Effect of Self-Management Protocol on Dietary Adherence for Patients with Kidney Stones undergoing Shock Wave Lithotripsy Technique

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Abstract:
Renal stone is a significant health problem all over the world. **Aim:** This study aimed to evaluate the effect of self-management protocol on dietary adherence for patients with kidney stones undergoing Shock Wave Lithotripsy Technique. **Design:** A quasi experimental design was used. **Setting:** This study was performed in the shock wave lithotripsy unit of the Urology Outpatient Clinic affiliated with the Zagazig University Hospital . **Sample:** A Purposive sample of 100 patients, 50 randomly allocated to each group (study and control). **Tools:** Patients' interview questionnaire, Self- management practices, perceived dietary adherence questionnaire, and barriers towards consuming a healthy diet. **Results:** More than two thirds (70.0%) of patients in the study group adhered to diet post program, while most (92.0%) of the patients in control group were not adherent. There was a highly statistically significant difference between study and control groups post implementation of self - management protocol regarding total knowledge, attitude, practice of fluid drink, and total practice regarding food at p<0.001. **Conclusion:** According to study findings the level of knowledge, attitude, practice of fluids consumption, and practice regarding food consumption of the patients in the study group significantly improved after the intervention compared to before the intervention. There was a positive correlation between knowledge ,practice ,attitude ,and among the patients in study group, which supported the stated hypothesis. **Recommendations:** Additional study on larger probability sample is recommended for general capacity and wider use of self-care practices**.**

Keywords: Dietary adherence, Kidney Stones, Self-management Protocol, & Shock Wave Lithotripsy Technique

Introduction:

The prevalence of urinary stones is high, estimated at 2 to 3% in the general population. The disease is a common cause of emergency hospitalizations, with more than 30,800 reported hospitalizations per year in England and 550,000 emergency room visits in the United States. in 2009. The risk of recurrence is estimated at 50% within 5 years of the first stone episode **(Raja et al., 2020, & Snicorius et al., 2021).**

Although the etiology of kidney stones is multifactorial, diet appears to be an important factor due to its ability to affect urine composition. Certain components of the diet, in addition to fluid intake, can alter important factors that increase the risk of kidney stones. Dietary habits play an important role in the formation and recurrence of kidney stones, food manipulation has become a fundamental tool in the medical treatment of nephrolithiasis. Dietary counseling aims to reduce most lithogenic risk factors by reducing urinary super saturation, mainly calcium oxalate, calcium phosphate, and uric acid **(Prieto et al., 2019**, **& Ferraro et al., 2020)**.

Extracorporeal shock wave lithotripsy "ESWL" is considered as a first-line cure for kidney calculus smaller than 2.0 cm, with a success rate of 33 to 91%. The ESWL is also recommended for the use of ureteral stones. Strong contraindications for ESWL are pregnancy, untreated urinary tract infection/urosepsis, decompensated coagulopathy, uncontrolled arrhythmia, and abdominal aortic aneurysm > 4.0 cm. A number of factors can affect ESWL outcomes, including calculus-related factors (size, location, compositional density), factors related to renal anatomy (obstruction/stasis, hydronephrosis, uretero-uterojunctional stenosis, pelvic, calyx diverticula, horseshoe kidney, ectopia). kidney/renal fusion) and patient-related factors (obesity, skin-stone distance, kidney failure) **(Torricelli et al., 2015)**.

The self-management approach includes various techniques such as action plans, problem solving, self-monitoring, coping skills, stress management, experience sharing, coaching, motivation and confidence, positive feedback and peer role models to support and empower patients to improve their quality-of-life **(Hassan et al., 2019)**. Nurses are key and have the most important role in health education to support and persuade patients to self-medicate **(Mohamed et al. , 2017).**

Adherence is defined as the extent to which the patient's behavior changes in relation to medication intake, diet or exercise, and other lifestyle changes (**Hussein et al., 2020).** Poor adherence is associated with reduced drug efficacy, significant disease worsening, higher healthcare costs, and higher mortality rates (**Ismail et al., 2019**). The patient must commit to self-care behaviors, including adherence to medication and diet, self-monitoring, and observing signs and symptoms of illness. Lack of self-care behavior leads to serious consequences of illness and patient re-hospitalization (**Hediyeh et al., 2020**).

One of the most appropriate ways to prevent the occurrence and progression of complications is to adopt effective self-care behaviors that play an effective role in reducing patient hospitalization and mortality rates (**Aghamohammadi et al., 2019, & Adinkrah et al., 2020**).

Significance of the study:

Kidney stones are becoming an increasing clinical and economic burden on global health services(**Hughes et al.,2020)**. Stone disease and its treatment(s) can impair patients' health-related quality of life (HRQoL), increase hospital admissions, and even cause kidney damage or infection with poor health outcomes and increased financial burden (**Raja et al., 2020 & Abdelwahab et al., 2021)).** The hospital admissions for the target patients in the selected setting were 1000 patients through (2020) **(Statistical Records of Shock Wave Lithotripsy unit at urology outpatient clinic at Zagazig university Hospitals, 2020)**.

