Assessment of educational needs for elderly patients with urolithiasis undergoing extracorporeal shock waves lithotripsy

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Abstract

Background: Today 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 without surgical intervention. **The aim of this study**: was to assess educational needs for elderly Patients undergoing extracorporeal shock waves lithotripsy in order to design an educational program as indicated by their knowledge. **Descriptive research design**: was used. **Patients & methods**: the study was carried out in Minia Al-Watany hospital. The sample was included 112 patients suffering from upper urinary tract stones undergoing ESWL procedure. Data was collected in a period of 6 months started from January to the end of June 2013. An interview questionnaire sheet consists of one tool was utilized divided into three parts, first part; included socio-demographic characteristics, second part; included past and present history, and third part; was to assess knowledge of elderly patients regarding disease and ESWL procedure. **Results:** the majority of patients were male, married, come from rural areas, and illiterate (66.1%, 79.5%, 50.9, and 61.6 % respectively), the mean of age was (65.46 ± 5.13). Results showed unsatisfactory total knowledge scores about urolithiasis, ESWL, and disease prevention among the studied sample. **Conclusion:** education for patients with urolithiasis undergoing ESWL is very necessary to achieve a satisfactory level of knowledge about the procedure, clearance of stone, and prevention of stone recurrence. Replication of this study on larger probability sample is highly recommended.

Key words: Assessment, Urolithiasis, Extracorporeal Shock Waves Lithotripsy & Stone Clearance.

Introduction

The Central Agency for Public Mobilization and Statistics (2011) reported that the number of the elderly population in Egypt by 2011 was 8.5 million elders represented 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**.** Therefore, nurses must be prepared to meet the challenges of caring for this rapidly increasing segment of 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 glomerulus's decreased by 40%, and there is a reduction in renal blood flow and the glomerular 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) means presence of stones anywhere in the urinary tract, it considered one of the most painful urological diseases in Egyptian older adults, responsible for 45% of urological hospital admissions per year, and accounting for approximately 800,000 elderly patient hospitalizations **(El-Sharqawy & 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 significant impact on the quality of their life **(Robnett & Chop, 2012).**

The goal of kidney stone treatment among 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. Also planning teaching program concerning; lifestyle changes, dietary recommendations, importance of exercise and weight reduction, increasing fluid intake, monitoring the outcomes and compliance are a critical roles in managing stone formation in elderly and in preventing its future occurrences **(Schietal et al., 2009, Pietrow & Preminger, 2011).**

Significance of the Study

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. It was founded that about 16% of chronic renal failure (CRF) among the Egyptian elderly patients caused by renal stones **(Helmy, 2010).**

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.

Because extracorporeal shock waves lithotripsy (ESWL) became the first treatment choice for 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 assess educational needs of elderly patients with urolithiasis undergoing ESWL in order to design educational program for them as indicated by their knowledge.

Aim of the study

Assess educational needs for elderly patients undergoing extracorporeal shock waves lithotripsy in order to design an educational program as indicated by their knowledge.

Subjects & Methods

I-Research design

Descriptive research design was used in this study.

II-Technical design

Setting of the study

This study was carried out in Minia Al-Watany hospital.

Sample

Convenient sample of 112 elderly patients meeting the study criteria. Collection of data was in a period of six months started from January 2013 to the end of June 2013.

Inclusion criteria

All available elderly patients aged 60 years and more, both sexes male and female, with upper urinary tract stones undergoing first session of ESWL procedure were included in this study.

Exclusion criteria

- Elderly patients with secondary ESWL session.
- Elderly patients suffering from deafness.
- Elderly patients with mental disabilities.

Study tools: To achieve the purpose of the current study one tool was developed by the researcher based on current related literature **(Stamatiou et al., 2006, Ahmad, 2007, Collela et al., 2011, Rajkumar et al, 2012, & Abid, 2014)** for collecting data divided into three parts:

Part (I): Included **socio-demographic data** such as: (name, age, sex, marital status, occupation, location, and level of education)and

Part (II): Medical data sheet included; past medical histories of chronic diseases, past history of urinary tract stones and present complaints.

