Impact of Health Education Program for Elderly Patients Undergoing Extracorporeal Shock waves Lithotripsy on Clearance of Urolithiasis

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Abstract: Background: Urolithiasis is the third most common urological disease affecting elders with high recurrences rates. Extracorporeal shock waves lithotripsy (ESWL) became the treatment of choice for upper urinary tract stones in older adults without surgical intervention. The aim of this study was to investigate the impact of health teaching program for elderly patients undergoing ESWL on clearance of urolithiasis. Quazi experimental research design was utilized in the present study. The study was carried out in Minia Al-Watany hospital. The sample was included 112 elderly patients undergoing ESWL procedure divided randomly into two groups, study and control group (56 patients for each one). Data was collected in a period of 6 months starting from January to the end of June 2013. A structured interview questionnaire sheet consists of three parts was utilized in this study. First part; included personal characteristics, second part; included past and present history and follow up, and third part; was to assess knowledge of elderly patients regarding disease and ESWL procedure. Post test for patient knowledge conducted after ESWL procedure and follow up for ESWL outcomes within 6 months. Main findings of the study were; statistical significant improvements in knowledge of the study group post teaching program, and there was statistical significant difference between stone clearance rate after ESWL and total knowledge score. Based on the results, it can be concluded that the education program had a significant impact on both knowledge of patients and clearance of stones after ESWL. A continuous educational program should be planned and offered on regular basis for patients undergoing ESWL procedure, and replications of the current study on larger probability sample were recommended.

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1. Introduction

The number of elderly people has risen worldwide; this is due to medical and social development which in turn has lead to great improvement in the health services and consequently leads to prolongation of life. There are currently about 589 millions older people in the world. This increase in the senior population will continue and by 2020, there will be billion older people world-wide **(Goldfarb *et al.*, 2013).**

The Central Agency for Public Mobilization and Statistics reported the arrival of the elderly population in Egypt by 2011 to about 8.5 million elders represent 6.2% of the total population, and expected to reach 12 million (fifth of the population in Egypt.) representing 10 percent of the total population by 2030 **(Central Agency For Public Mobilization and Statistics–Egypt, 2011).** Therefore, nurses must be prepared to meet the challenges of caring for this rapidly increasing segment of that population and help them to maintain health as long as possible **(Gad, 2012).**

The aging process slowly degrades the structure and function of the renal system. With aging kidneys mass diminished by 30%, the number of glumerules decreased by 40%, and there is a reduction in renal blood flow and the glumerular filtration rate. In addition the regulation of hormones that respond to dehydration and the ability to conserve salts declined **(Parmer, 2011).** These anatomical and functional changes makes older adults particularly vulnerable to dehydration, kidneys became less efficient in eliminating solutes from the blood, coupled with decreased total body fluid and physical activity putting older adults at greater risk for urinary tract stones formation and renal impairments **(Halter *et al.*, 2009).**

Urolithiasis (UL) which mean presence of stone anywhere in the urinary tract, considered the most painful urological diseases among Egyptian older adults, it is responsible for 45% of urological hospital admissions per year and accounting for approximately 800,000 elderly patient hospitalizations. **(El-Sharqawy and Ewis, 2010).** Although new and effective therapeutic methods to treat nephrolithiasis have been

introduced recently, urinary tract stones continue to be one of the most painful urologic disorders, occupy a major health problem for elders associated with high rates of recurrences and complications, and have a significant impact on the quality of their life **(Robnett and Chop, 2012).**

The goal of kidney stone treatment among the elderly patients is to achieve maximal stone clearance with minimal morbidity to the patient. Modern technological advances in the design of extracorporeal shock wave lithotripsy (ESWL) became the first treatment choice for most upper urinary tract stones in elderly without surgical intervention. ESWL have several advantages for elderly; it is done as an outpatient procedure, no need for anesthesia, no wound, and less complications rates. It is an effective procedure for managing 85-90% of upper urinary tract stones in elders safely **(Chandhoke, 2014).**

Patient education and counseling are vital role of geriatric nurse for effective care concerning; causes and risk factors for stones formation, ESWL procedure, its advantages, precautions to be followed prior, during and after ESWL. In addition planning teaching program concerning (lifestyle changes, dietary recommendations, importance of exercise and weight reduction, increasing fluid intake, monitoring the outcomes and compliance) is a critical role in managing stone formation and in preventing its future occurrences **(Pietrow and Preminger, 2011).**

Significance of the Study

Urinary tract stones considered the 3rd most common urological diseases in older adults worldwide. Older people are particularly susceptible to recurrent episodes of urinary tract stones, recurrent renal stones without proper treatment more likely to develop chronic kidney disease. The prevalence of chronic renal failure (CRF) among the Egyptian elderly patients was 28.4%., 16% of them caused by renal stones **(Helmy, 2010).**

Several studies indicated that patient's knowledge about urolithiasis disease and ESWL procedure was inadequate and there is a need for further studies about it among geriatric population in Minia governorate, especially that the statistics from Minia university hospital reported that the total number of admission to urology department with urinary tract stones during 1-7-2011 to 30-12-2011 was 110 cases, 65 cases of them were elderly (≥60 ys old), while the total urological admissions to ESWL unit in Minia university hospital during the same period was 75 cases, 67% of them were elderly **(Minia University statistical office, 2012).**

Because extracorporeal shock waves lithotripsy (ESWL) became the first treatment choice for most upper urinary tract stones in elderly without surgical intervention, and little is known about its advantages, necessary preparations, precautions to be followed prior, during and after procedure, and the discharge plan to prevent future recurrence of urinary stones. So this research is estimated to evaluate the impact of health education program for elderly patients undergoing ESWL procedure on clearance of urolithiasis.

