

Effect of Implementing Nursing Guidelines on Clinical Outcomes for Patients Undergoing Extracorporeal Shock Waves Lithotripsy for Urolithiasis

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Abstract

Background: Extracorporeal shock wave lithotripsy (ESWL) is non-invasive method for treating kidney stones < 2cm. **Aim:** This study was conducted to evaluate the effect of implementing nursing guidelines on clinical outcomes for patients undergoing ESWL for urolithiasis. **Design:** Quasi- experimental design was utilized in this study. **Subjects:** A convenience sample of (100) adult patients with renal stone undergoing ESWL admitted to ESWL Unit at Tanta International Educational Hospital which is affiliated to Main Tanta University Hospital. **Tools:** Three tools were used for data collection: **Tool (I)** Patients' Structured Interview including two parts, part-one: socio-demographic characteristics of patients, part-two: Patients' medical data interview questionnaire **Tool (II)** Patients' health relevant data including two parts, Part-one : Numeric pain rating scale , part-two: Hospital Anxiety Scale, **Tool (III)** Clinical Outcomes assessment sheet including two parts, Part-one: Patients' assessment for complications of extracorporeal shock waves lithotripsy, part-two: patients' knowledge assessment interview questionnaire. **Results:** There was an improvement in the clinical outcomes for study than control group, it was evident that minority of study group(0.6%) compared to about one quarter of control group(26.0%) suffered from nausea and vomiting during second week post ESWL. Also there was a highly statistically significant difference between Patients' knowledge levels after implementation of nursing guidelines through period of study. **Conclusion:** The study findings revealed that implementation of nursing guidelines was successful for improving clinical outcomes and knowledge score for patients undergoing ESWL. **Recommendation:** Replication of the study using a larger probability sample and longer follow up period for studied patients. **Key words:** Clinical outcomes, ESWL, Nursing guidelines, Urolithiasis.

Introduction

Urolithiasis are frequent health problems nearly the third most common disorder in the urology department that cause significant burden on the health care system ^(1,2,3). Renal stones are widely prevalent disease worldwide with wide variation in rates depend on geography, climate, diet, fluid intake, genetic factors, sex, occupation ,age ,family history, physical activity and increase intake of vitamins D and C ^(4,5).

According to renal stones composition, they are classified as calcium, uric acid, cysteine and struvite stones ⁽⁶⁾. Most of patients with renal stones are asymptomatic, symptoms usually appear during stones movement that may include sever colicky flank pain radiating to the groin or scrotum that may be accompanied with nausea, vomiting, persistent urge to urinate, hematuria, pain during urination , fever and chills if infection is present ⁽⁷⁾.

Treatment of renal stones usually depend on their size, site and composition, small stones may pass spontaneously ⁽⁸⁾. Management of renal stones can be classified into prevention management that are focus on life-style modification to decrease risk of recurrence of renal stones and curative management which include medical expulsive therapy (MET), chemolysis, ureteroscopy (URS), percutaneous nephrolithotomy (PCNL), extracorporeal shock wave lithotripsy (ESWL) in addition to open surgery as last option in treatment^(9,10).

Extracorporeal shock wave lithotripsy became one of the most important treatment options in the urology department due to its non-invasive nature for treating urinary stones less than 2 cm ^(4,11,12). Many factors can affect outcomes

of ESWL such as stone size, site, composition, thickness, skin-to-stone distance, and presence of ureteral stent, anatomical feature of patients, the efficacy of lithotripter and experience of operator ^(13,14). Some possible complications may result from ESWL such as hematuria, hematoma at site of operation, nausea, vomiting, anxiety, Steinstrasse and urinary tract infection ^(15,16).

Nurses have major role in minimizing chances of complications and maximizing the success rate for patients undergoing ESWL by providing a series of scientific nursing guidelines through comprehensive preoperative patient assessment to rule out any contraindication for ESWL in addition to providing adequate patients'preparation before ESWL by asking the patients to fast 6 hours before ESWL and stop taking some medication as anticoagulant after consultation to physician ^(17,18,19,20,21,22).

Additionally, the nurses also monitor the patients' vital signs and assess patients' level of pain during procedure. In addition, the nurses also give patients instructions about warning sing that require immediate medical attention. Additionally, the nurses also play important role in improving patients' knowledge about life style modification by giving patients health education about preventive measure to decrease risk of recurrence of renal stones ^(21,22).

Therefore, Nursing staff should be able to incorporate scientific nursing guidelines before, during, after care for patient undergoing ESWL for urolithiasis through assessment, planning, implementation and evaluation of nursing guidelines to improve patients' clinical outcomes and

decrease suffering and complications among patients undergoing ESWL.

Significance of the study

Renal stones are one of the serious health problems nearly the third most common problem in the urology department, affect from 1–20% of population of both sex worldwide in addition it negatively affect patients' quality of life and pose a significant burden on the health care system^(9,23,24). Renal stones associated with high risk of recurrence about 10% within a year and about 50% within 5-10 years and 75% over 20 years period⁽²⁵⁾. Extracorporeal shock waves lithotripsy is the only method that is truly non-invasive for management of renal stone, can achieve the stone-free-rates that approach 75% and it is considered as the first-line treatment for smaller stones (less than 2 cm size)^(15,21).

Implementing of nursing guidelines improves clinical outcomes for patients undergoing extracorporeal shock waves lithotripsy for urolithiasis.

The aim of the study

Evaluate the effect of implementing nursing guidelines on clinical outcomes for patients undergoing extracorporeal shock waves lithotripsy for urolithiasis.

Research hypothesis

1. Study group undergoing extracorporeal shock waves lithotripsy for urolithiasis who receive nursing guidelines is expected to exhibit improve in their clinical outcomes than control group.

