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Original Research Article

Safety and efficacy of decoction obtained from *Asparagus officinalis* and *Cucumis melo* in the management of nephrolithiasis: single blind, randomized, active controlled parallel arm study

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ABSTRACT

Background: Nephrolithiasis (Hisah-al-kulya) is a common and painful condition where the stone formation is due to crystallization of lithogenic factors in the upper urinary tract. There are a number of medications listed in classical Unani literature that are intended to treat nephrolithiasis. Haliyun (*Asparagus officinalis*) and Tukhm-e-Kharpaza (Seeds of *Cucumis melo*) are among those drugs which are said to have lithotriptic properties. To evaluate the safety and therapeutic efficacy of oral administration of decoction of *Asparagus officinalis* and seeds of *Cucumis melo* in the management of nephrolithiasis.

Methods: In a single blind, active controlled two arm study, 44 patients were randomly allocated in test and control group. To check the efficacy, subjective assessment was done after every two weeks of treatment. Investigations including objective and safety parameters were performed only at 0 day and after completion of the treatment. 20 patients from each group completed the trial and the result data obtained was analyzed using student t-test, Wilcoxon, chi-square and McNemar test.

Results: The symptoms like flank pain, dysuria and hematuria were graded using arbitrary grading scales ranging from absent, mild, moderate or severe and the results obtained, using Wilcoxon matched pair test and chi-square test, are significant. The ultra-sonography and X-ray data clearly reveals the improvement by the test drug compared to control drug.

Conclusion: The current study has shown that the Unani formulation, decoction of *Asparagus officinalis* and *Cucumis melo* seeds, possess lithotriptic activity and is safe and effective in the management of Nephrolithiasis.

Keywords: Hasah-al-kulya, Nephrolithiasis, *Asparagus officianalis*, *Cucumis melo*, Unani

INTRODUCTION

Nephrolithiasis is the third commonest disorder of the urinary tract after urinary tract infection and prostatic hyperplasia.[1] Nephorolithiasis (Hisah-al-kulya) is a common and painful condition where the stone formation is due to crystallization of lithogenic factors in the upper urinary tract which may subsequently move into the ureter and cause renal colic.[2] The life time risk of kidney stone disease in industrialized nations approach 20% in men, a rate three to five times greater than in women.[3] Over 80% of these stones contain calcium and most of which are composed primarily of calcium oxalate or less often calcium phosphate.[4] Acidic urine is the primary cause of uric acid stones (not hyperuricosuria).[5] Struvite or triple phosphate (calcium, ammonium, magnesium phosphate) stones are always associated with infection and increased pH levels.[6] Cystine stones are caused by an

uncommon familial genetic defect and account for only 1% to 2% of all urinary stones.[7] Most of the urinary stones start as Randall plaque at the junction of the nephron's collecting tubule and the renal pelvis in the papilla.8 Many kidney stones may be watched conservatively, with intervention planned as an outpatient. Smaller stones (<5 mm) have a greater chance (90%) of passing on their own with medical expulsion therapy (usually tamsulosin, alfuzosin, nifedipine, alfuzosin, silodosin, or mirabegron).[9-11] According to Ibn-e- Sina (980-1037AD) the stone formation in the kidney is due to raised temperature inside the kidney and lithitic matter/morbid matter which is vicious and sticky substance.[12,13]

In classical Unani literature a vast list of medicines is mentioned that are intended to treat nephrolithiasis. Haliyun (*Asparagus officianalis*) and Tukhm-e-Kharpaza (Cucumis melo Linn.) are among those drugs which are said to have lithotriptic property.[14-19] A clinical trial was performed to evaluate the safety and therapeutic efficacy of oral administration of decoction of *Asparagus officinalis* and seeds of *cucumis melo* in the management of nephrolithiasis.

METHODS

A single-blind randomised, standard control study was conducted from March 2022 to October 2022 in accordance with the declaration of Helsinki (as revised in 2013). An inclusive protocol was framed and approval was obtained from the Institutional Ethics Committee on 26-11-2021 with IEC No: RRIUM-SGR/MD-2019/CT/HK/NL/UCF and registered prospectively in Clinical Trials Registry-India (CTRI) with CTRI No (CTRI/2022/01/039603). The patients were enrolled in the study after obtaining their written informed consent and fulfilment of the following criteria:

Inclusion criteria

Clinically/ radiologically diagnosed patients of Nephrolithiasis of size, 5 to 10 mm, Patients irrespective of gender, Patients between 18 to 60 years of age, patients who agreed to sign the informed consent form and follow the protocol.