2. Subjects and Methods

I-Research design:

Quazi experimental research design was utilized in the present study.

II-Technical design

Setting of the study:

This study was carried out in Minia Al-Watany hospital which is located in Minia City-33 Saad Zaghloul street.

Sample:

Convenient sample of 112 elderly patients meeting the study criteria, aged 60 years and more, (male and female), with upper urinary tract stone (renal and upper ureter stones) undergoing ESWL procedure which divided randomly into (56 control group and 56 study group).

Exclusion criteria

- Elderly patients with secondary ESWL session.
- Patients who are missed at the follow up period.
- Elderly patients suffering from deafness.
- Elderly patients with mental disabilities who aren't able to understand the health education program.

Tools of the study:

One tool developed by the researcher for collecting data divided into three parts:

Part I: A structured interview questionnaire sheet: included socio-demographic data such as: (name, age, sex, marital status, occupation, location, and level of education).

Part II: Medical assessment sheet included; past and present medical history, chief complaints, and follow up chart after extracorporeal shock waves lithotripsy.

1- past medical history

- Medical history of chronic diseases (diabetes, hypertension, liver, renal, respiratory and cardiac disease, gout, osteoporosis, hyperparathyroidism, and cancers).
- Previous hospital admission with urinary tract stones, frequency and method of its treatment.

2- **Present medical history of stone characteristics and present complaints:**

- Stone characteristics (stone location, size and number).
- Present complaints (such as flank pain, frequency of micturation, haematuria, dysurea,etc)

3- Follow up after extracorporeal shock waves lithotripsy procedure for both groups:

1- Assessed the outcome of ESWL procedure after one week which was either significant residual fragmentation (not stone free) need re-treatment with other ESWL session or insignificant residual fragmentation (less than 4mm considered stone free).

2- Assessed the outcomes of ESWL for both groups after three months to know during this period patients either get stone free after one session, two session, and three sessions, or not get free stone.

3- Assessed total success free rates of stone within 6 months for both groups was either clear or not clear stone, which assessed by urologists through radiological studies.

Part III: Knowledge assessment sheet included:

1- Knowledge of elderly patients about urolithiasis disease. This assessment included 7 items (structure of urinary tract, definition, causes, risk factors, clinical manifestations, complications, and treatment approaches of urolithiasis).

2- Knowledge about ESWL procedure included 5 items (definition, advantages, and of ESWL, instructions to be followed prior, during and after lithotripsy).

3- Knowledge about how to prevent the recurrence of urinary tract stones consists of 4 items.

Scoring system

- The correct answer for each question was given:

- One grade for each complete correct point.
- Half grade for each incomplete correct point.
- Zero for incorrect answer.
- Total knowledge score (95 grades) was judged by using scoring system as following:

- Poor < 50%
- Fair 50<70 % and more.
- Good 70% and more

Operational design:

Tools testing and pilot study:

A pilot study was implemented on 10 patients undergoing ESWL procedure to test the clarity of the tool, estimate the time needed for data collection, and test the feasibility of conducting the research. Minimal modifications were done and those patients were excluded from the actual study.

Technique for data collection:

A structured interview was utilized to fill out the questionnaire sheet.

Procedure:

The present study was carried out on two phases:

Phase I: (Preparatory phase): Was concerning formulation of the study tools and proposed an educational program by the researcher based on extensive review of current, local, and international related literature, also using of books, articles, and magazines was done. Educational program was developed according to the patients' needs.

Phase II: (Implementation phase):

- An official permission to conduct the proposed study was obtained by the researcher from the manager of hospital and the head of ESWL unit.
- Researcher interviewed patients individually.
- At initial interview, the researcher introduce her self to initiate line of communication, explain the nature, purpose of the program, fill out the four tools of the study and scheduled with them the educational sessions.
- Collection of data was in a period of 6 months, started from the beginning of January 2013 to the end of June 2013, through two days weekly. The number of patients who are interviewed per each day varies between (1-2 patients) based on patients response and inclusion criteria. The time spent with each patient for filling assessment sheet varies between 30-45minutes according to patient response.
- Randomly the researcher started to make individual interview with each elderly patient, (number 1 usually for study group and number 2 for control group, number 3 was for study group, number 4 was for control group…..etc).
- The tool used twice for the same patients as the following;

- For study group; first time was used one day before extracorporeal shock waves lithotripsy session (pre-test), and the second time was 7 days after session, after giving health education program to conduct post knowledge test, using follow up part of the and part three only.