Subjects and Method

Study design

A quasi- experimental design was utilized in this study.

Study setting:

The study was conducted at Extracorporeal shock waves lithotripsy unit for urolithiasis at Tanta International

Educational Hospital which is affiliated to Tanta Main University Hospital.

Subjects

A convenient sample of 100 adult patients who are admitted to the above mentioned setting and diagnosed with renal stone undergoing extracorporeal shock waves lithotripsy for urolithiasis.

The study subjects were divided into two equal groups:

Group (1): Study group: - 50 patients who received designed nursing guidelines in addition to routine hospital care.

Group (2): Control group: - 50 patients who received routine hospital care only by nursing staff.

Inclusion criteria were adult patients (18-60 years) and Patient undergoing ESWL for the first session.

Exclusion criteria were patients with urinary tract infection, hypertension (Diastolic >100), Pacemaker, cerebral aneurysm, bleeding disorders, gastrointestinal and bowel elimination disturbances, non-intact skin, skin bruising or skin itching and patients with sleep pattern disturbances.

Tools of data collection

Three tools were used in this study to collect pertinent data related to the study purpose as follow

Tool I: Patients' Structured Interview Scheduled Sheet

This tool was developed by the researcher and developed in Arabic language after reviewing relevant recent literatures^(26,27,28,29) to collect baseline data pertinent to the current study. It was consist of two parts as follow:

Part(1):Socio-demographic

characteristics of patients: This part concerned with patients' age, sex, marital status, educational level and occupation.

Part (2): Patients' medical data interview questionnaire: This part concerned with patient's date of admission, diagnosis and vital signs, past medical history, past surgical history, currently used medications, family history for renal stones and pain assessment.

Tool (II): Patients' Health Relevant Data Interview Questionnaire. It was consisted of two parts as follow:

Part (1): Numeric pain rating scale (NPRS-11): This scale was developed by McCaffary (1989)⁽³⁰⁾ and it was adopted by the researcher to assess patients' level of pain with the following rating system: (0) no pain, (1-3) mild pain, (4-6) moderate pain, (7-10) severe pain.

Part (2): Hospital anxiety and depression Scale (HADS):

This scale was developed by **Zigmond (1986)**⁽³¹⁾ and it was adapted by researcher to assess patients' level of anxiety. It is a seven-item scale, scoring for each item ranges from 0 to 3 with the following scoring system: (0-7) normal (no anxiety), (8-10) mild anxiety, (11-14), moderate anxiety, (15-21) severe anxiety. The depression subscale was excluded by researcher.

Tools (III) : Clinical Outcomes Assessment Sheet

This tool was developed by the researcher and developed in Arabic language after reviewing of related recent literatures^(10,28,32,33). It was consist of two parts as the following:

Part (1): Patients' assessment for complications of extracorporeal shock waves lithotripsy. :

This part was constructed by the researcher based on related literature review. It was used to assess the effect of implementing nursing guidelines on clinical outcomes for patients undergoing

ESWL for urolithiasis. It was divided into (5) categories as the following:

-Urinary elimination assessment: such as elimination pattern, urine amount, urine color, bladder empty, indicators for stress and indicators for urinary tract infection.

-Gastrointestinal tract assessment: such as nausea, vomiting and loss of appetite.

-Bowel elimination assessment: such as constipation, diarrhea.

-Integumentary assessment: such as skin intact, skin bruises and itching.

-Sleep pattern assessment: such as go into deep sleep, interrupted sleep, cannot sleep

Part (2): Structured patients' knowledge assessment interview questionnaire:

This part was developed by researcher based on related literature review^(7,28,34) to assess patients' knowledge regarding lifestyle modifications. It consisted of 13 close ended questions about

A-Knowledge regarding dietary modifications such as daily consumption of sodium, calcium, animal protein, water and fluid consumption.

B-Knowledge regarding exercise

Two levels of scoring for questions were utilized as follows:

- Correct and complete answer scored (1), incorrect answer scored (0).

Each right answer was given one score. The total scores were 13.

The total scoring system of patients' knowledge was calculated and classified as the following: ($\geq 75\%$) high level of knowledge, (60% to $>75\%$) moderate level of knowledge, ($< 60\%$) low level of knowledge

Method

1- Official Permission to carry out the study was obtained from the responsible authorities

2- Ethical consideration:

- Nature of the study was not causing any harm or pain to the entire sample.

-Confidentiality and Privacy were taken into consideration regarding data collection. A code number was used instead of names

-Informed consent was obtained from every patient included in the study after explanation of the aim of the study and their right to withdraw from the study at any time.

-This study was approved from the ethical committee.

3- Tool I, III were developed by the researcher after review of the relevant literatures. Tool II part (1): Numeric pain rating scale was adopted by researcher. Tool II part (2): Hospital anxiety and depression scale was adapted by researcher and they are translated into Arabic.

4-All tools were tested for content validity by five jury of experts in the field of medical-surgical nursing at the faculty of Nursing and urological experts at the faculty of medicine.

5- A pilot study was carried out on (10) (10%) of patients to test the tool for its clarity, applicability, feasibility.

6- Alpha Cronbach's test was used to test tool reliability and the estimated reliability of the entire test. Tool I=0.892, Tool II= 0.864, Tool III=0.873

7- Data were collected over a period of 6 months started from January to June 2022.

Field of work

The study was conducted at four phases which include: assessment, planning, implementation and evaluation.

