokshuradi guggulu, Chandraprabha Vati in equal quantities) internally with dosage of 500 mg BID schedule for a period of 4-6 weeks. Both the groups were subjected for a Subjective parameters (Pain, Burning micturition, Dysuria, Tenderness at renal angle) and Objective parameters (X-ray KUB, USG KUB) following a standard proforma. USG-KUB determines size, consistency and location of calculus and it place an important role in assessing Objective criteria.

Statistical analysis used: Two Sample t-Test is used for statistical analysis.

#### **4.1 Subjects and Methods**

All the patients in the present study have been divided into two groups, each group containing 10 patients.

Group I: 10 patients (Alkali preparation of Barley -Yava kshara in paneeya kshara Form) - TEST DRUG

Group II: 10 patients (PM Compound) - STANDARD CONTROL

#### **4.2 Parameters**

##### **4.2.1 Subjective Parameters:**

Assessment of the Therapy is done according to the relief observed in the signs and symptoms with the help of scoring pattern which is prepared according to classical Ayurveda and modern texts.

##### **4.2.2 Objective Parameters:**

Based on various investigations like urine, blood, biochemical examination, X-Ray (KUB), USG (KUB) are carried before and after treatment.

### **V. Inclusion Criteria**

- 5.1) Age: Between 15 to 60 years
- 5.2) Sex: Either sex
- 5.3) Radiological evidence of stone (up to 8 mm) in Kidney, Ureter and Urinary Bladder.

### **VI. Exclusion Criteria:**

- 6.1) Patients with age below 15 years and above 60 years.
- 6.2) Stone size more than 10mm.
- 6.3) Impacted stone.
- 6.4) Gross Hydronephrosis.
- 6.5) Pyelonephritis.
- 6.6) Uncontrolled Diabetic Mellitus and Hypertension
- 6.7) Malignancy.
- 6.8) Impaired Renal Function.
- 6.9) Poorly Functioning Kidney.
- 6.10) Patients with obstruction in urinary passage.
- 6.11) Patients with known Metabolic abnormality for calculus formation.
- 6.12) Any other complication of calculus.
- 6.13) Patients undergoing treatment for any other serious illness

In both the groups all the patients were instructed to follow their normal dietetics and to maintain regular intervals in between the two meals. All the patients were advised to resist from all the diets which are directly or indirectly contributory to the formation of stone. Further all the patients were instructed to take plenty of water.

### **VII. Subjective Criteria**

Assessment of the therapy was done according to the relief observed in the signs and symptoms, with the help of scoring pattern.

General Symptoms Score:

- Complete absence of the signs and symptoms - 0
- Mild degree of the signs and symptoms - 1
- Moderate degree of the signs and symptoms - 2
- Severe degree of the signs and symptoms - 3
- Acute condition of signs and symptoms - 4

### **VIII. Objective Criteria**

Based on various investigation like urine, blood, biochemical examination, x-ray (KUB), USG (KUB), done before and after treatment. The statistical analysis was done of these score before starting the treatment and after completion of 60 days course. The details of the scores adopted for the chief signs and symptoms in the present study were as follows –

#### **8.1 Pain:**

- No pain – 0
- Occasional pain did not require treatment - 1
- Occasional pain but, required treatment - 2
- Constant dull ache pain, required treatment - 3
- Severe constant pain, but did not show relief even after treatment - 4

#### **8.2 Burning Micturition:**

- No burning micturition - 0
- Occasional burning micturition - 1
- Occasional burning micturition, required treatment - 2
- Constant burning micturition required treatment - 3
- Constant severe burning micturition but did not show relief even after Treatment - 4

#### **8.3 Dysuria:**

- No dysuria - 0
- Occasional dysuria - 1
- Occasional dysuria which require treatment - 2
- Constant dysuria which require treatment - 3
- Constant severe dysuria but did not show relief Even after treatment - 4