- For the control group; first time also was used one day before extracorporeal shock waves lithotripsy session (pre-test) using all three parts and the second time was after the procedure by 7 days without giving health education program (post knowledge test), using only follow up part and part three of knowledge.

- Follow up period for both group was to evaluate the outcome of extracorporeal shock waves lithotripsy within 6 months, it was three times (after one week of the procedure, then 3 months and six months.

- Researcher interviewed patients of the study group through three sessions. The following table discussed plan organization for educational program of the study group.
- The sessions were conducted by the researcher in a simple Arabic language using discussion, posters, and handout
- Each patient obtained a copy of the educational program booklet included all educational content.

Organization plan for educational program of the study group:

Program sessions	Specific objectives	Contents	Educational Media	Methods of teaching	Time	Evaluation
1st day before ESWL **First session**	**By the end of this session patient will be able to:** -Identify the general and specific objectives of the program. -Discuss the program content. - Identifies definition of the disease. -Lists causes and risk factors.	- Identification between the researcher and the participants. -Objectives of the program and its time. - Fulfillment of sociodemographic and medical data. -Pre knowledge test for the participants -Definition of uorolithiasis -Causes and risk factors of disease.	• Hand out • Posters	• Lecture • Discussion	- One day before ESWL procedure while the patient performed fitness - time taken was **45-60 minutes**	Written exam (answers recorded by researcher)
2nd day **Second session**	**By the end of this session patient will be able to:** -Identify manifestation of the disease. -List complications of the disease. -Enumerate ESWL procedure, and its advantages. -Explain indications of ESWL procedure. -List instructions before, during and after ESWL -explain methods of preventing the recurrent of the disease.	- Clinical picture. -Complications. - Meaning of ESWL and its advantages. - Instructions to be followed before, during and after the procedure. - Methods of preventing disease.	• Hand out • Posters	• Lecture • Discussion	During the same day of ESWL procedure before starting it. - time taken was **60-70 minutes**	
3rd day **Third session**	Evaluate the impact of health education program on patient's knowledge about urolithiasis, ESWL procedure and disease prevention	Post knowledge test for the participants.			- After 7 days of ESWL procedure -Time taken **30-45 minutes.**	Written exam.

- The last phase is the evaluation after program implementation for knowledge after one week using part three of study tool, and for ESWL outcomes after 6 months using follow up part of the study tool.
- The whole period for teaching program was 1 year began from January 2013.

Ethical and legal consideration:

The patients were informed about the purpose and nature of the study. The researcher emphasized that the participation is voluntary; confidentiality and anonymity of the subjects were assured through coding of all data. Each patient has the right to withdraw from the study at any time without any rational and this data will not be reused without a second permission from them.

Limitations of the study

Our study was limited by decreased attention span of aged persons which affects time spent in education. Also some of patients refused to participate or to complete the research because they had pain and fatigue. In addition Low educational level of the studied sample needed high effort and long time from the researcher.

3.Results

Findings of this study were presented in four different parts. The first one focuses on the socio-

demographic, the second section displayed past and present medical data, and the third one provided data about; subtotal and total knowledge scores of the studied sample, relationships between demographic variables and the total knowledge score knowledge, and multiple regression analysis for factors affecting knowledge of patients.

Part one: (socio-demographic characteristics)

Table (1): Illustrated distribution of the studied sample according to their socio-demographic characteristics. It was founded that mean of age for the study and control group was 65.46 and 65.91 respectively. As regarding sex; 69.6% and 66.1% of the study and control group were male. The majority of the studies sample was live in rural areas and illiteracy had the highest percentage among the studied sample

Part two: (Past and present medical history)

Table (2): Showed distribution of the studied sample according to their medical history of chronic disease. It was founded that more than two thirds (69.6%) of the study group had chronic diseases, the most common chronic diseases founded among them were; hypertension, diabetes, cardiovascular, respiratory, liver, osteoporosis, and hyperparathyroidism with a percentage of 94.9%, 64.1%, 51.3%, 51.3%, 25.6%, 20.5% and 20.5% respectively. As compared to (78.6%) of control group who had chronic diseases, with highest percentage of 88.6%, 65.9%, 45.5% and 43.2% for hypertension, diabetes, respiratory and cardiovascular diseases respectively.

Table (3): Showed distribution of the studied sample according to their history of urinary tract stones. Results revealed that (53.6% and 60.7%) of the study and control group respectively had a history of previous hospital admission with urinary tract stones, renal stones had a highest percentages for both groups as a stone location. Also it was noticed that (36.7% and 41.2%) of the study and control group respectively had previous urinary stones more than two times.

Table (1): Distribution of the study and control group according to their socio-demographic characteristics.