1) Assessment phase:

-Before procedure, patients who meet inclusion criteria was interviewed by researcher and all purpose, nature and follow up schedule was explained to patients undergoing ESWL for urolithiasis
-After obtaining informed consent, the researcher collect baseline data pertinent to the current study by using tool I, II and III (part 2) throughout the period of the study (first week and second week post ESWL).

2-Planning phase:

-Nursing guidelines before, during and after extracorporeal shock waves lithotripsy for urolithiasis will be planned based on the study subjects' assessment and guidelines available in the relevant literature review⁽³⁵⁾.

Expected outcomes include:

1-Improve clinical outcome for patients' undergoing extracorporeal shock waves lithotripsy for urolithiasis

Decrease complication after extracorporeal shock waves lithotripsy

2-Improve patients' knowledge about lifestyle modifications.

Nursing guidelines are planned to be educated to each patient individually into three sessions.

I- In the first session the patients was educated about nursing guidelines before ESWL for good patient's preparation to ESWL procedure. This session had taken about 10-15 minutes and this session was planned to be given to the patients before ESWL, at the first time the patient came at ESWL unit to take appointment.

II- The second session included nursing guidelines during ESWL, this session had

taken about 5 minutes and it was planned to be given during ESWL.

III- The third session included development of health education session about normal and warning signs post ESWL and also patient education about life style modifications and it was planned to be given post ESWL to each patient individually by researcher in one session. The session had taken about 20-25 minutes.

The teaching method was including discussion with patient and summarizing by patient. Also, the teaching media was including a colored brochure about guidelines that was formulated in Arabic language and distributed for patients and their families to reinforce information

3- Implementation phase

-Control group: patients received routine hospital care only by nursing staff as prescribed by physician and consisted of routine preoperative care, routine intraoperative care, and routine pharmacological treatment.

-Study group: nursing guidelines for patients undergoing ESWL for urolithiasis was implemented by the researcher during hospitalization.

-The content of nursing guidelines for patients undergoing extracorporeal shock waves lithotripsy for urolithiasis was divided into three main parts (nursing guidelines before ESWL , during ESWL and nursing guidelines post ESWL) with special emphasis on health education to patients to increase their knowledge about warning signs that require immediate medical attention and also increase their knowledge about life style modifications to decrease recurrence of renal stones. according to **Ibrahim (2017)**⁽³⁵⁾.

-Patients' response and other complications were monitored using tools II and III post ESWL

4- Evaluation phase

- Patients of both groups were evaluated by using tool II immediately post procedure, first week and second week post ESWL.

- Patients of both groups were evaluated by using tool III first week and second week post ESWL to evaluate the effect of implementing nursing guidelines on clinical outcomes among adult patients undergoing ESWL for urolithiasis.

- Comparison was done between the results of both groups to evaluate effect of implementing nursing guidelines on patients' clinical outcomes and their level of knowledge.

Statistical analysis:

Data were analyzed using Statistical Program for Social Science (SPSS) version 22.0 Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage. Independent-samples t-test of significance was used when comparing between two means. A one-way analysis of variance (ANOVA) when comparing between more than two means. Chi-square (X²) test of significance was used in order to compare proportions between two qualitative parameters. Pearson's correlation coefficient (r) test was used for correlating data. The level of significant was adopted at $p < 0.05$ ⁽³⁶⁾.

Results

Table (1): Presents socio -demographic characteristics of studied groups undergoing ESWL for urolithiasis. It reveals that Mean± SD for age of study and control group were (42.9 ± 10.46, 42.6 ± 9.63) respectively. Most of the

study group (72.0%) and about two third of control group (66.0%) were males. Also, in relation to marital status, majority of the study group and the control group (82.0%, 84.0% respectively) were married. Regarding educational level, more than one third (38.0%) of the study group, and near half (48.0%) of the control group had secondary education. Finally, in relation to occupation, near half of the study group and near one third of control group (46.0%, 30.0% respectively) were workers.

Table (2): Illustrates level of the pain of studied groups for patients undergoing ESWL. It was prominent that there were highly statistical significant differences between both groups (p value 0.001).

Table (3): Clarifies level of anxiety for studied groups according to HADS score of studied groups for patients undergoing ESWL. This result highlighted that there

were highly statistical significant differences between both groups (p value 0.001).

Table (4): Illustrates clinical outcomes assessment for studied groups in second week post ESWL. It shows highly statistical significant differences between both groups regarding amount of urinary output, decrease gastrointestinal system complications (p value 0.001, 0.006).

Table (5): shows level of knowledge about lifestyle modifications for patients undergoing ESWL. It illustrates highly statistical significant differences between both groups during first and second week post ESWL (p value 0.001).

Table (6): This table shows correlation between severity of pain of studied groups and their level of anxiety. A positive highly significance correlation was revealed between severity of pain and the level of anxiety in both groups (P=0.001).

Table (1): Distribution of studied groups undergoing ESWL according to their socio -demographic data. (n=100).

Socio -demographic data		Study(n=50)		Control(n=50)		X ²	P-value
		N	%	N	%		
Age	Range	18 – 60		19 – 59		T: 0.022	0.882
	Mean ± S. D	42.9 ± 10.46		42.6 ± 9.63			
Sex	Male	36	72.0	33	66.0	0.412	0.517
	Female	14	28.0	17	34.0		
Marital status	Married	41	82.0	42	84.0	2.079	0.556
	Single	8	16.0	7	14.0		
	Widow	1	2.0	0	.0		
	Divorced	0	.0	1	2.0		
Education	Illiterate	14	28.0	13	26.0	4.035	0.258
	Read & write	15	30.0	8	16.0		
	Secondary	19	38.0	24	48.0		
	University	2	4.0	5	10.0		
Occupation	Employee	6	12.0	9	18.0	7.242	0.511
	Worker	23	46.0	15	30.0		
	Unemployed	1	2.0	1	2.0		
	Housewife	10	20.0	17	34.0		
	security	2	4.0	1	2.0		
	Seller	4	8.0	2	4.0		
	Driver	3	6.0	4	8.0		
	Cooker	1	2.0	0	0		
Architect	0	.0	1	2.0			

Table (2): Distribution studied groups according to their level of pain before session of ESWL, immediately after session of ESWL, one week and then two week after session of ESWL. (n=100).