Aim of the study

This study aimed to evaluate the effect of Self-Management protocol on dietary adherence for patients with kidney stones undergoing Shock Wave Lithotripsy Technique.

Through the following specific objectives:

- Assess the patients' knowledge regarding kidney stones.
- Determine the level of patients' adherence to diet and most common barriers affecting dietary adherence towards current food choices.
- Assess patients' self-management practices regarding fluid consumption, and food consumption.
- Assess patients' attitude regarding dietary adherence.
- Design, implement, and evaluate effect of self-management protocol for patients with kidney stones to improve patients' knowledge and self-management practice regarding kidney stones based on needs assessment.

Hypotheses

To fulfill the purpose of this study, the following research hypotheses were formulated:

H1: Self-management protocol will have a positive effect on dietary adherence for patients with kidney stones undergoing Shock Wave Lithotripsy Technology post program compared to pre- program.

H2: The knowledge and practices of the patients in the study group will improve compared to those of the patients in the control group after application of self-management protocol.

H 3: Mean score of barriers of consuming healthy diet of the patients in study group will be less than those of patients in control group after implementation self-management protocol.

H 4: Mean score of dietary adherences of patients in study group will be higher than that of patients in control group after implementation self-management protocol.

Operational definitions:

Self-management protocol has been defined as "a protocol that aims to equip patients with skills to actively participate and take responsibility for managing their chronic illness in order to function optimally, For the purpose of this study, the term means at least through the acquisition of knowledge and a combination of at least two to encourage independent monitoring of signs/symptoms, decision-making skills for medical treatment management, and modification of their physical activity, diet (food and fluids consumption), smoking habits, and attitude of the patient regarding dietary adherence.

Adherence: The term adherence is used in combination with other terms such as therapy adherence, medication adherence, exercise adherence and diet adherence (self-reported quality of implementation by stubborn patients).

Materials and Methods:

Research Design:

A quasi-experimental research design (study and control) was utilized to conduct the study. Quasi-experimental design is a useful tool in situations where true experiments cannot be used for ethical or practical reasons as non-random method is used to assign subjects to groups (**Thomas ,2020).**

Setting:

The current study conducted at Shock Wave Lithotripsy unit at urology outpatient clinic located in the third floor consisted of 4 rooms "one for patient preparation before session, one room for taking session, two small rooms for patient follow up after session, each room contained one bed", at University Hospital of Zagazig in Sharquia Governorate, Egypt. The selected setting provided services for patients with Kidney Stones undergoing Shock Wave

Lithotripsy Technique in the form of pre , post care, and follow up after 15 days after each session.

Subject

A Purposive sample of 100 patients with kidney stones undergoing Shock Wave Lithotripsy Technology were recruited from Shock Wave Lithotripsy unit**,** urology at out-patients clinic of Zagazig University Hospital. The sample was calculated by power and sample size calculation program to give power of 95%. The study participants were divided into two equal groups, the study group (50 patients) and the control group (50 patients). The estimated sample size is 100 cases out from 1000 cases who attend the previous mentioned setting, at

$$n = \frac{N \times p(1-p)}{\left[\left[N - 1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

confidence level 95% **(Thompson, 2012)**.Formula of calculating sample size was:

Inclusion criterions: adults aged ≥18 years, both sexes, presence of stone confirmed by Computed tomography of kidneys, ureters and bladder "CTKUB", patients with a any stone requiring removal, kidney stones of less than 2 cm in size, unilateral or bilateral ureteric stones, stone requiring ESWL treatment, and capable of giving written informed consent, which includes adherence with the requirements of the self-management protocol .Exclusion Criteria: Stones not confirmed by CTKUB, Patients with bleeding tendencies, active untreated urinary tract infection, pregnancy, patients had a Permanent Pacemaker, distal ureteral obstruction, or patients did not complete follow up period, Patients with deafness, or patients with severe mental or cerebral vascular diseases that can impair cognitive ability. The patients in study group received Self-Management protocol, and control group received the routine care.

Tools of data collection:

Tool I: Patients' interview questionnaire: It was designed by the researcher based on literature review and opinions of expertise for content validity. It was translated in Arabic form to avoid misunderstanding; it was applied to all patients in study and control groups before and after implementation of the training program. The questionnaire covered four main parts as the following:

Part I: Demographic characteristics.

It included eight items of personal demographic characteristics of the patients such as age, gender, marital status, level of education, occupation, residence, income, and living status.