Socio-demographic characteristics.	Study (n= 56)		Control (n= 56)		*P*-value
	No.	%	No.	%	
Age:					
60 - < 65 years	27	48.2	26	46.4	0.788
65 - < 70 years	17	30.4	15	26.8	
≥ 70 years	12	21.4	15	26.8	
Mean ± SD	65.46 ± 5.13		65.91 ± 5.49		0.657
Sex:					
Male	39	69.6	37	66.1	1.000
Female	17	30.4	19	33.9	
Marital status:					
Married	45	80.4	44	78.6	0.815
Widow	11	19.6	12	21.4	
Level of education:					
Illiterate	29	51.8	28	50.0	0.631
Read and write	1	1.8	5	8.9	
Primary	6	10.7	7	12.5	
Preparatory	8	14.3	6	10.7	
Secondary	6	10.7	6	10.7	
University	6	10.7	4	7.1	
Job before retirement:					
Employ	11	19.6	5	8.9	0.265
Free work	9	16.1	12	21.4	
Farmer	17	30.4	21	37.5	
Housewife	19	33.9	18	32.1	
Job after retirement:					
Work	1	1.8	5	8.9	0.208
Not work	55	98.2	51	91.1	
Residence:					
Urban	20	35.7	23	41.1	0.260
Rural	36	64.3	33	58.9	

Table (2): Distribution of the study and control group according to their history of chronic diseases.

Medical history of chronic disease.	Study (n= 56)		Control (n= 56)	
	No.	%	No.	%
Yes	39	69.6	44	78.6
No	17	30.4	12	21.4
Type of chronic disease: #	**No=(39)**		**No=(44)**	
Hypertension	37	94.9	39	88.6
Diabetes mellitus	25	64.1	29	65.9
Cardiovascular diseases	20	51.3	19	43.2
Respiratory diseases	20	51.3	20	45.5
Liver disease	10	25.6	15	34.1
Hyperparathyroidism	8	20.5	6	13.6
Osteoporosis	8	20.5	11	25.0
Gout	3	7.7	5	11.4

 # means there was more than one answer.

Table (3): Distribution of the study and control group according to their history of urinary tract stones.

History of urinary tract stones.	Study (n= 56)		Control (n= 56)		*P*-value
	No.	%	No.	%	
Previous hospital admission with urinary tract stones:					
Yes	30	53.6	34	60.7	
No	26	46.4	22	39.3	0.445
Place of stones:	**N=(30)**		**N=(34)**		
Renal stone	14	46.7	12	35.3	0.654
Renal and ureteral	10	33.3	12	35.3	0.670
Bladder stone	2	6.7	4	11.8	0.675
Ureteral stone	4	13.3	6	17.6	0.476
Number of recurrence:					
Only one time	7	23.3	14	41.2	
Two times	12	40.0	6	17.6	0.107
More than 2 times	11	36.7	14	41.2	
Methods of treatment: #	**N=(30)**		**N=(34)**		
Spontaneous by medication and fluid	16	53.3	21	61.8	0.496
ESWL	11	36.7	6	17.6	0.086
Open surgery	21	70.0	25	73.5	0.754
Endoscope	13	43.3	20	58.8	0.216

Table (4): Showed distribution of the study and control group according to present history of stone characteristics. As regards stone side and number; it was observed that right side of stone formation was more than left side for both groups and more than three quarters of both groups were had single stone. Also results revealed that renal pelvis stones represented highest percentage for both groups as a stone location and mean of stone size was (14.71mm and 17.23 mm) for the study group and control group respectively.

Table (5): Illustrated comparison between study and control group in relation to outcomes of ESWL during the period of follow up**.** Results revealed that success free rate of stones by ESWL occurred in the study group more than the control group presented by percentage of (83.9% and 66.1%) for both groups respectively and there was statistical significant different presented by p-value (0.029*).

For the study group, from over all 56 patients; 33 patients (58.9%) get stone free after first session of ESWL, from remaining 23 patients underwent second session, 10 patients (17.9%) get stone free after second session, from remaining 13 patients underwent third session; 4 cases (7.1%) get free stone after third session and 9 cases (16.1%) failed to get stone free and still had the same stone site and size.

For control group; from over all 56 patients; 20 patients (35.7%) get stone free from the first session of ESWL, from 36 patients underwent second session, 8 patients (14.3%) get stone free after second session, from remaining 28 patients underwent third session; 9 cases (16.1%) get free stone after third session and 19 cases (33.9%) failed to get stone free.

Table (4): Distribution of the study and control group according to present history of stone characteristics.

Stone characteristics	Study (n= 56)		Control (n= 56)		*P*-value
	No.	%	No.	%	
Stone side:					
Right side	32	57.1	30	53.6	0.704
Left side	24	42.9	26	46.4	
Number of stone:					
Single	43	76.8	42	75.0	0.825
Multiple	13	23.2	14	25.0	
Stone size: #	N=56		N=56		
Low diameter (less than 10mm)	27	48.2	24	42.9	0.184
Medium diameter (10mm < 20mm)	29	51.8	26	46.4	
High diameter (20mm and more)	13	23.2	20	35.1	
Mean ± SD	14.71 ± 6.54		17.23 ± 6.95		0.051*
Location of stones: #	N=56		N=56		
Upper calyx	14	25.0	12	21.4	0.673
Middle calyx	12	21.4	11	19.6	
Lower calyx	16	28.6	13	23.2	
Renal pelvis	24	42.9	20	35.7	
Upper ureter	13	23.1	14	25.0	

 # means there was more than one answer.

Table (5): Comparison between study and control group in relation to outcomes of ESWL during the period of follow up.