#### **8.4 Tenderness in Renal Angle:**

- No tenderness - 0
- Mild tenderness - 1
- Moderate tenderness - 2
- Severe tenderness - 3
- Acute tenderness – 4

#### **8.5 Haematuria: On the basis of microscopic urine analysis**

- No RBC/Hpf - 0
- 0 – 5 RBC/Hpf - 1
- 6 – 10 RBC/Hpf - 2
- 11 – 15 RBC/Hpf - 3
- >16 RBC/Hpf - 4

#### **8.6 Pus Cells: On the basis of microscopic urine analysis**

- No pus cells/Hpf - 0
- 0 – 5 pus cells/Hpf - 1
- 6 – 10 pus cells/Hpf – 2
- 11 – 15 pus cells/Hpf - 3
- >16 pus cells/Hpf – 4.

And like wise other clinical symptoms were assessed on the basis of severity, this was done before treatment and after treatment and improvement was assessed on percentage basis.

### **IX. Criteria For Total Effect Of Therapy**

For the assessment of the total effect of the therapy following four categories were taken into considerations.

#### **9.1 Cured – 76% to 100%**

- Complete relief in subjective signs and symptoms.
- Absence of any calculus in urinary tract with radiological evidence.

#### **9.2 Markedly Improved – 51% to 75%**

- Relief in subjective signs and symptoms
- Downward movement or partial disintegration of Renal Calculi with radiological evidence.

#### **9.3 Improved – 26% to 50%**

- Relief in signs and symptoms
- Without any change in size of stone confirmed with radiological evidence.

#### **9.4 Unchanged – Up to 25%**

- Relief in subjective sign and symptoms.

### **X. Follow Up**

All the patients who were studied under this clinical trial after completion of treatment for prescribed period were instructed to have regular check up at the interval of 7 to 15 days for the period of 3 months (90 days). During this follow up study period patients were examined thoroughly for the recurrence of either signs and symptoms of stones. Further, they were instructed about Pathya-Apathya.

### **XI. Selection Of The Drug**

YAVAKṢĀRA – Alkali preparation of barley

Latin name: *Hordeum vulgare*

Family: Gramineae

#### **Properties:**

- Rasa: Kaṭu
- Guṇa: Laghu, Snigdha
- Virya: Uṣṇa
- Vipāka: Kaṭu
- Doṣaghnatā: Kapha Vāta Śāmaka

**11.1 Pharmacological Action :** This drug is useful in the pathogenesis like Amlapitta, Aśmari, Mūtrakṛcra, Udaraśūla, Gulma, Arśa.

**Chemical Constituents:** The substance contains potassium chloride, potassium sulphate, potassium bicarbonate and potassium carbonate.

N.B.: Toxic doses of alkalis or when continued in large doses cause alkalosis giving rise to headache, vomiting, general prostration and possibly Tetany due to diminished Calcium in plasma (R. Gosh).

#### **BARLEY**

Latin name : *Hordeum vulgare*

Family : Gramineae

Gaṇa: Dhānya Varga (B. P.)

Part used: Whole plant

#### **Properties:**

- Rasa: Kaśāya, Madhura
- Guṇa: Guru, Rukṣa, Mṛdu, Piccila
- Virya: Śīta
- Vipāka: Kaṭu
- Doṣaghnatā: Kapha-pittahara

Pharmacological Action: Medohara, Pramehahara, Tṛsāhara, Kaphahara, Śramahara, Raktapitta Prasadaka, Atisāra, Mūtrakṛcra.

Chemical Constituents: Yava contains carbohydrates, protein, minerals like calcium, iron, etc.

11.2 Alkali preparation of Barley (Kṣāra Nirmāṇa Vidhi):

This is an alkali substance, which is being prepared from the bread of Barley with the procedure of Kṣāra Nirmāṇa Vidhi. Dry Yava Pancāṅga should be divided into small pieces, ignited by sesamum stalks (Tila) with pebbles of limestone. When the fire has burnt out, the ash and the slake lime should be collected separately. Then one Droṇa of the ash should be dissolved in six Droṇās of water and filtered 21 times and should be treated on fire in a big pan, while it is slowly stirred by a ladle. When it becomes clear, red, sharp and slimy, it should be filtered through a wide piece of cloth and the filtrate should be placed again on fire after removing the separated residue.