Part II : Patient's Medical and surgical History: It involved ten questions about the medical history of the patients related to disease duration, family history, previous hospitalization with urinary tract stones, anatomical site, number of stones, stone size , number of ESWL, associated manifestations , other health problems, and Previous methods of treatment .**It was adapted from Abd El-Wahid et al.,(2016) & Mahmoud, et al.,(2019).**

Part III: Patient Self-Management knowledge assessment questionnaire: (Pre/ Posttest): To assess patient's knowledge. It was adopted from **(Bos et al., ,2014, Almuhanna et al., 2018, Almutairi et al., 2019 ,&Mahmoud et al.,2019,).** Total items were 21 included in the list. These items were classified into three different sections including:

First section : Assessment of patients' knowledge regarding kidney stones: It was applied for all patients in (study and control groups); and filled in by the researchers; consisted of nine questions Multiple choice Questions(MCQ) about definition of kidney stone, risk factors of stone formation, types of kidney stone, symptoms, diagnosis, methods of prevention, factors that increase formation of stones, methods of treatments, and what are the stones that respond to drug treatment .

The second section: Assessment of patients' 'knowledge regarding stone formation and diet: composed of four questions(MCQ) about (relationship between stone formation and diet, foods that reduce the chance of forming stones, foods that increase the chance of stone formation, and amount of water that must be consumed throughout the day).

The third section: **Assessment of patients' 'knowledge regarding Shock Waves Lithotripsy:** consisted of eight questions(MCQ) about definition of shock waves lithotripsy, which cases indicated shock waves lithotripsy, contraindications for using shock waves, patient needs before starting ESWL, side effects of shock wave lithotripsy, preoperative preparations before ESWL, complications of ESWL, and disadvantages of using shock waves**.**

Scoring system: Response scores were assigned as follows: Scoring of questions (1,3,10,11,13,14,17) each question has one correct answer, if the patient answer is correct, patient would score one grade. The other questions, each correct option has score one grade, Zero was given for incorrect answer or I do not know. and then all selected options are collected, and score given. Scores ranged from 0 to 62 degrees . The overall grades were added up, the percentage calculated for all participants and knowledge level was considered satisfactory at cut of point ≥ 60 %, unsatisfactory < 60 % based on statistical analysis.

Part IV: Patient attitude regarding the management of recurrent kidney stones:

The questionnaire involved eight items measured patient attitude regarding the management of recurrent kidney stones. It's a three-way Likert scale ; agree (two degrees), Neither Agree nor Disagree "Neutral" (one degree), Disagree (zero degree). Total scores ranged from Zero to 16 degrees. This score has been converted to a percentage and ranked as follows : agree considered positive attitudes, disagree or Neutral considered negative attitudes based on statistical analysis. The patient filled it pre - post Shock Wave Lithotripsy session. **It was adapted from Binsaleh, et al. ,(2016).**

Tool II: Self- management practices scale: It was adapted from Mahmoud, et al.,(2019).and modified by the researchers after a thorough review of the current literature. It divided into three sub items as follows: Self-management practices related to consumption of permitted foods (eight points) on eating white meat, fresh fruits, fish and sea foods, fiber such as oats / bran, egg, liver, vegetables as spinach / turnips and whole grains, Self-management practices related to consumption of restricted foods (ten points) to eat canned food, salty foods, fast foods, sweetened foods, carbohydrates, milk and dairy products, red meat, chocolate, citrus foods like lemon and orange, foods high in oxalates like tomatoes and legumes, Self-management practices related to consumption of fluids(ten points) about drinking plenty of fluids in hot weather, fever, diarrhea, exercises, heavy physical exertion, avoid drinking water from harmful resources for health reasons, avoid drinking cola, avoid taking stimulants, as tea and coffee, drinking fresh fruit juice as cranberry juice, control the amount of urine which should not be less than (2.5) liters / 24 hours, replace fluid loss when working for long periods in hot areas such as kitchen and oven drink enough fluids with or between meals, drink water before bed and after waking up. It's a three-way Likert scale; Always (three degrees), Usually (two degrees), Never took it (one degree) .

Scoring system: Total items of Self-management practices were 28-items covered self-management practices related to consumption of permitted foods (eight points): scores ranged from 8 – 24. Self-management practices regarding consumption of restricted foods (ten points): scores ranged from 10 to 30. Self- management practices regarding consumption of fluids (10 points): scores ranged from 10 to 30 . Total scores for self-management practices ranged from 28 to 84. This score had been converted into a percentage and classified according to the following criteria:: satisfactory level of practices ≥ 70 %, unsatisfactory level of practices < 70 % based on statistical analysis.

Tool III: Perceived dietary adherence questionnaire "PDAQ": The PDAQ was adopted from **Asaad et al, (2015**). The questionnaire consisted of nine questions structured to cover the nutrition therapy guidelines such as On how many of the last seven days did you eat foods high in fiber ?, On how many of the last seven days did you eat dairy products or salty foods? The response based on a seven-point Likert scale to answer the question phrased as "On how many of the last 7 days did you: : : ?" . Higher scores reflected higher adherence except for items 4 and 9, which reflected unhealthy choices (foods high in sugar or fat). For these items, higher scores reflected lower adherence, therefore, for computing a total PDAQ score, the scores for these items were inverted and categorized as the following: adherent level ≥ 70 %, not adherent level < 70 % based on statistical analysis. Although based on a weekly timeframe, it was anticipated that the PDAQ would reflect usual dietary patterns based on knowledge that most people consumed similar foods from week to week.