Outcomes of ESWL procedure	Study (n= 56)		Control (n= 56)		*P*-value
	No.	%	No.	%	
Follow-up after 7 days					
Significant fragments need retreatment with ESWL.	23	41.1	36	64.3	0.014*
No significant fragments	33	58.9	20	35.7	
Success stone free rate after 3 months:					
Clear stone after one session	33	58.9	20	35.7	0.029*
Clear stone after two sessions	10	17.9	8	14.3	
Clear stone after three session	4	7.1	9	16.1	
Not clear	9	16.1	19	33.9	
Total stone clearance rate after 6 months					
Success clearance of stone	47	83.9	37	66.1	0.029*
Failed clearance of stone	9	16.1	19	33.9	
Methods of assessing ESWL outcomes after six months.					
Kidney, ureter and bladder x-ray	12	21.4	12	21.4	0.155
Ultrasonograghy	24	42.9	15	26.8	
Both	20	35.7	29	51.8	

*** means there is statistical significant difference**

Figure (1): Showed comparison between total knowledge score for the study and control group in pre and post knowledge test. Results revealed that (98.2%) of the control group who hadn't received health education had poor percentage of knowledge while the study group all of them (100%) had poor knowledge before the educational program but after teaching this percent decreased to by only 33.9%.

Results showed there was highly statistical significant difference between knowledge of the study group who had health education in pre and post knowledge test with *P* value (0.001), while no statistical significant difference between knowledge of the control group in pre and post-test presented by *P*-value (1.000), which reflect no improvement in their knowledge.

Table (6): Illustrated effect of total knowledge score on total stone clearance rate after ESWL for the study and control group. It was noticed that patients who get free stone after ESWL in the study group had mean of knowledge score more than patients of control group who get free stone after ESWL. There was statistical significant difference between stone clearance rate and total knowledge score for the study and control group presented by *p*-value (0.001*).

Table (7): Showed that a high percentage for both

groups suffering from; dysuria, frequency of urination, hematuria, flank pain, and renal colic pre implementation of the educational program, but these symptoms greatly declined for the study group in post program and in follow up period after ESWL compared to control group with statistical significant different presented by (*p*-value 0.001*).

Table (8): Illustrated multiple regressions of factors affect success free rates of stone by ESWL for the studied sample. It was founded that patients' sex and history of chronic diseases had no effect on stone clearance. While success stone free rate was highly affected by patient's knowledge, age group, place of residence, number, size of stone, and history of recurrent urolithiasis. In which the risk of poor stone clearance increased in those; had poor knowledge about disease and ESWL procedure, aged more than 70 years, those live in rural areas, and those who had multiple and high diameter stones.

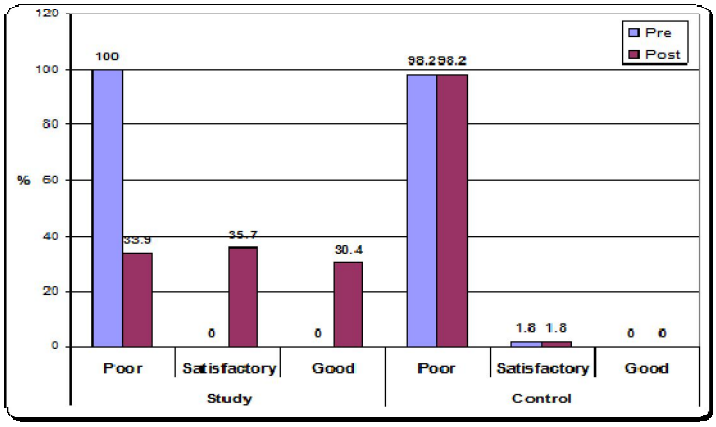

Figure (1): Comparison between total knowledge score for the study and control group in pre and post knowledge test.

Table (6): Effect of total knowledge score on total stone clearance rate after ESWL for the study and control group.

Knowledge of studied sample	Total stone clearance rate		*P*-value
	Clear stone	Not clear stone	
	Mean ± SD	Mean ± SD	
Study	61.32 ± 16.54	49.11 ± 15.19	0.045*
Control	21.08 ± 14.69	9.26 ± 6.94	0.002*
***P*-value**	0.001*	0.001*	

-One Way ANOVA test.
- * means there is statistical significant difference

Table (7): Distribution of clinical picture for the study and control group in pre, post, and follow up period of program application.