## XII. Pm Compound

A compound prepared out of Punarnavadi Mandoora 50gms, Gokshuradiguggulu 50gms, Chandraprabha Vati 50 Gms in equal quantities.

**12.1} Punarnavadi Mandoora:** ingredients are punarnava, trivrit, maricha, pippali, vidanga, kushta, pippalimula, musta, mandura, gomutra

**12.2} Gokshuradiguggulu:** ingredients are gokshura, pura, maricha, pippali, haritaki, vibhitaki, amalaki, musta

**12.3} Chandraprabhavati:** ingredients are chandraprabha, vacha, musta, bhunimba, amrita, daruka, ativisha, vidanga, danti, patraka, eranda, sita, silajitu, guggulu etc.,

Both the Test drugs were prepared at the Pharmacy of S.V. Ayurveda Pharmacy, Tirupati.

## XIII. Analytical Study

The analytical study of the prepared Alkali preparation of barley and PM Compound were undertaken in the pharmaceutical laboratory of S.V. Ayurveda Medical College, Tirupati. The details are described as below

### 13.1 Analysis:

	Alkali preparation of Barley	PM Compound
<i>Specific Gravity</i>	1.019	1.016
<i>pH</i>	6.73	6.38

## XIV. Results

In the present clinical study total 28 patients were registered which were divided into two groups.

Group I: Treated with Alkali preparation of Barley in paneeyakshara form orally comprised of 15 patients. Amongst them 05 patients left the treatment against medical advice.

Group II: Treated with PM Compound orally comprised of 13 patients. Amongst them 03 patients left the treatment against medical advice.

No. of Patients	Group I	Group II	Total
Registered	15	13	28
Completed	10	10	20
LAMA*	05	03	08

\*LAMA – Left Against Medical Advice

Table – 1: Age wise distribution of 28 patients of Renal Calculi

Age	Group I	Group II	Total pts.	%
21-30 years	04	01	05	17.86
31-41 years	07	05	12	42.86
41-50 years	02	03	05	17.86
51-60 years	01	02	03	10.71
Above 60 yrs	01	02	03	10.71

It was found that maximum number of patients i.e. 42.86% belonged to age group of 31 – 40 years, while 17.86% patients belonged to 21 – 30 years and 41 – 50 years of age group each, and 10.71% of patients belonged to 51 – 60 and above 60 years of age group.

Table – 2: Sex wise distribution of 28 patients of Renal Calculi

Sex	Group I	Group II	Total pts.	%
Male	12	08	20	71.43
Female	03	05	08	28.57

In this series, the maximum numbers of patients i.e. 71.43% were

male while rest of the patients i.e. 28.57% were female.

Table –3: Socio-economic status wise distribution of 28 patients of Renal Calculi

	Group I	Group II	Total pts.	%
Poor	01	01	02	07.14
Lower middle	06	07	13	46.43
Middle	06	05	11	39.29
Upper middle	02	00	02	07.14
Rich	00	00	00	00.00

Table shows that maximum i.e. 46.43% patients were belonging to lower middle class, 39.29% were from middle class and minimum 07.14% each were belonging to poor sector of society and upper middle class.

Table – 4: Diet wise distribution of 28 patients of Renal Calculi

Diet	Group I	Group II	Total pts.	%
Vegetarian	07	08	15	53.57
Mixed	08	05	13	46.