Tool IV: The barriers towards consuming an adherence for healthy diet: it was adopted from **Bishop et al.,(2019).** The questionnaire was used to assess the barriers to healthy eating and attitude towards current food choices. The purpose of this section was to gain insight into motivation behind specific eating habits and patients' attitudes towards implementing a healthier diet. It is a Likert scale with three possible answers: Always (three degrees), sometimes (two degrees), and never (one degree). It included 22 points on possible perceived barriers to healthy eating e.g., irregular work hours, busy lifestyle, willpower, lack of knowledge, and lack of appetite for a recommended diet. Total scores ranked from 22 to 66 degrees. The score was ranked as follows: high barriers ≤ 22 low barriers ≥ 66 based on statistical analysis.

Content validity and Reliability: Of the proposed tools by using face and content validity. Face validity aimed at inspecting the items to determine whether the tools measured what supposed to measure. Content validity was conducted to determine whether the content of the tools covered the aim of the study. Tools were revised by five experts in each specialty and academic position "2 of them professors and 3 assistant professors of medical surgical nursing from faculty of nursing at Zagazig university and urology staff from faculty of medicine at Zagazig university "who reviewed the tool's content for clarity, relevance, comprehensiveness, understanding, and ease for implementation. According to their opinions, minor modifications were done, and the final form was developed.

The reliability of the tools was tested using the internal consistency method. It was found that Cronbach's alpha reliability coefficient was 0.731 for patient knowledge, attitude score was reliable at .970, practice fluid consumption score was .974, total practice food consumption score was. 942, barrier score was .915, while dietary adherence was reliable at .759 Content validity and reliability test was done before starting of data collection.

Ethical considerations

Before the initial interview, an oral consent was secured from each subject after being informed about the nature, purpose and benefits of the study. Patients were also informed that participation was voluntary and about their right to withdraw at any time without giving reasons. Confidentiality of any obtained information was ensuring through coding of all data. The researchers reassured patients that the data would be used for only the research purpose. The control group received the same self-management intervention at the end of the study.

Pilot study:

A pilot study was carried out on10% of the total study subjects (10 patients) to test the clarity and practicability of the tools and to estimate the needed time to fill in each form. Necessary modifications were done according to the pilot study results. Pilot subjects were later excluded from the main study sample.

Field work:

An official permission to conduct the proposed study was obtained by the researcher from the manager of hospital , the head of urology outpatient clinic, and local ethical committee at Zagazig University Hospitals to conduct the study after explaining its purpose. Informed consent was obtained from patients in this study after explanation the nature and purposes of study.

At the first interview the main researcher introduced self, explained nature and purposes of the study. The researchers interviewed Patients at mentioned setting three days per week pre session and post session periods till discharge to assess patients' knowledge and conditions. Control group received routine hospital care while study group received routine hospital care in addition to Self-management protocol (teaching booklet) provided by the researchers.

The study was carried out through four phases: preparatory, assessment, implementation, and evaluation. These phases were carried out over a period of six months from the beginning of October 2021 to the end of March 2021.

Preparatory phase:

This phase was pertaining to construction of the study tools and production of the self-management intervention by the researcher based on extensive review of current, related literature; (**Abd El-Wahid et al., 2016**, **Bishop et al., 2019, Khan et al., 2019, & Abdelwahab et al., 2021).** It was written by simple Arabic language and contained pictures for more illustrations to facilitate patients' understanding.

Assessment phase:

Researchers interviewed patients in control and study groups individually. At preliminary interview, the researchers introduced them self to set a line of communication, explain the nature, purpose of the study, fill out the study tools and scheduled with them the instructional sessions (study group). The researchers started to make individual interview with each patient as the first 50 patients assigned for control group as well the last 50 patients assigned for study group. The researchers met patients three days per week (Saturday, Monday and Wednesday).

General objective:

The general objective of the self-management protocol was to improve knowledge, attitude, and practice of kidney stone patients regarding dietary adherence.

Specific objectives:

By the end of the self-management protocol, the kidney stones patients should be able to mention function of the kidney, define the meaning of kidney stones, enumerate the risk factors and causes of kidney stones, identify the signs and symptoms of kidney stones, identify the required investigations and methods of treatment of kidney stones, list most common recurrent type of stone and factors increase stone formation ,discuss the precautions for prevent recurrence, management of stone recurrence and methods of prevention , define of ESWL, list indications and contraindications of ESWL, mention common preparation for ESWL , predict of success ESWL, list complications associated with ESWL, mention home care and discharge instructions after ESWL: medication, deep breathing and coughing exercises, diet, intake and output of fluids, activity, expected and warning symptoms and follow up appointments , and explain self-management practices that can be managed by patients which included the following :self-management to deal with renal colic, self-management to deal with dysuria, fever, nausea/vomiting, hematuria (smoky-looking urine),fatigue ,urinary tract infections, and dietary adherence.