Exclusion criteria

Pregnant and lactating women, patients below the age of 18 years and above the age of 60 years, diabetes mellitus, hydronephrosis grade ii and above, poorly controlled hypertension, significant liver and renal dysfunction, cardiovascular diseases, unwillingness or inability to sign consent form, any medical condition that in the investigator's opinion would interfere the treatment, safety or adherence to protocol. A total of 57 patients were screened for the study. During screening 13 patients did not fulfil inclusion criteria and were excluded from the study, remaining 44 patients were randomly allocated into test and control groups by simple randomization using online generated randomization chart. During the course of trial, 4 patients dropped out of study, 3 from control group and only 1 patient from test group. Rest of the 40 patients completed the trial. The efficacy of the test drug and control drug was assessed via some subjective and objective parameters.

Method of intervention

Diagnosed patients of nephrolithiasis qualifying the inclusion criteria were enrolled for clinical trial after obtaining their written consent and were randomly assigned into test and control groups. Test group comprises of 20 patients who were given test drug Haliyun and Tukhm-e-Kharpaza in the form of decoction. The test drug bought from open market was identified and authenticated from Centre for Biodiversity and Taxonomy, Department of Botany, University of Kashmir, with Voucher Specimen No. 6006-KASH Herbarium/2022. Joshanda (Decoction) of Haliyun (fruit of *Asparagus officinalis* Linn.) with Thukhm-e-Kharpaza (Seeds of *Cucumis melo* Linn.) was prepared by taking 6gms of Haliyun and 7 gms of Thukm-e-Kharpaza in a container. All the ingredients of the test drug were soaked for overnight in 100 ml of water.

Next morning it was boiled till the water remains half. Decoction was divided into two equal parts; one dose was given in the morning before breakfast and the other dose was given one hour before dinner. Every day the same procedure was adopted for 45 days. Control group also comprise of 20 patients in which standard drug Potassium Citrate and Citric Acid 15 ml was given in the form of syrup for the same duration. If there was any kind of severe spasmodic pain the patient was managed with the occasional use of antispasmodic drotaverine hydrochloride (80 mg).

Selection of the subject was done after screening of the patients, medical history, physical examination and laboratory investigations. All the findings were recorded on a prescribed case record form (CRF), which was designed according to the objectives of the study. Patients underwent clinical assessment every two weeks on 7th, 15th, 30th and 45th day of study. Therapy was started from day 1st after the patients fulfill the required criteria. The efficacy of the test drug was assessed using subjective and objective parameters. The data of subjective parameters (flank pain, dysuria, with or without hematuria, nausea, vomiting) was recorded on 0, 7th, 15th, 30st and 45th day of the study. The data for objective parameters (Urine examination-routine and microscopic, usg abdomen and pelvis, plan X-ray KUB) was recorded on 0 day (pre-treatment) and 46th day (post treatment) of the study. Arbitrary grading scale was used to assess the improvement in the subjective parameters and the decreases in the size or removal of the stone was identified by USG and X-ray KUB. Safety parameters were carried out before and after treatment, which

include, USG abdomen and pelvis, urine examination-routine and microscopic, KFT (Blood urea, Serum creatinine), CBC, LFT (Serum bilirubin, SGOT, SGPT, alkaline phosphatase), serum electrolytes, serum calcium, plane X-ray KUB, ECG, random blood sugar (before treatment only, to exclude diabetes mellitus).

Statistical analysis

For statistical analysis the recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS version 20.0 (SPSS Inc, Chicago, Illinois, USA). Continuous variables were expressed as Mean±SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar and line diagrams. Student's independent t-test was applied for the inter group comparison and for intra group comparison paired t-test was employed. T-test was employed subject to the condition that data satisfies the assumption of normality and other relevant conditions. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing inter group categorical variables and for pre-post comparison of categorical variable either McNemar or matched pair Wilcoxon test whichever appropriate was used. A P-value of less than 0.05 was considered statistically significant.