Pain		Study (n=50)		Control (n=50)		X ²	P-value
		N	%	N	%		
Before	Normal	0	.0	2	4.0	4.051	0.256
	Mild	4	8.0	3	6.0		
	Moderate	3	6.0	7	14.0		
	Severe	43	86.0	38	76.0		
	Range	1-10		0-10		T. test	0.123
	Mean ± S. D	8.30 ± 2.42		7.52 ± 2.60		1.554	
Immediate	Normal	10	20.0	3	6.0	15.769	0.001*
	Mild	17	34.0	12	24.0		
	Moderate	19	38.0	15	30.0		
	Severe	4	8.0	20	40.0		
	Range	0-10		0-10		T:4.042	0.001*
	Mean ± S. D	3.16 ± 2.44		5.46 ± 3.20			
Post 1w.	Normal	2	4.0	1	2.0	46.562	0.001*
	Mild	18	36.0	1	2.0		
	Moderate	24	48.0	9	18.0		
	Severe	6	12.0	39	78.0		
	Range	0-9		2-10		T:9.623	0.001*
	Mean ± S. D	4.04±2.16		7.74±1.65			
Post 2w.	Normal	8	16.0	5	10.0	42.592	0.001*
	Mild	34	68.0	7	14.0		
	Moderate	3	6.0	32	64.0		
	Severe	5	10.0	6	12.0		
	Range	0-9		0-10		T:4.319	0.001*
	Mean ± S. D	2.48 ± 2.17		4.46 ± 2.41			

Table (3): Distribution of HADS score of studied groups pre, immediately, one week and then two week after session of ESWL. (n=100).

HADS		Study (n=50)		Control (n=50)		X ²	P-value
		N	%	N	%		
Before	Normal	0	.0	4	8.0	6.369	0.095
	Mild	7	14.0	12	24.0		
	Moderate	9	18.0	7	14.0		
	Severe	34	68.0	27	54.0		
	Range	8-20		7-20		T:2.033	0.052
	Mean ± S. D	16.22±3.86		14.42 ± 4.93			
Immediate	Normal	10	20.0	4	8.0	21.700	0.001*
	Mild	21	42.0	15	30.0		
	Moderate	13	26.0	4	8.0		
	Severe	6	12.0	27	54.0		
	Range	4-20		7-20		T:4.686	0.001*
	Mean ± S. D	9.94 ± 4.01		14.26 ± 5.14			
Post 1 week	Normal	17	34.0	2	4.0	47.633	0.001*
	Mild	21	42.0	2	4.0		
	Moderate	4	8.0	12	24.0		
	Severe	8	16.0	34	68.0		
	Range	0-20		7-21		T:8.493	0.001*
	Mean ± S. D	8.90± 4.86		16.40 ± 3.92			
Post 2week	Normal	42	84.0	10	20.0	42.256	0.001*
	Mild	2	4.0	11	22.0		
	Moderate	2	4.0	19	38.0		
	Severe	4	8.0	10	20.0		
	Range	0-20		3-20		T:5.728	0.001*
	Mean ± S. D	6.22 ± 4.75		11.30± 4.09			

Table (4): Distribution of health outcomes assessment for studied groups in the second week after session of ESWL. (n=100).

Clinical outcomes assessment			Study (n=50)		Control (n=50)		X ²	P-value
			N	%	N	%		
Urinary system assessment	Amount of urinary output per day	< 800	2	4.0	26	52.0	32.295	0.001*
		800 – 2000	31	62.0	21	42.0		
		> 2000	17	34.0	3	6.0		
	Hematuria		3	6.0	17	34.0	12.250	0.001*
Gastrointestinal system assessment	Nausea		3	6	13	26	7.44	0.006*
	Vomiting		3	6	13	26	7.44	0.006*
	Loss of appetite		3	6	18	36	13.562	0.001*
Bowel elimination assessment	Constipation		1	2.0	7	14.0	4.891	0.027*
	Diarrhea		1	2.0	1	2.0	0.0	1.0
Integumentary system assessment	Skin bruises		2	4.0	5	10.0	1.797	0.407
	Itching		1	2.0	2	4.0		
Sleep pattern assessment	Interrupted sleep		3	6.0	22	44.0	25.945	0.001*
	Cannot sleep (insomnia)		2	4.0	7	14.0		

Table (5): Distribution of studied groups' level of knowledge about lifestyle modification before, first week and second week after health educational guidelines given to patients after session of ESWL. (n=100).

Knowledge		Study (n=50)		Control (n=50)		X ²	P-value
		N	%	N	%		
Before	Low	48	.0	50	4.0	2.041	0.153
	Moderate	2	8.0	0	6.0		
	Range	0-8		0-7		T:0.867	0.388
	Mean ± S. D	2.86± 2.07		3.22± 2.08			
Post 1week	Low	0	20.0	46	6.0	100.001	0.001*
	Moderate	0	34.0	4	24.0		
	High	50	38.0	0	30.0		
	Range	10-13		1-8		T:24.747	0.001*
	Mean ± S. D	12.10± 1.04		3.90± 2.10			
Post 2wek	Low	0	36.0	46	2.0	93.143	0.001*
	Moderate	3	48.0	4	18.0		
	High	47	12.0	0	78.0		
	Range	9-13		1-8		T:21.973	0.001*
	Mean ± S. D	11.38± 1.18		3.84± 2.12			

Table (6): Correlation between level of pain for studied groups and their level of anxiety for patients undergoing ESWL for urolithiasis.