Implementation phase:

After filling the study tools, the researchers prepared the self-management protocol by the using of power point presentation as well as video tapes and posters, after that the researchers distributed the patients in study group into small groups including 7-8 patients in each group and conducted the instructional program sessions distributed into five groups The

content of the program was distributed over 6 consecutive sessions, including theoretical and practical part.

The first session was for orientation to clarify aim and contents of the program, its general objectives, the teaching methods, learner's activities, and evaluation methods. Two sessions covered the theoretical part , one session included the necessary information related to kidney stone definition, risk factors, causes, diagnosis, investigations, management, types of restricted foods as well as permitted foods and fluids, and other session included the necessary information related to ESWL definition ,indications and contraindications, preparation for ESWL ,predictors of success ESWL, complications associated with ESWL, and home care and discharge instructions after ESWL(medication , deep breathing and coughing exercises, diet, intake and output of liquids, activity, expected and warning symptoms and follow up appointments) .

Three sessions covered practical part regarding self-management practices that can be managed by patients which included self-management to deal with renal colic, dysuria, fever, nausea/vomiting, hematuria (smoky-looking urine), fatigue ,urinary tract infections, and dietary adherence Moreover, the researchers handed the booklet of guidelines to each patient in study group. Duration of each session was 30–45 minutes.

Evaluation phase:

Was the last phase carried out to both groups after 21 days from implementation of the protocol to evaluate its effect by the using of the same pre-test tools as Patient Self-Management knowledge assessment questionnaire, and Self- management practices scale. The researchers evaluated the control group firstly and then the study group to achieve fairness of the results.

Statistical Design:

All data were collected, tabulated and statistically analyzed using (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.2015). Quantitative data were expressed as the mean ± SD &median (range), and qualitative data were expressed as absolute frequencies (number) and relative frequencies (percentage). Independent samples. Percent of categorical variables were compared using Chi-square test or Fisher exact test when appropriate. Mc nemarTest was used for dependent categorical variables. Pearson correlation coefficient was calculated to assess relationship between various study variables, (+) sign indicated direct correlation and (-) sign indicated inverse correlation, also values near to 1 indicated strong correlation and values near 0 indicated weak correlation. All tests were two sided. p-value < 0.05 was considered statistically significant

(S), and p-value ≥ 0.05 was considered statistically insignificant (NS).

Results

Table (1): Frequency and Percentage Distribution of Demographic Characteristics of The Patients in Study and Control groups(n=100).

Variables	Studied patients				χ^2	p-value
	Study group n.50		Control group n.50			
	No.	%	No.	%		
Age per years						
<40 years	20	40.0	25	50.0	**1**	**0.32**
≥40 years	30	60.0	25	50.0		
Mean ± SD Range	42.1±8.7 27-53		40.9±11 23-58			
Gender	.	.				
Males	35	70.0	30	60.0	**1.1**	**0.29**
Females	15	30.0	20	40.0		
Marital status	.	.				
Married	42	84.0	44	88.0	**0.33**	**0.56**
Single	8	16.0	6	12.0		
Educational level	.	.				
Educated	41	82.0	35	70.0	**1.9**	**0.16**
Not educated	9	18.0	15	30.0		
Occupational Status	.	.				
Worked	40	80.0	35	70.0	**1.3**	**0.25**
Not worked	10	20.0	15	30.0		
Residence	.	.				
Rural	29	58.0	30	60.0	**0.041**	**0.84**
Urban	21	42.0	20	40.0		
Income	.	.				
Sufficient	20	40.0	25	50.0	**1**	**0.32**
Insufficient	30	60.0	25	50.0		
Living status	.	.				
with family	35	70.0	41	82.0	**1.9**	**0.16**
Alone	15	30.0	9	18.0		

χ^2 = Chi square test   f= Fisher exact test   non-significant p>0.05

Table (2): Comparison of Patients' Medical and Surgical History in The Study and Control Groups ((n= 100)

Variables	Study group		Control group		χ^2	p-value
	No	%	No	%		
Family history (positive)	17	34 %	15	30 %	018	0.67
Disease duration per months	43.8±33. mean± SD		45.6±33.7 mean± SD		0.37	0.71
Number of ESWL	1(04) Median(range)		1(0-4) Median(range)		0.82	0.42
Previous hospitalization for urinary tract stone	40	80.0%	41	81.0%	.065	.799
Previous Methods of treatment						
Medication and fluid	50	100.0%	50	100.0%	-	-
ESWL	50	100.0%	49	98.0%	F	0.99
Surgery	4	8.0%	5	10.0%	F	0.99
Endoscope	20	40.0%	18	36.0%	0.12	0.68
Other Health problems						
Hypertension	20	40.0%	20	40.0%	-	-
Diabetes	10	20.0%	15	30.0%	1.33	.248
Osteoarthritis	5	10.0%	10	20.0%	1.96	.161
Cerebral stroke	3	6.0%	2	4.0%	F	0.99
Respiratory disease	10	20.0%	6	12.0%	1.19	.275
Chronic kidney disease	1	2.0%	3	6.0%	F	0.62
Recurrent urinary tract infection	50	100.0%	50	100.0%	-	-
Cardiovascular disease	4	8.0%	2	4.0%	F	0.68