RESULTS

With the active intervention of Unani compound formulation containing decoction of Haliyun and Tukhme- kharpaza significant improvement have been shown in resolving the calculi. Majority of the patients in the test group had no calculi at the end of the study as reflected by their USG reports. The data obtained, shows the mean age of patients in test group was 39.00±2.928 years and in control group it was 36.10±2.445 years, of which 60% were males and 40% females.

Majority of the patients (47%) with renal calculi were having sanguine temperament (damvi mizaj), 35% have phlegmatic temperament (balghami mizaj), 15% have bilious (safrawi mizaj) and only 2.5% have melancholic temperament (sawdawi mizaj). Also out of 40 patients, 31 (77%) belong to middle socio-economic class, 5 patients (12.5%) belong to lower socio-economic class and only 4 (10%) belong to upper socio-economic class. The symptoms like flank pain, dysuria and hematuria were graded using arbitrary grading scales ranging from absent, mild, moderate or severe and the results obtained, using Wilcoxon matched pair test and chi-square test, are given in tabular form (Table 1-3).

The ultra-sonography and X-ray data clearly reveals the improvement by the test drug compared to control (Table 4 and 9).

The status of pus cells, RBCs, crystals and epithelial cells in urine in both the groups before and after treatment are given in (Table 5-8). Lastly the effect of test and control drugs on safety parameters are summarized in (Table 10 and 11).

Table 1: Severity of flank pain as per arbitrary grading scale.

Flank pain	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	0.00	0.00	14.00	70.00	0.00	0.00	16.00	80.00
Mild	2	10.00	4.00	20.00	3	15.00	3.00	15.00
Moderate	7	35.00	2.00	10.00	4	20.00	1.00	5.00
Severe	11	55.00	0.00	0.00	13	65.00	0.00	0.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups Wilcoxon matched pair test, p value<0.0001, Wilcoxon matched pair test, p value<0.0001, Test vs Control, BT vs BT, Chi-sq=1.18, df=2, p value=0.553, AT vs AT, Chi-sq=0.610, df=2, p value=0.737.

Table 2. Severity of dysuria as per arbitrary grading scale.

Dysuria	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	0.00	0.00	16.00	80.00	0.00	0.00	16.00	80.00
Mild	1	5.00	3.00	15.00	3	15.00	4.00	20.00
Moderate	7	35.00	1.00	5.00	4	20.00	0.00	0.00
Severe	12	60.00	0.00	0.00	13	65.00	0.00	0.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups, Wilcoxon matched pair test, p value<0.0001, Wilcoxon matched pair test, p value<0.0001, Test vs Control, BT vs BT, Chi-sq=1.8, df=2, p value=0.395, AT vs AT Chi-sq=1.14, df=2, p value=0.565.

Table 3. Severity of hematuria as per arbitrary grading scale.

Haematuria	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	11.00	55.00	18.00	90.00	9.00	45.00	18.00	90.00
Mild	4	20.00	2.00	10.00	5	25.00	1.00	5.00
Moderate	4	20.00	0.00	0.00	4	20.00	1.00	5.00
Severe	1	5.00	0.00	0.00	2	10.00	0.00	0.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups Wilcoxon matched pair test, p value<0.0001 Wilcoxon matched pair test, p value<0.0001, Test vs Control, BT vs BT, Chi-sq=0.644, df=3, p value=0.886, AT vs AT, Chi-sq=1.33, df=2, p value=0.513.

Table 4. Status of USG before and after the treatment in test and control group.

USG	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	0.00	0.00	13.00	65.00	0.00	0.00	3.00	15.00
Present	20	100.00	5.00	25.00	20	100.00	11.00	55.00
Concretions	0	0.00	2	10.00	0	0.00	6	30.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups Wilcoxon matched pair test, p value<0.0001 Wilcoxon matched pair test, p value<0.0001, Test vs Control, BT vs BT -, AT vs AT, Chi-sq=10.5, df=2, p value=0.005.

Table 5. Status of pus cells in urine before and after the treatment in test and control group.