Clinical Picture	Study (n=56)#						Control (n=56)#					
	Pre		Post		Follow up 6th months		Pre		Post		Follow up 6th months	
	No.	%	No	%	No	%	No	%	No	%	No	%
Difficulty with urination	18	32.1	9	16.1	3	5.4	21	37.5	16	28.6	16	28.6
Pyuria	16	28.6	9	16.1	5	8.3	10	17.9	8	14.3	8	14.3
Dysuria	40	71.4	13	23.1	9	16.1	29	51.8	20	35.7	18	32.1
Frequency of urination	41	73.2	15	26.8	6	10.7	34	60.7	25	44.6	20	35.7
Hematuria	27	48.2	11	19.6	7	12.5	22	39.3	16	28.6	12	21.4
Nausea & vomiting	5	8.9	0	0.0	0	0.0	6	10.7	3	5.4	0	0.0
Fever &chill	7	12.5	0	0.0	0	0.0	7	12.5	4	7.1	4	0.0
Flank pain	21	37.5	15	26.8	5	8.9	28	50	20	35.7	15	26.8
Renal colic	24	42.9	11	19.6	9	16.1	25	44.6	16	28.6	16	28.6
Loss of appetite	20	35.7	9	16.1	5	8.3	23	41.1	17	30.4	17	30.4
General weakness	24	42.9	12	21.4	6	10.7	30	53.6	20	35.7	20	35.7
***P*-value**	0.001*						0.357					

- * means there is statistical significant difference

Table (8): Multiple regressions of factors that affect success stone free rates by ESWL for studied sample.

Factors affecting success free rates of stone by ESWL	*P*-value	OR	95.0% C.I.	
			Lower	Upper
Total knowledge score	0.001*	2.152	1.601	8.421
Age: (> 70 years)	0.002*	1.252	0.252	6.223
Sex	0.251	3.763	0.894	15.836
Education	0.030*	1.254	0.305	5.240
Place of residence (rural)	0.012*	1375	1.052	11.406
Multiple stones	0.005*	1.793	0.309	10.423
Size of stone (more than 2cm)	0.040*	3.675	1.063	12.706
History of chronic disease	0.371	1.774	0.505	6.230
History of urinary tract stones	0.002*	3.298	0.265	5.356

- Multiple regression analysis

*** means there is statistical significant difference**

4.Discussion

Worldwide, urolithiasis is the third most common urological disease affecting elders after urinary tract infection and prostatic enlargement. Although new and effective therapeutic methods have been introduced recently, urolithiasis remains major health problem for older adults leading to many complications reach to renal failure **(Yoshida and Okada, 2008).** Extracorporeal Shock Wave Lithotripsy (ESWL) became the treatment of choice for upper urinary tract stones for older adults with success rates ranged from 60-90%. Positive outcomes of the procedure depends on several factors such as size, location, and number of stone and the knowledge about precautions followed prior, during and after ESWL session to ensure clearance of stone **(Abid, 2014).**

The aim of the present study was is to evaluate the impact of health teaching program for elderly patients undergoing ESWL on clearance of urolithiasis.

Findings of the current study ensured that health teaching, which is one of the most important nursing responsibilities, had a significant impact on clearance of urolithiasis after ESWL procedure, and on improvement of patients' knowledge about preventing newly urinary tract stones.

Findings of the current study showed that the mean of age for the study and control group was (65.46 ± 5.13 and 65.91 ± 5.49) respectively, this was supported by **Yoshida and Okada (2008)** who founded in their study increased incidence of uroloithiasis among people aged 65ys and more and also agreed with **Stamatiou *et al.* (2006)** who studied 500 patients with urinary tract stones undergoing ESWL, and founded more than 45% of the studied sample were aged persons 60 years and more. Many recent literatures explained that prevalence of urolithiasis increased with aging, and discussed that the aged kidneys became less efficient in eliminating solutes from the blood, coupled with decreased total body fluid and physical activity putting older adults at greater risk for urinary tract stones formation than younger persons **(Halter *et al.*, 2009).**

As regards sex, our results revealed that the majority of the studied sample was male. This was highly similar to findings of **Onkar *et al.* (2009)** and **Abid (2014)** who founded in their studies that male patients undergoing ESWL procedure represented the highest percentage than females. This discussed by **Abbagani *et al.* (2013)** because anatomical difference between males and females; in which male urethra is longer than female which, this may cause accumulation and stagnation of urine in the bladder for longer times. Also increased incidence in males has been attributed to increased dietary protein intake, which increases urinary excretion of phosphates and magnesium and reduces urinary citrate concentration.

While the lower risk of stone formation in women was attributed to estrogen treatment in postmenopausal women that can decrease the risk of stone recurrence by lowering urinary calcium and calcium oxalate saturation. Estrogen may also help to prevent the formation of calcium stones by keeping urine alkaline and raising protective citrate levels **(Heller *et al.*, 2008).**

Concerning the educational level, it was observed that illiteracy had the highest percentage in our studied sample represented. This was in consistent with findings of **Abd El-Hakim (2007)** who found that 40% of the studied patients were illiterate, but disagree with **Yoshida and Okada (2008)** who found similar percentage between educated and none educated patients in their studies.

Also results revealed that the vast majority of the studied sample was living in rural areas. This supported by findings of **Stamatiou *et al.* (2006),** and **Gamal *et al.* (2010)** who founded that the majority of the studied sample was lived in rural areas, and explained that lack of education, poor sanitation, and poor media in rural areas place people at higher risk for disease. While disagree with **Onkar *et al.* (2009)** who mentioned that

place of residence had no effect on incidence of urinary tract stones or outcomes of ESWL procedure.