χ^2 = Chi square test   f= Fisher exact test   non-significant p>0.0

Table (3): Basic Characteristics of Stone Among The Patients in Study and Control Groups (n= 100)

Variables	Study group		Control group		χ²	p-value
	No	%	No	%		
Stone size	0.6 (0.11-1)		0.7(0.11-1.9)			
	Median(range)		Median(range)		1.3	0.18
Number of stone						
Single	40	80.0%	45	90.0%	1.96	0.16
Multiple	10	20.0%	5	10.0%		
Site of stone						
Kidney	35	70.0%	36	72.0%	0.049	0.83
Ureter	30	60.0%	31	62.0%	0.042	0.84
Urinary bladder	5		4		f	0.99
Associated symptoms						
Renal colic	50	100.0%	50	100.0%	-	-
Fever	2	4.0%	5	10.0%	F	0.44
Loss of appetite	5	10.0%	4	8.0%	F	0.99
Nausea	30	60.0%	28	56.0%	.16	.685
Vomiting	40	80.0%	39	78.0%	.06	.806
Dysuria	25	50.0%	27	54.0%	.16	.689
Oliguria	15	30.0%	18	36.0%	.407	.523

χ 2 = Chi square test   f= Fisher exact test   non-significant p>05.

Table (4): Barrier of Consuming Healthy Diet Among the Patients in Both Groups (n= 100)

Variables	Study group (N= 50)				Control group (N= 50)				χ²	P₁	P₂
	Pre		Post		Pre		Post				
	N	%	N	%	N	%	N	%			
Barrier											
Low	16	32.0	14	28.0	15	30.0	16	32.0	0.047	0.83	0.01*
High	34	68.0	19	38.0	35	70.0	34	68.0			
	43.9±4.5		31.4±2.6		44±4.4		43.9±4.5				
	Mean ±SD		Mean ±SD		Mean ±SD		Mean ±SD				
Most common barriers											
	Pre		Post		Pre		Post		0.407	0.75	0.00*
	N	%	N	%	N	%	N	%			
Irregular work hours	19	38.0	18	36.0	15	30.0	17	34.0			
Willpower	36	72.0	22	44.0	34	68.0	36	72.0			
Lack of knowledge	41	82.0	12	24.0	39	78.0	42	84.0			

(p1= pre for both groups),   (p2= post for both groups)   significant =p<0.05   χ 2 = Chi square test

Table (5): Dietary Adherence of the Patients in Study and Control Groups Post Intervention (n= 100)

Variables	Study group (N=50)		Control group(N=50)		χ²	P
Adherence	No	%	No	%		
Adherent	35	70.0	4	8.0	40.4	0.001
Not adherent	15	30.0	46	92.0		
	Mean ±SD 49.4±5.3		Mean ±SD 24.7±8.3			
	Range (40-56)		Range (13-47)			

significant =p<0.05   χ 2 = Chi square test

Table (6):   Distribution of Studied Patients Regard Knowledge, Attitude, Practice Level Regarding Food& Fluids Among the Patients in Study and Control Groups (n= 100).

	study group(n=50)				Control group(n=50)				P1	P2
	Pre		Post		Pre		post			
	No.	%	No.	%	No.	%	No.	%		
Total knowledge										
Satisfactory	4	8.0	38	76.0	3	6.0	4	8.0		
Unsatisfactory	46	92.0	12	24.0	47	94.0	46	92.0	0.69	0.0001
Mean ±SD **Range**	**27.1±7.5** 19-49		**53.7±5.2** 45-65		**26.5±7.4** 16-49		**26.8±6.8** 19-48			
• **P-value** • **%Of improvement**	0.0001 107%				0.99 2.3%					
Attitude										
Positive	10	20.0	33	66.0	11	22.0	12	24.0	0.81	0.0001
Negative	40	80.0	17	34.0	39	78.0	38	76.0		
Mean ±SD **Range**	**19.5±2.4** 16-24		**24.3±4.1** 15-29		**19.6±2.5** 16-25		**19.64±2.4** 16-24			
• **P-value** • **%Of improvement**	0.0001 25.7%				0.99 0.4%					
Practice fluid consumption.										
Satisfactory	5	10.0	43	86.0	6	12.0	6	12.0		0.0001
Unsatisfactory	45	90.0	7	14.0	44	88.0	44	88.0	0.75	
Mean ±SD **Range**	**16.8±2.2** 14-22		**24.3±2.8** 18-29		**16.9±2.4** 14-23		**17±2.4** 14-24			
• **P-value** • **%of improvement**	0.0001 46.5%				0.6%					
Total practice regard food consumption	.									
Satisfactory	3	6.0	26	52.0	4	8.0	4	8.0	0.99	0.0001
Unsatisfactory	47	94.0	24	48.0	46	92.0	46	92.0		
Mean ±SD **Range**	**28. ±4.5** 21-40		**35.8±6** 21-45		**26.4±5.5** 20-42		**26.7±5.7** 20-42			
• **P-value** • **%Of improvement**	0.0001 30.5%				5%					

p- value MC nemar test (pre& post for each group) (p1= pre for both groups) , (p2= post for both groups)
significant =p<0.05   % of improvement= percent of improvement score after intervention

Table (7): Correlation Matrix Between Total. Knowledge, Attitude, Practice Toward Fluid and Food Consumption, Barrier, and Dietary adherence Among the Patients in Study Group (n=50).