HADS	Pain			
	Study(n=50)		Control (n=50)	
	r	p	r	p
Before	0.212	0.140	0.639	0.001*
Immediate	0.488	0.001*	0.815	0.001*
1 week	0.585	0.001*	0.809	0.001*
2 weeks	0.772	0.001*	0.886	0.001*

Discussion

Urolithiasis is global health problem affect 2% to 20% of population worldwide. Small stone may pass spontaneously while large one requires medical or surgical treatment^(37,38).

Now a day ESWL became one of the most important treatment options for treatment of kidney stones less than 2 cm and ureteral stones less than 1.5 cm due to its non-invasive nature^(28,39,40).

Nursing guidelines for patients undergoing ESWL provide good patients preparation before operation and adequate patients care during operation in-addition to educating patients about life style modifications to decrease recurrence of renal stones post operation^(27,32,41).

Implementation of nursing guidelines for patients undergoing ESWL for urolithiasis led to significant improvement in patients' clinical outcomes and their knowledge level. This improvement might be related to the majority of patients were excited to learn and have highly expressed need to learn more about nursing guidelines and preventive measures to decrease risk of recurrence of urolithiasis.

Concerning socio-demographic characteristics of patients undergoing ESWL for urolithiasis, the findings of the present study revealed that Mean±SD for age of study and control group were (42.9 ± 10.46, 42.6 ± 9.63) respectively with no significant difference between the two groups. In this regard, this finding is justified by bad dietary habits, fast food and poor life style in this age.

This finding was in agreement with El-Shishtawy et al, (2022)⁽⁴²⁾ who stated that the mean age of studied groups

were (42.1±8.7, 40.9±11 40.9±11). On the other hand, this finding was in contrast with Bokhari et al,(2022)⁽⁴³⁾, who found that the mean age of studied groups were 26.3 ± 12.8 years old.

As regard to sex, the present study showed that the majority of the study group and about two third of control group were males with no significant difference between the two groups. This finding may be related to increased physical stress and exposure to ambient temperature in male.

This result was similar with Tubsaeng et al (2022)⁽⁴⁴⁾, who reported that most patients undergoing ESWL for urolithiasis were male.

Finally, in relation to occupation, the findings of the current study revealed that near half of the study group and near one third of control group were workers. This finding is justified by exposure to ambient temperature, excessive sweating and decrease fluid replacement during long working hours. This finding was supported with Heo et al (2022)⁽⁴⁶⁾, who found that the prevalence of urolithiasis was significantly higher in workers than in non-workers.

Concerning level of the pain for patients with urolithiasis undergoing ESWL, the current study revealed that the majority of study group and control group had severe level of pain before session of ESWL with no statistical significant differences between both groups.

This result was supported by Mei et al (2021)⁽⁴⁷⁾ who mentioned that majority of study group and control group suffered from severe level of pain before session of ESWL. Conversely,

this finding was in differences with Hiraj et al (2018)⁽⁴⁸⁾ who found that only about one third of studied patients with urolithiasis presented with sever level of pain.

Furthermore, the current study presented that study group experienced decrease in severity of pain immediately, first week and second week post ESWL than those in control group with highly statistical significant differences between the two groups. This result was in agreed by Elsayed et al (2019)⁽⁴⁹⁾ who mentioned that most of study group compared to only near one quarter of control group experienced mild level of pain post first session of ESWL.

In addition this finding is also in line with Badawy et al (2019)⁽⁵⁰⁾ who found decreased in severity of pain in study group than those in control group after implementation of pre-procedure teaching module for patients undergoing shock wave lithotripsy on anxiety, claustrophobia, pain perception and urolithiasis clearance.

This result is justified by ESWL is painful procedure, so patients' experience of pain usually result in increased respiratory rate which in turn causing that shock waves not effectively focused on stones which affect stones fragmentation and more hits affect renal parenchyma⁽⁵¹⁾. In the current study, patients were instructed by researcher to maintain slow breathing for effective stone fragmentation which in turn result in ease passage of small stones fragments and less pain to patients.

In relation to level of anxiety for patients undergoing ESWL, the current study revealed that the most of study

group and more than half of control group had sever level of anxiety before ESWL and there was no statistical significant differences between the two groups.

In this regard, this finding is justified by, this anxiety could be related to fear of unknown such as steps of ESWL procedure, complication of ESWL, sound produced by ESWL and prognosis of disease. This result was supported by Dogan et al (2021)⁽⁵²⁾ who revealed that most of studied patients suffered from severe level of anxiety before ESWL for urolithiasis.

On the other hand, study group experienced decrease in severity of anxiety immediately, first week and second week post ESWL than those in control group with highly statistical significant differences between the two groups. This result was reinforced by Mei et al (2021)⁽⁴⁷⁾, who mentioned that comfort nursing care can markedly reduce postoperative anxiety and complications of patients undergoing kidney stone surgery.

This finding could be related to comprehensive explanation about all steps of ESWL, emotional support given to patients by researcher, educational guidelines given to patients about normal finding and warning signs post ESWL and also information about preventive measure to decrease recurrence of urolithiasis.