Part (III): Knowledge assessment sheet included:

- Knowledge about urolithiasis disease included (structure of urinary tract, definition, causes, risk factors, clinical manifestations, complications, and treatment approaches of urolithiasis).
- Knowledge about ESWL procedure included; (definition, advantages, and indication of ESWL, instructions to be followed prior, during and after lithotripsy).
- Knowledge about methods of preventing the recurrence of urinary tract stones.

Scoring system

Each right answer was given one score. The total scores were 95. Those who obtained less than 60 % were considered having unsatisfactory knowledge level, equal or more than 60 % were considered having satisfactory.

Administrative design

An official permission to conduct the proposed study was obtained by the researcher from the Manager of Minia El-Watany hospital. Also consent was obtained from each elderly patient participated in the study. Clarification of the nature and purpose of the study was done on initial interview with each patient. The

researcher emphasized that the participation was absolutely voluntary and confidentiality of each subject will be assured throughout the whole study.

Operational design

Ethical Considerations

The purpose of this study was explained for every elderly patient, each patient has ethical right to agree or refuse participation in the study and has the right to withdraw from the study at any time; consent to participate was taken, and informed them that the information obtained will be confidential and will be used only for the purpose of the study

Technique for data collection: This study was carried out through 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, and then the content validity of the tool was checked and revised by 5 nursing and medical experts. Reliability was estimated by Alpha Cronbach's test for the tool and its result was R= 0.84. This phase ended by pilot study.

A pilot study

- A pilot study was conducted before starting data collection to evaluate clarity of the study tool and to estimate the time needed to fill the sheet. It was carried out on a sample of 12 elderly patients with upper urinary tract stones undergoing extracorporeal shock waves lithotripsy procedure that were excluded from total sample. The necessary modifications were done according to the result of the pilot study.

Phase II: (Implementation phase)

- Once the permission was obtained to conduct the study, the researcher initiated data collection. 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 (1-3 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..

Statistical design

Data analysis was done by using (SPSS, version 17). Data were analyzed and expressed using descriptive statistics in the form of frequencies and percentages for qualitative variables, and using means and standard deviations for quantitative variables. Using ANOVA test was used for assessment of the inter-relationships among quantitative variables. Statistical significance difference was considered when statistical significance was considered at p-value < 0.05.Chi-square test was used to determine significant for non-parametric variable.

Limitations of the study

Our assessment 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.

Results

Table (1): Distribution of the studied sample according to their socio- demographic characteristics and medical history of chronic diseases.

Socio- demographic characteristics	(N=112)	Percent %
Age		
60 - < 65 years	53	47.3
65 - < 70 years	32	28.6
≥ 70 years	27	24.1
Mean ± SD	65.46 ± 5.13	
Sex		
Male	74	66.1
Female	38	33.9
Marital status		
Married	89	79.5
Widow	23	20.5
Educational level		
Illiterate	57	50.9
Read and write	6	5.4
Basic education	27	24.1
Secondary	12	10.7
University	10	8.9
Job before retirement		
Employ	16	14.3
Free work	29	25.9
Farmer	30	26.8
Housewife	37	33.0
Place of residence		
Urban	43	38.4
Rural	69	61.6
Medical history of chronic disease #		
Hypertension	76	67.9
Diabetes mellitus	56	50
Cardiovascular diseases	39	34.8
Liver disease	25	22.3
Osteoporosis	18	16.1
Hyperparathyroidism	14	12.5
Gout	8	7.1

Table (2): Distribution of the studied sample according to their history of urinary tract stones and present complaints.