Table – 5: ŚāriraPrakṛti wise distribution of 28 patients of Renal Calculi

Saririkaprakṛiti	Group I	Group II	Total pts.	%
Vāta –pitta	05	06	11	39.29
Kapha – pitta	02	02	04	14.29
Vāta-kapha	08	05	13	46.43

ŚāriraPrakṛti wise distribution indicates that most of the patients i.e. 46.43% were having Vāta-kapha ŚāriraPrakṛti, 39.29% patients were having Vāta-pitta and remaining 14.29% patients had Kapha-pitta ŚāriraPrakṛti.

Table–6: Chief complaints wise distribution of 28 pts. Of Renal Calculi

Chief complaint	Group I	Group II	Total pts	%
Nabhivedan	12	11	23	82.14
Bastivedan	08	08	16	57.14
Sevanivedan	06	00	06	21.43
Mehanvedan	05	02	07	25.00
Mutrādharsānga	14	06	20	71.43
Sarudhiramutrāta	05	04	09	32.14
Mutrāvīkṛāna	00	00	00	00
Gomedaprakāsam	04	02	06	21.43
Atiāvilamutrāta	12	12	24	85.71
Sasikta	00	00	00	00
Visirnadhara	00	00	00	00
Mrudnatimedhṛa	00	00	00	00

Table shows that maximum i.e. 85.71% patients were having AtiĀvilaMūtrātā, 82.14% were suffering from NābhiVedanā, 71.43% patients were having MūtrādhāraSānga, 57.14% patients were having BastiVedanā, 32.14% patients were having SarudhiraMūtrātā, 25% patients were having MehanaVedanā and 21.43% each were having SevaniVedanā and Gomedaprakāśam.

Table–7: Modern parameters wise distribution of 28 pts. Of Renal calculi

Modern parameters	Group I	Group II	Total no. of patients	%
Pain	15	13	28	100
Burning micturition	11	11	22	78.57
Haematuria	04	05	09	32.14
Dysuria	10	08	18	64.29
Nausea & vomiting	00	00	00	00
Fever	00	00	00	00
Tenderness in renal angle	06	04	10	35.71

All the 28 patients of Renal Calculi(Mūtrāśmari) were having the pain, 78.57% patients were having burning micturition, 64.29% patients were having dysuria, 35.71% patients were having tenderness in renal angle and 32.14% patients had haematuria

Table – 8: Size of stone wise distribution of 28 patients of Renal calculi

Size of stone	Group I	Group II	Total patients	%
< 0.5 cm	00	02	02	11.11
Above 0.5 cm	10	06	16	89.89

Table – 9: Site of stone wise distribution of 28 patients of Renal calculi

Site of stone	Group I	Group II	Total	%
Kidney	10	06	16	57.14
Ureter	05	03	08	28.57
Bladder	03	04	07	25.00
Urethra	00	00	00	00

\*some patients were having more than one stone at different sites. On considering the site of stone, it was found that maximum i.e. 57.14% patients were having stone in kidney, while 28.57% had in ureter and only 25% patients had bladder stones.

Table – 10: Number of stone wise distribution of 28 patients of Renal calculi

Number of stone	Group I	Group II	Total	%
Single	08	11	19	67.86
Multiple	07	02	09	32.14

Table – 11: Bilateral – unilateral wise distribution of 28 patients of Renal calculi

	Group I	Group II	Total	%
Bilateral	13	11	24	85.71
Unilateral	02	02	04	14.29

It is clearly evident from the data of the present series that majority of the patients i.e. 85.71% were having unilateral stone while only 14.29% were having bilateral stones.

Table – 12: Variety of stone wise distribution of 28 patients of Renal calculi

Variety of stone	Group I	Group II	Total	%
Vataja	09	09	18	64.29
Pittaja	02	01	03	10.71
Kaphaja	04	03	07	25.00

It is evident from the above table that maximum 64.29% patients had Vātaja type of Aśmari, while 25% patients were having Kaphaja type of Aśmari, whereas only 10.71% patients were having Pittaja type of Aśmari.