Regarding clinical outcome assessment for studies groups undergoing ESWL, the current study showed that minority of study group compared to more than third of control group suffered from loss of appetite and there were highly statistical significant differences between both groups during second

week post ESWL. This result could be related to elevated level of anxiety in control group than study group that can lead to loss of appetite. This result was reinforced by Mei (2021) ⁽⁴⁷⁾ who mentioned that comfort nursing care can markedly reduce postoperative complications of patients undergoing kidney stone surgery.

In relation to total **knowledge level about lifestyle modifications** for patients undergoing ESWL, the current study illustrated that majority of study group and all of control group had low level of knowledge about lifestyle modification and there were no statistical significant differences between both groups before implantation of health educational guidelines.

This result was supported with Abdulrida et al (2015) ⁽⁵³⁾ who found that participant had poor knowledge about fluid and dietary intake related to urolithiasis. In addition, Kunjumon et al (2020) ⁽⁵⁴⁾ also indicated that patients had poor knowledge about measure to prevent urolithiasis. From researcher point of view this finding may be interpreted by lack of information and recommendation about life style modifications provided by health care personal and lack of patients search about preventive measure to decrease recurrence of renal stones.

After implantation of health educational guidelines to patients in study group, it was prominent that there was marked improvement in knowledge level only for study group and there were highly statistical significant differences between both groups during first and second week

compared to control group. This finding was parallel with Abdelmowla et al (2017) ⁽⁵⁵⁾ who found high significant improvement on patients' knowledge for study group patients after introduce the teaching booklet. This finding is could be related to the effort that exerted by the researcher to explain all needed information about preventive measures to decrease recurrence of urolithiasis simply in study group using proper teaching material and also distribution of brochures to patients and their families in Arabic language to help them retain and recall needed information.

In relation to correlation between severity of pain of studied groups and their level of anxiety in both groups before, immediately, first week and second week post session of ESWL, the current study revealed a positive highly significance correlation between patients' severity of pain and their level of anxiety in both groups. This finding was approved with **Yilmaz** et al (2016) ⁽⁵⁶⁾ who found positive significance correlation between the patients' pre-ESWL anxiety and pain perception.

Conclusion

Based on the finding of the current study, it can be concluded that after implementing nursing guidelines for patients undergoing ESWL for urolithiasis, there was significant improvement in clinical outcomes and knowledge score for study group than control group.

-It was found that there was a highly statistical significant differences between study and control group regarding to their level of pain P value= 0.001.

-It was noted that there was a highly statistical significant differences between study and control group regarding to their level of anxiety P value= 0.001.

-It was revealed that there were highly statistical significant differences between both groups regarding to their level of knowledge P value= 0.001.

-It was revealed that there was a positive highly significance correlation between patients' severity of pain and their level of anxiety in both groups (P= 0.001).

Recommendations

Based on the finding of the present study, the researcher recommended: Replication of the study using a larger probability sample and longer follow up period for studied patients.

References

1. Coe F, Worcester E, Lingeman J, Evan A. *Kidney Stones: Medical and Surgical Management*. 2^{ed} ed. London: Jaypee Brothers Medical Publishers.2019; ch(1),3.
2. Haghghatdoos F, Sadeghian R, Abbasi B. The associations between tea and coffee drinking and risk of calcium-oxalate renal stones. *Plant Foods for Human Nutrition*.2021; 76(4): 516-22.
3. Khan F, Haider M, Singh M, Sharma P, Kumar T, Neda E. A comprehensive review on kidney stones, its diagnosis and treatment with Allopathic and Ayurvedic medicines. *Urology Nephrology Open Access J*. 2019; 7(4): 69-74.
4. Mourad S,Shalaby M,EL-Helaly R , Morsy A, Elgamasy A, Hamouda H. *The Egyptian Urological Guidelines*.1st ed. Egypt: 12 Botros Ghaly Street, Roxy, Cairo. 2021;ch(10),465-511.

5. Khalili P, Jamali Z, Sadeghi T, Esmaeili A, Mohamadi M, Ahmadi A, Ayoobi F, Nazari A. Risk factors of kidney stone disease: A cross-sectional study in the southeast of Iran. *BMC urology*.2021; 21(1): 1-8.

6. Wang K, Ge J, Han W, Wang D, Zhao Y, et al. Risk factors for kidney stone disease recurrence: a comprehensive meta-analysis. *BMC urology*.2022; 22(1):1-13.

7. Han H, Mutter W, Nasser S. *Nutritional and Medical Management of Kidney Stones*. 1st ed. Cham, Switzerland: Springer International Publishing.2019;ch(5),63-83.

8. Tsaturyan A, Bosshard P, Bokova E, Bonny O, Stritt K,Roth, B. The impact of stenting prior to oral chemolysis of upper urinary tract uric acid stones. *International urology and nephrology*. 2022;54(1): 37-45.

9. Abdelwahab D, Alaa El-deen S, Rezia A, Elhkouly A. Effect of implementing evidence-based guidelines on lifestyle modification for adult patients with renal stone undergoing ESWL Procedure. *Egyptian Journal of Nursing and Health Sciences*. 2021;2(1):13-52.

10. Turk C, Petrik A, Sarica K. *Urolithiasis*. European association of urology. Retrieved from <https://uroweb.org/wp-content/uploads/EAU-Guidelines-on-Urolithiasis-2019.pdf>. Accessed at october2021

11. Neto W, Morales E, Pacheco M, Pedro R, Reis L. Is extracorporeal shockwave lithotripsy (SWL) still suitable for >1.5cm intrarenal stones? Data analysis of 1902 SWLs.