Our result showed that (69.6%) of the study group and (78.6%) of control group had chronic diseases, with highest percentage for hypertension, diabetes, cardiovascular and respiratory diseases. This was highly agree with results of **Yokio *et al.* (2012)** who conducted a study on 209 elderly stone formers over age 65 in Tokyo hospital to investigate the relation between co-morbidities and incidence of urolithiasis, and founded that chronic diseases such as diabetes, hypertension, and hyperparathyroidism are associated with an increased risk of developing kidney stones in old age. Also in agreement with **Stamatelou *et al.* (2010)** who studied risk factors of renal stones in elderly population of India, and their results revealed increased urinary calcium excretion commonly detected in hypertensive and diabetic patients that increase stone formation. While disagree with **Tag-Eldeen *et al.*, (2000)** who studied causes and risk factors of urolithiasis in Alexandria, and founded the commonest causes were gout and hyperparathyroidism with percentages of (35% and 24% respectively).

Concerning history of urinary stones, results displayed that the majority of the studied sample had a history of urinary tract stones. This was in agreement with the results of **Abid (2014)** who conducted perspective study on 500 elderly patients undergoing ESWL in Baghdad, and reported that vast majority of the studied sample was had previous history of urinary tract stones.

According to recent literature of **Anderson and Brenner (2013)**; aging of the kidney is characterized by changes of both structure and function making the prevalence of renal calculi increased with increasing age with high rate of recurrences. Also the aging kidney is constantly exposed to the effects of variety processes such as drugs and chronic illnesses putting elders at greater risk for urinary tract stones.

In our study; renal stones had highest percentage as previous stone location in both groups. This was highly supported by the results of **Yoshida and Okada (2008)** who studied epidemiology of urolithiasis among older adults in Japan, and founded that the most noticed stone location in the studied sample were renal stones. Also confronted by findings of **Abd El-Hakim, (2007)** who founded that more than 55% of the studied sample had a previous history of renal stones.

In our study the mean of stone size was (14.71mm and 17.23 mm) for the study group and control group respectively. This was in agreement with the findings of **Brownie, (2006),** and **Koketsu *et al.* (2012)** who founded mean size of stone formers involved in their studies was (14,65 mm & 17.11mm) for both respectively.

Concerning comparison of stone clearance between the two groups, results revealed that success free rate of stones by ESWL occurred in the study group more than the control group presented by percentages of (83.9% and 66.1%) for both groups respectively.

The outcome of ESWL was described as; a success or failure, whereas success means stone-free (complete stone clearance, or clinically insignificant residual fragments <4 mm with no symptoms within 6 months after ESWL). While failure means residual stone fragments (clinically significant residual fragments more than 4 mm after three sessions of ESWL, as confirmed by a plain film).

Hence findings reflected statistical significant different with P-value (0.029*) between success free rate of stones by ESWL in both groups, in which stone clearance rates occurred in the study group more than the control group. These findings were highly in approval with findings of **Rajkumar *et al.* (2012)** who founded success free rates of stones among study group was higher than the control group. Also supported by **Abd El-Hakim (2007)** who studied impact of using lithotripsy on clearance of renal stones in Ein-Shams University hospital, and found that success stone free rate for the study group was 85% versus 79% for control group with *P*-value (0.001*).

In addition submitted by **Koketsu *et al.* (2012)** who conducted a study in Australia involved elderly patients undergoing ESWL and confronted that ESWL became the treatment choice for renal and upper ureteral stone among elders with a highly success free rate of 85-90%.

The current study findings revealed a great lack of elderly patients' knowledge about (urinary tract stone disease, ESWL procedure, and disease prevention) prior the application of educational program. These findings were in agree with **Colella *et al.* (2011)** who founded that the majority of the studied sample had unsatisfactory level of knowledge about urinary tract stones, ESWL procedure among the studied sample. Also supported by **Ahmed (2007)** who studied the most effective treatment modalities for management of urolithiasis in Cairo University and founded that 90 %the vast majority of the studied group had poor knowledge about lithotripsy as an effective safe treatment modality for elders.

After implementation of the educational program for the study group, patient's knowledge was significantly improved, this was in agreed with **Yılmaz and Turgut, (2011**) who stated that patient education is the most helpful approach for preventing recurrences of urinary tract stone.

Recent literatures by **Schietal *et al.* (2009)** and **Pietrow and Preminger, (2011)** reported that Patient education and counseling are vital roles of geriatric

nurse for effective care concerning; causes and risk factors for stones formations, ESWL procedure, its advantages for elders, precautions to be followed prior, during and after ESWL procedure. Also planning teaching program to prevent the formation of new stones concerning; (lifestyle changes, dietary recommendations, importance of exercise and weight reduction, increasing fluid intake, monitoring the outcomes of ESWL and compliance of treatment) are a critical roles in caring for patients undergoing ESWL and in preventing urinary tract stones recurrences.

Results showed there was highly statistical significant difference between knowledge of the study group who had received health education in pre and post knowledge test with P value was (0.001*), while no statistical significant difference between knowledge of the control group in pre and post-test presented by *P*-value (1.000), which reflect no improvement in their knowledge.