### XV. Effect Of Therapies

In the present study, 28 patients were registered out of which 8 Patients left treatment against medical advice. Remaining of 20 patients completed the full course of the treatment. They were categorized into two groups and studied as follows---

Alkali preparation of barley (Group – I: Treated Group):

Table – 13: Effect of therapy on clinical features (Acc. to Ayurveda) in 10 patients of Renal calculi

Clinical features	MEAN		%	SD	SE	‘t’	P
	B.T.	A.T.					
Nabhivedana	2.20	1.00	54.55	0.78	0.25	4.80	<0.001
Bastivedana	1.30	0.60	53.85	0.82	0.26	2.69	<0.01
Sevanivedana	1.10	0.60	45.45	0.53	0.17	2.94	<0.01
Mehanyedana	0.80	0.40	50.00	0.70	0.22	1.81	<0.05
Mutraddharasanga	2.10	1.10	47.62	0.66	0.21	4.76	<0.001
Sarudhiramutrata	0.70	0.30	57.14	0.52	0.16	2.50	<0.01
Gomedaparakasa	0.70	0.10	85.71	0.84	0.27	2.22	<0.05
Atiavilamutrata	2.00	0.90	55.00	0.99	0.31	3.55	<0.001

After completion of the therapy of Alkali preparation of barleyin Paneeya kshara form for six weeks , its effect on the clinical features were observed as presented in table. Alkali preparation of Barley provided highly significant relief in Nābhivedanā (umbilical pain) (54.55%), MūtradhāraSanga (47.62%) and AtiĀvilamūtratā (55.00%). Effect was statistically significant in BastiVedanā (53.85%), SevaniVedanā (45.45%) and SarudhiraMūtratā (Haematuria) (57.14%), followed by insignificant relief in MehanaVedanā (50.00%) and GomedaPrakāśam (85.71%).

Table –14: Effect of therapy on clinical features (acc. to modern) in 10 patients of Renal calculi

Clinical features	MEAN		%	SD	SE	't'	P
	B.T.	A.T.					
Pain	3.50	1.90	45.71	0.80	0.25	6.40	<0.001
Burning micturition	2.60	0.50	80.76	1.10	0.35	6.00	<0.001
Haematuria	0.00	0.40	0.00	-----	-----	-----	NS
Dysuria	2.00	1.40	30.00	0.80	0.25	2.40	<0.01
Pyuria	1.00	1.10	10.00	-----	-----	-----	NS
Tenderness at Renal Angle	0.90	0.30	66.66	0.70	0.22	2.73	<0.01

After completion of the therapy of Alkali preparation of barleyin Paneeya kshara for six weeks its effect on the clinical features were observed as presented in table. Alkali preparation of barley provided highly significant relief in Pain (45.71%) and burning micturition (80.76%). Effect was statistically significant in Dysuria (30.00%) and tenderness at renal angle (66.66%), followed by insignificant relief in Haematuria and Pyuria.

PM COMPOUND (Group – II: Standard Control Group)

Table –15: Effect of therapy on clinical features (Acc. to Ayurveda) of 10 patients of Renal calculi

Clinical features	MEAN		%	S.D.	S.E.	't'	P
	B.T.	A.T.					
Nabhivedana	2.20	1.70	22.73	0.53	0.17	2.94	<0.01
Bastivedana	1.70	0.70	58.82	0.82	0.25	4.00	<0.001
Mehavedana	0.40	0.10	75.00	0.67	0.21	1.43	<0.05
Mutradharasang	1.10	0.40	63.64	0.82	0.26	2.69	<0.01
Sarudhiramutrata	0.80	0.30	62.50	0.71	0.22	2.27	<0.01
Gomedaprakasha	0.50	0.10	80.00	0.84	0.27	1.48	<0.05
Atiavilamutrata	1.60	1.00	37.50	0.70	0.22	2.73	<0.01

After completion of the therapy of PM Compound for six weeks, its effect on the clinical features was observed as presented in table. PM Compound provided highly significant relief in BastiVedanā (58.82%). Effect was statistically significant in NābhiVedanā (22.73%), MūtradhāraSanga (63.64%), AtiĀvilamūtratā (37.50%) and SarudhiraMūtratā (62.50%), followed by insignificant relief in MehanaVedanā and GomedaPrakāśam.