Variables		Total knowledge score		Attitude score		Practice fluid. Consumption score		Total practice food consumption score	
		Study group (n=50)							
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
Total knowledge score	r	1	1						
	p								
Attitude score	r	0.001	.490**	1	1				
	p	0.996	0.0001						
Practice fluid consumption score	r	781**	459**	.577**	.498**	1	1		
	p	0.0001	0.001	0.0001	0.0001				
Total practice food consumption score	r	0.061	.310*	0.067	.636**	.418**	.672**	1	1
	p	0.674	0.028	0.644	0.0001	0.002	0.0001		
Barrier	r	-.052		0.073		-.567 **		-.088	
	p	0.722		0.613		0.0001		0.545	
Dietary Adherence	r		.851**		.429**		417**		.326*
	p		0.0001		0.002		0.003		0.021

*r) correlation coefficient ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed)*

According to the current study table (1): Reveals that, studied patients of study and control groups were males (70% & 60% respectively), their age was more than 40 years with the mean age (42.1±8.7 & 40.9±11 respectively). Majority (82.0 %) of patients in the study group, and less than three quarters (70.0 %) of patients in control group were educated. the studied patients in study and control groups were having insufficient income. (60.0 % & 50.0% respectively). Finally, there was no statistically significant differences between both groups (p value > 0.05).

Table (2): Shows that, about one third (34%& 30%) of patients in study and control groups respectively had positive family history for kidney stone formation. All the patients in study group (100%) had previous experience of treatment with Extracorporeal Shock Wave Lithotripsy (ESWL). Most of the patients (98.o%) in control group were exposed to ESWL as a method of treatment. Two fifth (40%) of patients in study and control groups had hypertension, while all of them (100) were suffering from recurrent urinary tract infection.

Table (3): Indicates that, nearly three quarters of patients in study and control group (70.0%& 72.0%) respectively had stones in the kidney, while about two thirds (60.0%& 62.0%) of the patients in study and control groups respectively had ureter stones. All patients in the study had renal colic, the majority of patients in study group and more than three quarters of patients in control group (80.0%& 78.0%) had vomiting with no statistically significant difference p> 0.05.

Table (4): Shows that more than two thirds of patients in study and control group (68.0%, & 70.0%) respectively had high barriers of consuming healthy diet pre protocol implementation with no statistically significant difference p> 0.05. while, after implementation the high barriers diminished to nearly two fifth (38.0%) in study group than in control group with statistically significant difference between two groups p<0.01.

Table (5): Indicates that more than two thirds of patients in study group (70.0%) were adherent to diet post implementation of protocol, while most of patients in control group (92.0%) were not adherent with highly statistically significant difference p<0.001.

Table (6): Reveals that, there was a highly statistically significant difference between patients in study and control groups post implementation of self - management protocol regarding total knowledge, attitude, practice of fluid drink, and total practice regarding food at p<0.001 .

Table (7): Illustrates that there was a positive correlation coefficient between total level knowledge with attitude, total practice fluids intake, total practice

food, and dietary adherence post application of protocol among the patients in study group (r=. 490 at P≤ 0.01, r=. 459at P≤ 0.01, r= .310 at P≤ 0.05, & r= .851 at P≤ 0.01 respectively), while in preprogram phase, there was no significant correlation coefficient between total level knowledge with attitude, total practice food, and barriers (r= 0.001 at P≤ 0.05, r=. 0.061 at P≤ 0.05, & r= -.052 at P≤ 0.05 respectively) among the patients in study group.

Discussion:
In chronic diseases, the lifetime chance of developing kidney stones is estimated at 1 to 15% and varies by age, gender, race, and geographic area. Self-care and patient involvement in improving health and awareness of risk factors affecting disease development in patients with urolithiasis are influential factors in controlling and improving quality of life of the patients**(Shahmoradi et al, 2021).**

Concerning barrier of consuming healthy diet, and dietary adherence. The current study revealed that a statistically significant difference between two groups was found post protocol implementation. The most common barriers were irregular work hours, willpower, and lack of knowledge. This is similar with **Bishop et al, (2019) & Mohammed et al, (2020** who identified the main barriers for consuming a healthy diet as a busy lifestyle, price of healthy foods, willpower, feeling that the diet was already healthy, irregular work hours and not wanting to change eating habits.