Pus cells	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	6.00	30.00	18.00	90.00	8.00	40.00	10.00	50.00
Present	14	70.00	2.00	10.00	12	60.00	10.00	50.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups, McNemar test, p-value<0.0001, McNemar test, p-value=0.500, Test vs Control, BT vs BT, Chi-sq=0.439, df=1, p value=0.507, AT vs AT, Chi-sq=7.619, df=1, p value=0.0058.

Table 6. Status of RBC in urine before and after the treatment in test and control group.

RBC	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	4.00	20.00	18.00	90.00	8.00	40.00	17.00	85.00
Present	16	80.00	2.00	10.00	12	60.00	3.00	15.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups, McNemar test, p-value<0.0001, McNemar test, p value=0.004*, Test vs Control, BT vs BT, Chi-sq=1904, df=1, p value=0.167, AT vs AT, Chi-sq=0.228, df=1, p value=0.632.

Table 7. Status of calcium oxalates in urine before and after the treatment in test and control group.

Calcium oxalate	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	11.00	55.00	19.00	95.00	11.00	55.00	15.00	75.00
Present	9	45.00	1.00	5.00	9	45.00	5.00	25.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups, McNemar test, p value<0.0001, McNemar test, p value=0.004*, Test vs Control, BT vs BT, Chi-sq=0.0, df=1, p value=1.0, AT vs AT, Chi-sq=3.137, df=1, p value=0.076.

Table 8. Status of epithelial cells in urine before and after the treatment in test and control group.

Epithelial cells	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Absent	11.00	55.00	20.00	100.00	11.00	55.00	12.00	60.00
Present	9	45.00	0.00	0.00	9	45.00	8.00	40.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups, McNemar test, p value<0.0001, McNemar test, p value=1, Test vs Control, BT vs BT, Chi-sq=0.0, df=1, p value=1.0, AT vs AT, Chi-sq=10.0, df=1, p value=0.001.

Table 9. Status of X-ray KUB in test and control group.

KUB	Test				Control			
	BT		AT		BT		AT	
	N	%	N	%	N	%	N	%
Abnormal	14.00	70.00	3.00	15.00	15.00	75.00	9.00	45.00
Normal	6	30.00	17.00	85.00	5	25.00	11.00	55.00
Total	20.00	100.00	20.00	100.00	20.00	100.00	20.00	100.00

Within groups, McNemar test, p value<0.0001, McNemar test, p value<0.0001, Test vs Control, BT vs BT, Chi-sq=0.1254, df=1, p value=0.723, AT vs AT, Chi-sq=4.28, df=1, p value=0.038*.

Table 10. Status of safety parameters in control and test group.

Safety parameters		Mean-control	Mean-test	S.D. control group	S.D. test group
Hb	BT	13.7800	13.3550	1.44353	1.49648
	AT	13.1350	13.4450	1.75897	1.76381
TLC	BT	5.9210	6.8110	1.35195	1.52324
	AT	6.5045	6.6700	1.59035	1.66642
Lym	BT	33.2055	30.5100	9.47978	9.41320
	AT	31.9095	34.5800	9.24755	9.17649
GRAN	BT	56.3290	63.0700	14.86197	6.74889
	AT	61.4150	60.2250	7.18326	9.36791
MID	BT	4.8550	4.6715	1.61554	1.74710
	AT	5.2350	4.9785	1.39898	1.78670
Sr. Bilirubin	BT	1.0390	0.8235	.51100	0.47299
	AT	0.9910	1.0820	.39483	0.83650
SGOT	BT	25.3900	27.3950	9.42806	14.24088
	AT	27.4000	28.8750	12.13672	14.83101
SGPT	BT	33.2200	32.4650	18.69460	23.00264
	AT	33.3900	43.3950	17.47684	40.51711
ALP	BT	106.3500	105.9000	48.71861	38.32259
	AT	120.0000	114.9250	59.77942	42.66709
Urea	BT	22.5	25.58	5.35	8.185
	AT	27.24	23.24	8.006	5.172
Creatinine	BT	0.8595	0.8545	0.1768	0.2038
	AT	0.877	0.873	0.1879	0.2334

Table 11. KFT of patients before and after the treatment in test and control group.