Table –16: Effect of therapy on clinical features (acc. to modern) in 10 patients of Renal calculi

Clinical features	MEAN		%	S.D.	S.E.	't'	P
	B.T.	A.T.					
Pain	3.40	1.50	55.88	0.57	0.18	10.56	<0.001
Burning micturition	2.00	1.60	20.00	0.53	0.17	2.94	<0.01
Haematuria	1.10	0.70	36.36	1.65	0.52	0.77	<0.05
Dysuria	1.40	0.60	57.14	0.79	0.25	3.20	<0.01
Pyuria	2.20	1.50	31.82	1.06	0.34	2.06	<0.05
Tenderness at Renal Angle	0.80	0.30	62.50	0.71	0.22	2.27	<0.01

After completion of the therapy of PM Compound for six weeks, its effect on the clinical features were observed as presented in table. PM Compound provided highly significant relief in Pain (55.88%). Effect was statistically significant in Burning micturition (20.00%), Dysuria (57.14%) and tenderness at renal angle (62.50%), followed by insignificant relief in Haematuria and Pyuria.

Table –16: Effect of therapy on stones at different site and size in both the groups (I & II)

SIZE(Diameter)	SITE	No. of patients			
		Group I	Effect	Group II	Effect
< 0.5 Cm	Kidney	00	---	01	NC- 1
	Ureter	00	---	02	EXP - 1 DM - 1
	Bladder	00	---	01	EXP - 1
	Urethra	00	---	00	---
> 0.5 Cm	Kidney	06	EXP -1 DS- 1 IS- 1 NC - 1	05	DS-1 NC -3
	Ureter	04	EXP -1 NC -1	01	NC -1
	Bladder	01	NC- 1	01	NC -1
	Urethra	00	---	00	---

\*some patients were having more than one stone at different sites.

Key of observations –

NC: No change Exp.: Expelled

DM: Downward movement DS: Decrease in size

IS: Increase in size

It has been observed in group I (Alkali preparation of barley) that all the stones were >0.5 cm in size, total 6 stones were found in kidney, out of them 3 expelled out, 1 decreased in size, 1 increased in size and in remaining 1 stone no change was observed after the completion of the therapy. However in 4 ureteric stones, 2 were expelled out and in remaining 2 stones there were no change observed. In a bladder stone no change was observed.

In group II (PM Compound), it has been observed that total 4 stones were found in <0.5 cm size out of them 1 kidney stone found with no change, in 2 ureteric stone 1 was expelled out and another got downward movement, whereas a bladder stone was expelled out after the completion of treatment. It has been observed that total 7 stones were found in >0.5 cm in size, amongst them 5 were in kidney, out of them 2 stones decreased in size and 3 stones remained unchanged. In a ureteric and a bladder stones no change was observed.

Table –17: Effect of therapy on types of Aśmari in 20 patients of Renal calculi

Variety / Effect	Group I		Group II	
	No. of Pts.	%	No. of Pts.	%
<b>VATAJA ASHMARI</b>	06		07	
Cured	03	50.00	01	14.29
Markedly Improved	01	16.67	00	00.00
Improved	01	16.67	02	28.57
Unchanged	01	16.67	04	57.14
<b>PITTAJA ASHMARI</b>	02		01	
Cured	01	50.00	00	00.00
Markedly Improved	01	50.00	01	100
Improved	00	00.00	00	00.00
Unchanged	00	00.00	00	00.00
<b>KAPHAJA ASHMARI</b>	02		02	
Cured	00	00.00	00	00.00
Markedly Improved	00	00.00	00	00.00
Improved	01	50.00	02	100
Unchanged	01	50.00	00	00.00

In group I (Alkali preparation of barley given in paneeya kshara form), out of 10 patients, 6 patients were suffering from Vātaja type of Aśmari. Out of them 3 patients were observed cured (50%), 1 markedly improved (16.67%), 1 improved (16.67%) and 1 found unchanged (16.67%). In Pittaja type of Aśmari, out of 2 patients, 1 patient cured (50%) and 1 patient markedly improved (50%). In Kaphaja type of Aśmari, out of 2 patients 1 improved (50%) and 1 was found unchanged (50%).