- Scandinavian Journal of Urology. 2021;55(5):388-93.
12. Elawady H, Mahmoud M, Samir M. Can we successfully predict the outcome for extracorporeal shock wave lithotripsy (ESWL) for medium size renal stones? A single-center experience. *Urologia Journal*, 2021;89(2):235-39.
 13. Atis G, Culpan M, Ucar T, Sendogan F, Kazan H, Yildirim A. The effect of shock wave lithotripsy and retrograde intrarenal surgery on health-related quality of life in 10-20 mm renal stones: a prospective randomized pilot study. *Urolithiasis*. 2021;49(3):247-53.
 14. Cheng W, Chiu Y, Fan Y, Chang, C, Kao, K. Efficacy of intravenous hydration during extracorporeal shock wave lithotripsy in improving ureteral stone treatment success rate. *International Journal of Urology*, 2022;3(1)1-5.
 15. Smolic K, Markic D. Renal adverse effects of extracorporeal shock wave lithotripsy. *Acta clinica Croatica*. 2021; 60(1):118-23.
 16. Dogan S, Ceylan C. The effect of music on state anxiety in patients undergoing extracorporeal shockwave lithotripsy. *International Journal of Clinical Practice*. 2021;7(5):81-5.
 17. Parr M, Desai D, Winkle D. Natural history and quality of life in patients with cysteine urolithiasis: a single central study. *BJU International*. 2015;116(3):31-35.
 18. D'Cosat MR, Haley WE, Mara KC. Symptomatic and radiographic manifestations of kidney stone recurrence and their prediction by risk factors: A prospective cohort study. *J Am Soc Nephrol*. 2019;30(7):1251-60.
 19. Renuka K, Poongodi V. Assessment of risk factors for renal calculi among its patients at Nephrology OPD in MGMCRI, Puducherry , with A view to Develop Self-instructional Module Assessment. *Pondicherry Journal of Nursing*. 2020;13(3):1-12.
 20. Dimitropoulos K, Omar I, Chalkias A, Arnaoutoglou E, Douketis J, Gravas S. Preoperative antithrombotic (antiplatelet and anticoagulant) therapy in urological practice: a critical assessment and summary of the clinical practice guidelines. *World Journal of Urology*. 2020;38(11):2761-70.
 21. Manzoor H, Saikali S. Renal Extracorporeal Lithotripsy. 2^{ed} ed Treasure Island (FL): StatPearls (Internet(publishing. 2021; ch(3), 51-103. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/32809722>. Accessed at october 2021
 22. Prot-Bertoye C, Bertocchio J, Daudon M, Courbebaisse M. Urolithiasis: assessment and metabolic management. *La Revue du Praticien*. 2017; 67(5): 543-49.
 23. Betz M. Whole diet approach to calcium oxalate kidney stone prevention. *Journal of Renal Nutrition*. 2022; 32(1):11-17. Retrieved from [https://www.jrnjournal.org/article/S1051-2276\(21\)00268-5/fulltext](https://www.jrnjournal.org/article/S1051-2276(21)00268-5/fulltext). Accessed at April 2022
 24. Tastemur S, Senel S, Kizilkan Y, Ozden C. Evaluation of the anatomical factors affecting the success of retrograde intrarenal surgery for isolated lower pole kidney stones. *Urolithiasis*. 2022;50(1): 65-70.
 25. Lakshmi P, Kakarla K, Raghunath P , Reddy Y. Epidemiological risk factors

- influencing the formation of renal calculi, their chemical composition and association with urinary tract infections. *Scholars International Journal of Biochemistry*. 2020; 3(12): 260-6.
26. Khalili P, Jamali Z, Sadeghi T, Esmaili A, Mohamadi M, Moghadam A, Nazari A. Risk factors of kidney stone disease: a cross-sectional study in the southeast of Iran. *BMC urology*.2021; 21(1): 1-8
27. Partin A, Dmochowski R, Kavoussi L, Peters C, Wein A. *Campbell-Walsh-Wein Urology. Evaluation of the urologic patient: History and physical examination*. E-Book. 12th ed Philadelphia, PA: Elsevier.2020;ch(1),1-13.
28. Skolarikos A, Neisius A, Petřík B, Somani K, Thomas G, Gambaro D, Davis R, Geraghty R, Lombardo L, Tzelves. *European Association of Urology Guidelines on Urology*.2022. Retrieved from <https://uroweb.org/.../uploads/EAU-Guidelines-on-Urolithiasis-2020v3...> • PDF file. Accessed at May 2022.
29. Curhan C, Aronson D, Preminger M, O'Leary P. Kidney stones in adults: Diagnosis and acute management of suspected nephrolithiasis. *UpToDate*.2022;2022(2):1-12.
30. McCaffary M, Beebe A. The numeric pain rating scales Instructions. In: *pain: Clinical Manual for Nursing Practice*. Mosby, St. Louis. Retrieved from <https://www.sralab.org/sites/default/files/201707/Numeric%20Pain%20Rating%20Scale%20Instructions.pdf>. Available at 23-10-2021 at 8p.m
31. Zigmond A, Snaith R. The Hospital Anxiety and Depression scale. *Acta Psychiatr Scand*. 1986;67:361-70.
32. Salem S, Mehraei A, Zartab H, Shahdadi N, Pourmand G. Complications and outcomes following extracorporeal shock wave lithotripsy: a prospective study of 3,241 patients. *Urological research*.2010;38(2):135-42.
33. Aggarwal R, Srivastava A, Jain S, Sud R, Singh R. Renal stones: a clinical review. *European Medical Journal for urology*.2017; 5(1): 98-103.
34. Samantha C, Avani S, Kumar E, Prasobh G. A review on urinary calculi-types, causes, its mechanism, diagnosis, prevention and medical expulsion therapy of calculi. *World Journal of Pharmaceutical Research* .2021;9(10):473-86.
35. Ibrahim D, Ahmed B, El-Fayoumy H, Mahmoud A. Predictors of Outcome for Extracorporeal Shock Wave Lithotripsy among Patients with Renal Calculi: Suggested Nursing Guidelines. 2017. Published master thesis. Cairo university. Faculty of Nursing .77-115.
36. Gerstman B. *Basic Biostatistics, Statistics for Public Health Practice*. 3rd ed. Canada: Jones and Bartlett publisher Co. 2011:161-218.
37. Sarıkaya S, Yücel C, Karşıyakalı N, Sertoğlu E. Analysis of urinary stone types' distribution in Turkey according to the geographical regions where patients were born and live: A cross-sectional single-center experience. *Gülhane Medical Journal*. 2020;62(3):163.
38. Baowaidan F, Zugail A, Lyoubi W, Culty T, Lebdaï S, Brassart E, Bigot P. Incidence and risk factors for urolithiasis recurrence after endourological management of kidney stones: A retrospective single-center