KFT		Test				Control				P value
		Mean	SD	SEM	P value	Mean	SD	SEM	P value	
Urea	BT	25.58	8.185	1.83	0.237	22.5	5.35	1.196	0.0152	0.1669
	AT	23.24	5.172	1.157		27.24	8.006	1.79		0.068
Creatinine	BT	0.8545	0.2038	0.04558	0.493	0.8595	0.1768	0.03953	0.527	0.934
	AT	0.873	0.2334	0.05219		0.877	0.1879	0.04202		0.952

DISCUSSION

One of the most prevalent chronic kidney disorders that affect people worldwide is kidney stone disease. Renal calculi are thought to be an acute ailment. However, urolithiasis in its advanced stages can cause end-stage renal disease. Most stones in both adults and children are made of calcium oxalate, which is frequently combined with calcium phosphate.[20] About 3% to 20% of general population as a whole has a propensity to develop kidney stones during the life time of 70 years.[21] Conservative management is sufficient for stones under 5 mm in size, intervention is necessary for 50% of stones over 5 mm, and stones larger than 10 mm are unlikely to pass without assistance.

Kidney stone recurrence is common and a major contributor to the morbidity of this condition.[22,23] Present study entitled as clinical study of Ḥaṣāh-al-Kulya (Nephrolithiasis) and evaluation of therapeutic efficacy of Unani compound formulation in its management is randomized, single-blind standard control study with a sample size of 40 patients (20 in control, 20 in test group), belonging to age group of 18-60 years. The efficacy of the test drug and control drug was assessed using subjective and objective parameters appropriate statistical tests were applied for comparing the outcomes in both the test and control group. A p value of less than 0.05 was considered statistically significant. The eligible participants were similar in both groups with respect to demographic data (age, gender, marital status, religion, occupation, socioeconomic status, temperament, diet, and lifestyle).

Age

The data suggest that most of the patients were from age group of 37-47 years among them 60% were males and 40% females.

Temperament

The data shows 47.50% participants out of 40 were having sanguine temperament (Damwī mizāj) and 35% presented with phlegmatic temperament (Balghami mizāj), 15% presented with bilious (Ṣafrāwī mizāj) and 2.50% presented with the melancholic temperament (Saudawi mizāj) wherein we observe that both the groups are comparable with a p value of 0.720. Relevantly, both groups had the highest proportion of patients with sanguine temperament. The results of this study are consistent with those of Rajesh, who found that people with sanguine temperament were most likely to develop renal stones.[24]

Socioeconomic status (SES)

Most of the patients in both categories were from the upper middle-class SES. Significantly greater incidences of stone formation are attributed to higher economic standing with better standards of life. Lee YH et al and Bum Sik Tae et al, support this distribution of SES.[25,26]

Effect of interventions on subjective parameters

Flank pain

From Table 1 it is evident that in the test group at baseline, out of 20 patients, 10%had mild flank pain while as 35% had moderate and 55% had severe flank pain. After treatment significant reduction in flank pain has been seen ($p \leq 0.0001$). Efficacy of Haliyun in relieving pain is due to its potent anti-inflammatory, analgesic, antinociceptive properties which are constitutive qualities for any drug to act against pain. Anti-inflammatory activity is mainly by regulating the expression of inducible Nitric oxide synthase (iNOS) gene and the inflammatory genes.[27-29] Efficacy of Tukhm-e-Kharpaza in relieving the pain is also due to its anti-inflammatory and analgesic actions.[30,31]

Dysuria

In the test group at baseline, it was found that all the 20 patients complained of dysuria. From the table 1 it is clear that dysuria among patients of both the groups was improved significantly ($p \leq 0.0001$).

The anti-microbial and diuretic properties of Haliyun and Tukhm-e-Kharpza explain their effectiveness in treating dysuria as mentioned in classical literature and proven from various studies.[30,32]

Hematuria

It is evident from table 3, that in the in-test group at baseline, out of 20 patients 4 (20%) patients had mild hematuria while 4 (20%) had hematuria of moderate severity and 1 (5%) had severe hematuria. After treatment with test drug, we found that mild hematuria was present only in 2 (10%) patients and in rest of the patient's hematuria was eventually absent. which means that the treatment is effective in resolving the severity of haematuria ($p \leq 0.0001$).