As regard effect of total knowledge score on total stone clearance rates for the study and control group, results of present study reflected that there was statistical significant difference between stone clearance rate and total knowledge score for the studied sample presented by *p*-value (0.001*), in which patients of the study group who get free stone after ESWL had mean of knowledge score more than those of control group. This was in agreement with **Gentle and Leslies, (2005)** who mentioned that outcomes of ESWL procedure is greatly depend on knowledge by instructions that should be followed prior, during and after procedure. Also supported by **Al-Ansari *et al.* (2006)** who conducted a study on 300 patients undergoing ESWL in Elmansoura university hospital, and reported that high success rates of ESWL observed among patients who had high score of knowledge about ESWL.

Also the manifestations declined after ESWL for the study group who had education program than control group with statistical significant different (*P*-value 0.001*). These results were in consistent with **Awad *et al.* (2010) and Colella *et al.* (2011)** who founded marked decline in manifestations of the study group under ESWL than control group, and added that knowledge by the procedure, instructions to be followed after it, and recommended dietary plan were greatly affect outcomes of ESWL and the severity of manifestations.

Related advanced literature discussed that outcomes of lithotripsy is strongly affected by several factors including; stone factors (number, size, site, and composition), patient factors (e.g. obesity, co-morbidities, presence of hematological abnormalities, urinary tract infection, and anatomical abnormalities), operator experience, and machine factor such as type of lithotripter, shock wave number, and shock wave energy **(Al-Ansari *et al.*, 2006).**

Finally multiple regression analysis of factors that affect success stone free rates by ESWL for studied sample showed that sex and history of chronic diseases had no effect on stone free rates while; Knowledge, age, place of residence, education, stone location, size, number of stone, and history of recurrent urolithiasis had a significant effect on stone free rates by ESWL among the studied sample. With highly statistical significant difference.

In our study the success free rates of ESWL are achieved with single and smaller stones (from 4 mm to less than 2.5 centimeters).while stones that very large in size or are multiple, the effectiveness of ESWL was less favorable, and patient required several ESWL sessions or ESWL failed. Also results of this study reflected that ESWL gave best results for stones located in the kidney itself than in the ureter. Upper calyx, and middle calyx renal stones had a significant clearance over the lower pole renal stones. These findings were highly supported by findings of **Abd El-Khalek *et al.* (2007)**, who founded that better fragmentation of stones ranged from 5mm to less than 25mm and that located in kidney itself.

On other hand stone clearance rates occurred in present study for the study group who received health education about (ESWL, care before, during and after ESWL procedure, instructions that help flushing of stone fragments from the urinary tract after ESWL, and methods of preventing future stones) more than stone clearance occurred for control group who hadn't received health education program. This means that education program provided by the researcher also had a significant impact on clearance rates of stones.

This was in agreement with findings of **Colella *et al.* (2011)** who conducted a study in India about Impact of nursing care for patients undergoing ESWL procedure on outcomes of ESWL and founded that stone clearance rates was better in those received education than those who not received with a percentage of 87.0% versus 71%. Also in consistent with the studies of **Talic *et al.* (2012)** who reported that Stone-free rates was significantly influenced by patient knowledge regarding procedure, instructions to be followed, dietary plan to be recommended after ESWL.

Also results were highly in agreement with **Fouad (2004), Choi *et al.* (2009)**, and **Abid (2014)** who founded Stone-free rates by ESWL was greatly affected by age, place of residence, stone size, location and number, history of recurrent urolithiasis. In addition in consistent with **Dore *et al.* (2011)** who conducted perspective study on 200 elderly patients undergoing ESWL in Spain, and found that patient age ($p < 0.001$), stone size ($p < 0.001$), location ($p < 0.002$), and number ($p < 0.001$), knowledge ($p = 0.003$), and

history of renal stones ($p < 0.001$) had a significant impact on the stone-free rates by ESWL among the studied sample.

While disagree with **Onkar *et al.* (2009)** who mentioned that outcomes of ESWL influenced by sex with high success free rates for females rather than male presented by *P*-value (0.002*). Also disagree with **Al-Ansary *et al.* (2006)** who founded there is no statistical significant difference between stone free rates ESWL and place of residence.

Conclusion

Based on the results of the present study it can be concluded that

- Patients knowledge regarding; urinary tract stone disease, extracorporeal shock waves lithotripsy (ESWL), and methods of preventing future urinary stones were poor prior the application of educational program.
- Impact of giving health teaching was significant in improving patient's knowledge regarding (urinary tract stone disease, ESWL procedure, and methods for preventing recurrent urolithiasis).
- Application of educational program for elderly patients undergoing extracorporeal shock waves lithotripsy reflected significant impact on outcomes of ESWL and clearance of urolithiasis.

Recommendations

Based on results of the present study the following can be recommended:

For patients:

- A continuous educational and training program planned and offered on regular basis for patients undergoing ESWL procedure in ESWL unit.
- Written, simple and Arabic booklet should be available and provided for those high risk group included (instructions to be followed, diet and life style modifications that prevent formation of urinary stones).

For further study and research:

- Replication of the current study on larger probability sample is recommended to achieve generalize ability and wider utilization of the designed program.

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