In group II (PM Compound), out of 10 patients, 7 patients were suffering from Vātaja type of Aśmari. Out of them 1 patient was observed cured (14.29%), 2 improved (28.57%) and 4 found unchanged (57.14%). In Pittaja type of Aśmari, 1 patient was observed as markedly improved (100%) in Kaphaja type of Aśmari all the 2 patients were observed as improved 100%.

**Table –18: Effect of therapy on types of Urolithiasis in 20 patients of Renal calculi**

Variety / Effect	Group I		Group II	
	No. of Pts.	%	No. of Pts.	%
<b>KIDNEY STONE</b>	06		06	
Cured	02	33.33	00	00.00
Markedly Improved	00	00.00	00	00.00
Improved	02	33.33	04	66.37
Unchanged	02	33.33	02	33.33
<b>URETERIC STONE</b>	04		03	
Cured	02	50.00	00	00.00
Markedly Improved	02	50.00	01	33.33
Improved	00	00.00	01	33.33
Unchanged	00	00.00	01	33.33
<b>BLADDER STONE</b>	01		02	
Cured	00	00.00	01	50.00
Markedly Improved	00	00.00	00	00.00
Improved	00	00.00	00	00.00
Unchanged	01	00.00	01	50.00

In group I (Yavakshara in Paneeya form), out of 10 patients, 6 patients were having kidney stone, out of them 2 cured (33.33%), 2 improved (33.33%) and 2 unchanged (33.33%). Ureteric stone was observed in 4 patients, out of them 2 patients cured (50%) and 2 markedly improved (50%). Bladder stone was found in 1 patient without any change (100%).

In group II (PM Compound) of 10 patients, 6 patients were having kidney stone, out of them 4 improved (66.67%), 2 unchanged (33.33%). Ureteric stone was found in 3 patients. Out of them 1 markedly improved (33.33%), 1 improved (33.33%), 1 unchanged (33.33%). Bladder stone was found in two patients. Out of them 1 cured (50%), 1 unchanged (50%).

**Table –19 : Overall Effect of therapy on 20 patients of Renal calculi.**

RESULTS	GROUP I		GROUP II	
	No. of Pts.	% Relief	No. of Pts.	% Relief
Cured	04	40.00	01	10.00
Markedly Improved	02	20.00	01	10.00
Improved	02	20.00	04	40.00
Unchanged	02	20.00	04	40.00

The data of the present series reveals that in Group I (Alkalie preparation of barley given in Paneeya kshara form) out of 10 patients, 4 patients (40.00%) were cured, 2 patients (20.00%) markedly improved, 2 patients (20.00%) improved and 2 patients (20.00%) observed unchanged.

In Group II (PM Compound), out of 10 patients, 1 patient (10%) was cured, 1 (10.00%) markedly improved, 4 patients (40.00%) were improved and 4 patients (40.00%) were found unchanged

Discussion:

### **XVI. Overall Effect Of Therapy:**

Table indicates that in group I (Alkali preparation of barley given in Paneeya kshara form), out of 10 patients 40% cured, 20% markedly improved, 20% improved and 20% remained unchanged. In group II (PM Compound – standard control), out of 10 patients 10% cured, 10% markedly improved, 40% improved and 40%

remained unchanged. So, it can be concluded that the Group I (Alkali preparation of barley given in Paneeya kshara form) is found to be more effective in comparison to Group II (PM Compound – standard control). Probable Mode of Action: Stone might be dissolved due to the Aśmari Bhedana or Aśmariharaproperty of ingredients present in both the drugs.