But when we compare the test with the control group results, there was highly significant difference with a p-value of 0.005. Efficacy of Tukhm-e-Kharpaza in management of hematuria can be attributed to its potential Anti-Ulcer activity property.[30,33] Efficacy of Asparagus Officinalis in management of haematuria may be possibly due to its potent protective effects against oxidative stress, liver and kidney damage.[34]

Effect of interventions on objective parameters

USG-abdomen/pelvis

From Table 4 it is evident, in test group eligible 20 patients showed renal calculi in USG at the baseline. Out

of 20 patients, 65% patients reflected no stone in USG after the completion of trial. 10% patients showed reduction in their stone size to concretions (p≤0.0001). This significant result can be attributed to the diuretic and lithotriptic activity of Asparagus officinalis Linn. and Tukhm-e-Kharpaza as mentioned in classical literatures and proven from various studies.[18,19,35-39]

Urine

From Table 5 it is clear that 70% patients in the test group and 60% patient from the control group reflected pus cells in urine before the treatment. After treatment only 10% patient in both the groups had pus cells (p≤0.0001). The significant reduction in pus cells may be possibly due to potent antimicrobial activity of *Asparagus officinalis*.[32]

And almost both the ingredients of test drug formulation are diuretic, which help to flush away the bladder.[40-43] Similarly, as evident from table 6, total of 80% patients in test group and 60% patients from control group had red blood cells in urine before treatment. Post treatment only10% patients in test group had red blood cells in urine with a p value of <0.0001.

From Table 7, it is evident that only 5% patient from test group had calcium oxalates in urine after treatment (p=<0.0001) Present study is first of its kind that has been conducted to evaluate the efficacy of *A. Officinalis* Linn. And Tukhm-e-Kharpaza in the management of nephrolithiasis. So, we did not find any related study with which our results could be compared.

Plain X-ray KUB

From Table 9 it is evident, in test group out of 20 patients,70% patients reflected renal calculi (radio-opaque shadow) on X-ray KUB at the baseline. Out of these, only 15% patients showed the visible stone on X-ray KUB after the completion (p≤0.0001). When we compare the test with the control group, a high statistical difference was observed between the two treatments (p value 0.038). A high statistical difference observed between the two treatments (p value 0.038), indicating test drug has more lithotriptic activity than standard control. This significant result can be again due to the diuretic and lithotriptic properties of Haliyun and Tukhme-Kharpaza as mentioned in classical literatures and proven from various studies.[18, 41,44] Since 90% of the kidney stones are radio-opaque and can be easily visualized by plain X-ray of kidneys, ureters and bladder (KUB).[45] Large calculi can be detected with ease, however tiny calculi can be easily concealed by osseous structures like transverse processes or the sacrum as well as potentially confusing elements such as overlaying intestinal gas or faecal debris. Radiolucent stones and small renal calculi are also not visible on KUB.[46] This could explain the non-visibility of stones in almost eleven patients at baseline in spite of positive findings on ultrasound in our study.

Assessment of safety

From Table 10, it is clear that the safety profile was based on the assessment of biochemical investigations such as blood urea, serum creatinine, serum bilirubin, SGOT (AST), SGPT (ALT), alkaline phosphatase (ALP), serum electrolytes-potassium, sodium, serum calcium, random blood glucose levels and hematological investigations such as Hb%, TLC, DLC, ECG was also done. These investigations were carried out before enrolment in the study and after completion of the treatment. All parameters were normal before and after the treatment in both test and control group (p value >0.5), which means that both these treatments are safe.

The study was done on a small sample size with limited parameters and at a single centre having a limited catchment area. Hence in future a study with larger sample size at multiple centers and with more objective parameters can be done to make it more acceptable therapy for nephrolithiasis.

CONCLUSION

The current study has shown that the Unani formulation containing decoction of Haliyun (*Asparagus officinalis*) and Tukhm-e-Kharpaza (Cucumis melo seeds) is safe and effective in the management of nephrolithiasis. Test drug is economic, affordable, easily available and consistent with better compliance and devoid of any side effects.

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