- study. *Progrès en Urologie*.2022;32(9): 601-7.
39. Zhang D, Liang Z, Wang D, Lv J, Ding D, Yu D. The clinical efficacy and safety of extracorporeal shock wave lithotripsy in the treatment of patients with urinary calculi. *disease markers*. Hindawi Journal. 2022; 20 (10):1-7.
40. Guitynavard F, Azadvari M, Gholamnejad M, Naghdipoor M, Zareian L, Gorji A, Rahimnia R, Daroonekoiaee A, Afsari R, Madreseh E. Decreasing discomfort during shock-wave lithotripsy using transcutaneous electrical nerve stimulation. *Translational Research in Urology*.2022; 4(2):71-76.
41. Dans L, Silvestre M, Ho B, Fabregas C, Imperial M, Miguel R. *Manual for Clinical Practice Guideline Development*. 1st ed. Philippines.2018;ch(1),2.
42. El-Shishtawy M, Mohamed M. Effect of self-management protocol on dietary adherence for patients with kidney stones undergoing shock wave lithotripsy technique. *Assiut Scientific Nursing Journal*.2022;10(31):235-147.
43. Bokhari A, Aldarwish H, Alsanea S, Al-Tufaif M, Alghaslan S,Alghassab A, Alshammari B, Al-Tufaif A. Prevalence and risk factors of urolithiasis among the population of Hail, Saudi Arabia.*Cureus*.2022;14(7):1-14.
44. Tubsang P , Srisarakham P , Nueaiyong K. Treatment outcomes and factors affecting the success of extracorporeal shockwave lithotripsy in urinary stone treatment: a study of ten years of data from Mahasarakham Hospital. *Insight Urology*. 2022;43(1):34-40.
45. Maldonado-Valadez E, Valdez-Vargas D, Alvarez A, Rodea-Montero R. Efficacy of adjuvant tamsulosin for improving the stone-free rate after extracorporeal shock wave lithotripsy in renal stones: A randomized controlled trial. *International Journal of Clinical Practice*. 2022;22(10):1-8.
46. Heo J, Son J, Lee W, Epidemiology of urolithiasis with sex and working status stratification based on the national representative cohort in republic of Korea. *Safety and health at work*.2022;13(2):207-12.
47. Mei G, Jiang W, Xu W, Wang H, Wang X, Huang J, Luo Y. Effect of comfort care on pain degree and nursing satisfaction in patients undergoing kidney stone surgery. *American Journal of Translational Research*.2021; 13(10): 11993-98.
48. Hiraj G, Zaki M, Ahmed N, Hussain M. Frequency of signs and symptoms in patients presenting at tertiary care center with urolithiasis. *P J M H S*. 2018;12(2): 556 -57.
49. Elsayed N. Impact of nursing protocol on stone clearance rate and acute complications following extracorporeal shock wave lithotripsy. *International Journal of Novel Research in Healthcare and Nursing*.2019;6(3):648-58.
50. Badawy A, Elkalashy R. The Effect of pre-procedure teaching module for patients undergoing shock wave lithotripsy on anxiety, claustrophobia, pain perception and urolithiasis clearance. *Texila International Journal Of Nursing*.2019;5(1):1-13.
51. Laksita B, Soebadi A, Wirjopranoto S, Hidayatullah F, Klopung P, Rizaldi F. Local anesthetics versus systemic analgesics for reducing pain during

- extracorporeal shock wave lithotripsy (ESWL): A systematic review and meta-analysis. Turkish Journal of Urology.2021; 47(4): 270-8.
52. Dogan S, Ceylan C. The effect of music on state anxiety in patients undergoing extracorporeal shockwave lithotripsy. International Journal of Clinical Practice.2021;75(8): 1-5.
53. Abdulrida J, Kadhim H. Assessment of patient's knowledge about avoidance of recurrent urolithiasis. kufa Journal for Nursing sciences.2015; 5(1): 8-16.
54. Kunjumon. K, Nayak G, D'Souza P. Knowledge on urolithiasis among patients attending OPDs in selected hospital of Udupi district Karnataka. Indian Journal of Public Health Research and Development.2020;11(4):1.
55. Abdelmowla A, Hussein H, Shahat A, Ahmed A, Abdelmowla M. A. Impact of nursing interventions and patients education on quality of life regarding renal stones treated by percutaneous nephrolithotomy. Journal of Nursing Education and Practice.2017; 7(12): 52-63.
56. Yilmaz Ö, Saracoglu F, Senkul T, Zor M, Soydan H,et al. The effect of pre-procedure anxiety on pain perception during first session of shock wave lithotripsy. Journal of Urological Surgery.2016; 3(1): 18-21.