According to dietary adherence, the present study indicated that there was a highly statistically significant difference between both groups after implementation of self- management protocol where, over two thirds of patients in study group were adherent to diet, while most of patients in control group remained not adherent. This finding was slightly close to the result of the previous study performed by **Bishop et al, (2019)** who revealed that the majority of participants had adherence to diet. This finding contrasts with the results of **Mohammed & Sharew, (2019)** who stated that more than half of participants were not adhering to the recommended dietary practices.

According to the researchers' view ,the presence of high barriers in the study and control groups did not primarily include a lack of knowledge and willpower, nor did the patients in the study group adhere to patient dietary recommendations. of the control group. . This ensured the effectiveness of the self-management protocol in improving the knowledge, and therefore the dietary adherence, of the patients in the study group.

According to findings of the current study, there was a highly statistically significant difference between the patients in study and control groups regarding total knowledge post implementation of self - management protocol. This agreed with the results of **Mahmoud et al, (2019)** who revealed an improvement in level of knowledge among the studied group related to urolithiasis post intervention compared to pre intervention.

On the other hand, the present study findings is consistent with the results of **Pethiyagoda et al, (2017)** who showed that the majority of studied patients had sufficient knowledge regarding kidney stone disorder prevention.

Regarding attitude, there was a highly statistically significant difference between the patients in study and control groups post implementation of self - management protocol. Exactly two thirds of patients in study group had positive attitude post implementation while, less than one quarter of control group patients had improved attitude. These results supported by **Almuhanna et al, (2018)** who showed that participants had positive attitudes towards preventing renal stones and almost of them were agreeing that increasing fluid intake prevents the formation of renal stones.

Concerning practice toward fluid consumption, the majority of the patients in study group had satisfactory level of practice post protocol implementation than control group patients with highly statistically significant difference between two groups. This is similar to the findings of **Mahmoud et al, (2019)** who indicated that there was an improvement in self-care practices score concerning fluid consumption among the study group post intervention compared pre intervention. Moreover, **Siener, (2021)** demonstrated that an adequate fluid intake was the most important nutritional measure to prevent kidney stone recurrence, regardless of urine stone composition and individual risk factors for stone formation

The results of current study were contralateral with **Bos et al, (2014), & Almutairi et al, (2019**) **who** stated that less than half of participants applied their knowledge effectively in clinical practice and only one fifth of respondents advocate a urine output of 2 to 3 L per day for their kidney stone.

Concerning the practice toward food, the present study showed that over half of the patients in study group had satisfactory score of practice post protocol while, less than one tenth of patients in control group in comparison to These results revealed the statistically significant difference between both groups. This was supported by **Fakhoury et al, (2019)** who mentioned that the design of an effective program aimed at the prevention of stone formation,

encouraging patients to be proactive in modifiable behavior changes of stone promoting risk factors, and tailoring counseling to a patient's specific level of barriers. **According to the researchers' point of view** this improvement in knowledge, attitude, and practice regarding fluid and food consumption among the patients in study group reflect the positive effect of self -management protocol.

Regarding correlation between knowledge and attitude. the current study represented that there was a positive correlation coefficient between total level knowledge with attitude. This means that the patients with higher level of knowledge of subjects had better attitude, this was supported by **Esa et al. (2015), & Rahmah et al. (2021)** showed that the knowledge score was significantly correlated with the attitudes score.

Regarding correlation between knowledge and practice. It was obviously indicated in this study results that, there was a positive correlation coefficient between total level knowledge and practice. This result was not supported by **Sedek et al. (2015)** who found that knowledge had no significant relationship with the practices. Furthermore, the results of current study were similar to **Rasouli-Ghahroudi et al. (2016)** in the study entitled" Oral health status, knowledge, attitude and practice of patients with heart disease" they illustrated that there was strength significant correlation between knowledge and attitude, and knowledge and practice too.

Concerning correlation between dietary adherence and self-care practice regarding food and fluids consumption. The current study illustrated that, there was a positive correlation between dietary adherence and self-care practice regarding food and fluids consumption. This result was strengthened by **Krzemińska et al. (2021)** who reported that, there was a positive weak correlation between the level of adherence and self-care ability.

Conclusion

According to study findings the level of knowledge, attitude, and practice regarding fluids and food consumption among the patients in the study group significantly improved after the intervention compared to before the intervention. There was a positive correlation between knowledge, practice, attitude, and dietary adherence among the patients in study group after protocol implementation , which supported the proposed hypothesis.

Recommendations

Based on results of the current study it can be recommended that:

1. For patients with urolithiasis, a continuous education program on the treatment of the disease should be planned and offered regularly in the urology and outpatient departments.
2. Arabic booklet with easy language and various simple photos should be accessible and provided for high-risk groups, involving guidelines for adherence, nutrition and lifestyle changes that will avoid urinary stone formation.
3. Additional study on larger probability sample is recommended for general capacity and wider use of self-care practices.

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