### **15.1 Results:**

Both the drugs were found more effective on Vātaja Aśmari, Moderately effective on Pittaja Aśmari and least effective on Kaphaja Aśmari.

### **15.2 Role of Alkali preparation of barley:**

□ Alkali is having Lekhana, Bhedana, Pācana, Śodhana and Tridoshaghnaproperties. Alkali preparation of Barley is having pH 6.73, which is about to neutral (7.0). Thus it helps to neutralize the acidic media and prevents stone formation. Conclusions: Alkali preparation of Barley (Yavakshara) possesses the Properties regarding to disintegration and expulsion of stones and can produce total relief in sign and symptoms of Renal Calculi which proves that it is an ideal preparation for the management of Renal Calculi.

## **XVII. Conclusion Of The Study:**

- The study suggested the age group of 3rd and 4th decades are more prone to disease Renal Calculi.
  - Male are more prone to Renal Calculi than females.
  - Socio-economic status of the patients indicate that maximum (46.43%) of the patients were from lower middle class.
  - Majority of the patients (53.57%) were vegetarian
  - Majority of the patients 46.43% were having Vāta-kaphaja Prakṛti, which supports that Vāta and Kapha plays an important role in Calculiformation
  - Maximum number of patients (88.89%) were having stone's size >0.5 cm. The maximum numbers of patients (57.14%) were having kidney stone.
  - Majority of the patients (64.29%) were having Vātaja Aśmari, while 67.86% of patients were having incidence of single stone.
  - Maximum number of patients (88.89%) were having stone's size >0.5 cm. The maximum numbers of patients (57.14%) were having kidney stone.
  - Majority of the patients (64.29%) were having Vātaja Aśmari, while 67.86% of patients were having incidence of single stone.
  - Haematological and biochemical investigations reveals that both groups having statistically non-significant effect on all the parameters. However, it was noticed that the variation in all the parameters were observed within normal range.
  - Alkali preparation of Barley given in Paneeya kshara form is having better results in expulsion of Renal Calculi and decrease in size.
  - Both the drugs were found more effective on Vātaja Aśmari. Moderately effective on Pittaja Aśmari and least effective on Kaphaja Aśmari
  - In Alkali preparation of Barley given in Paneeya kshara form group, high cure rate was observed in kidney stone, whereas in (PM Compound-Standard Control Group) good cure rate was observed in kidney and ureteric stone.
  - Overall effect of therapy shows that in Alkali preparation of barley given in Paneeya kshara form group --- 40% of patients were cured, 20% markedly improved, 20% improved and 20% remained unchanged.
  - In PM Compound (Standard Control Group), 10% patients were cured, 10% were markedly improved, 40% improved and 40% remained unchanged.
  - So, here it can be concluded that Alkali preparation of barley given in Paneeya kshara form possesses the properties regarding to disintegration and expulsion of stones and can produce total relief in sign and symptoms of Renal Calculi which proves that it is an ideal preparation for the management of Renal Calculi.
- After this Clinical Study, entitled "A COMPARATIVE CLINICAL STUDY ON RENAL CALCULI – AN AYURVEDIC PERSPECTIVE" it put light on following conclusions:
- 1] Alkali preparation of Barley given in Paneeya Kshara form is a Classical remedy for Renal Calculi mentioned by Ancient Acharyas.
  - 2] Alkali preparation of Barley given in Paneeya Kshara form is very effective in reducing stone size as well as helps in expulsion of the stone from the body.
  - 3] Further Evaluation of this drug is still required for assessing the Side effects & exact mode of action on Large Sample.

4] The formulation can be prepared by the Pharmaceutical companies with due Standardization in its preparation for obtaining still better effect on the condition.

Finally, it can be concluded without hesitation, the formulation “Alkali preparation of Barley” is Very Effective in the Management of Renal calculi.

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