History of urinary tract stones.	Sample (n= 112)	Percent%
Previous hospital admission with urinary tract stones		
Yes	64	57.1
No	48	42.9
Place of stones		
Renal stone	26	23.2
Renal and ureteral	22	19.6
Ureteral stone	10	8.9
Bladder stone	6	5.4

History of urinary tract stones.	Sample (n= 112)	Percent%
Number of recurrence		
Only one time	21	32.8
Two times	18	28.1
More than 2 times	25	39.1
Present complaints #		
Dysuria	65	58.0
Frequency of urination	63	56.3
General weakness	55	49.1
Hematuria	50	44.6
Renal colic	46	41.1
Flank pain	45	40.2
Difficulty with urination	29	25.9
Pyuria	24	21.4
Incontinence	11	9.8
Nausea & vomiting	10	8.9
Fever & chill	8	7.1

 # means more than one answer

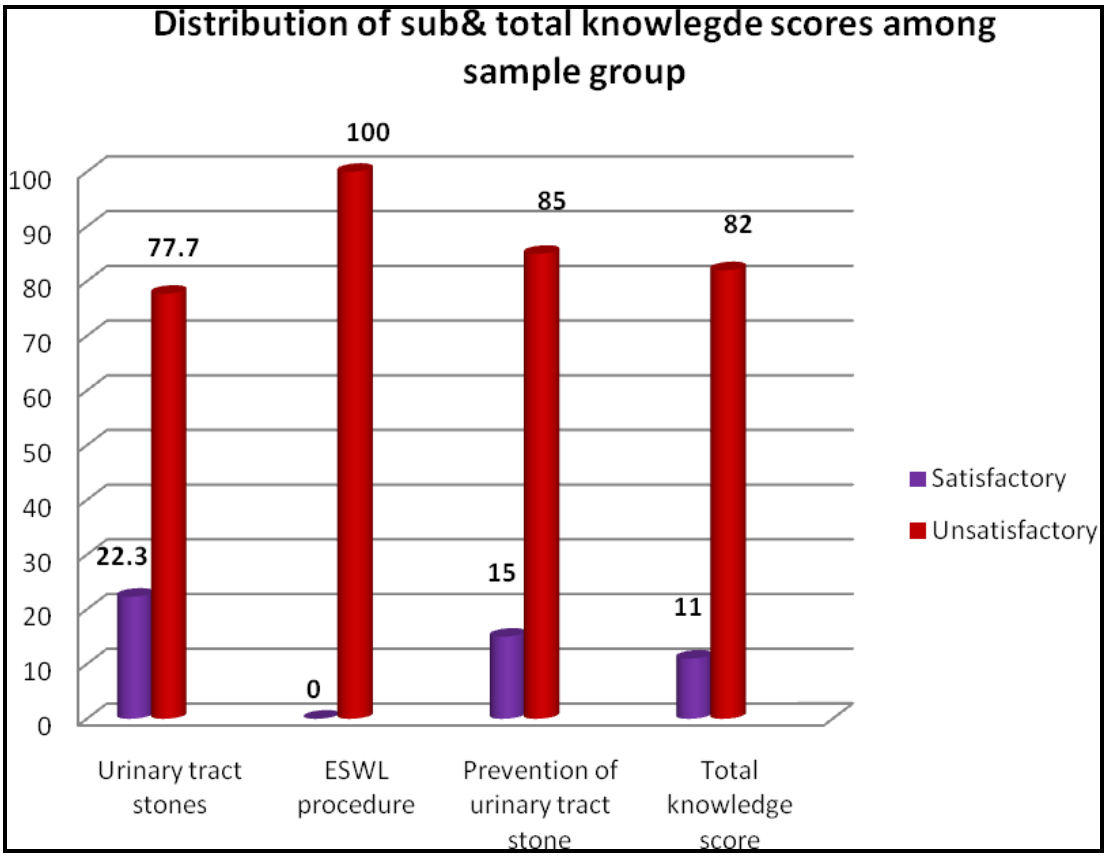

Figure (1): displayed distribution of subtotal and total knowledge score of studied sample.

Table (3): Relationship between socio – demographic variables and total knowledge scores about urolithiasis, ESWL procedure and disease prevention among studied sample.

Variables	Total knowledge score				χ2	*P*-value
	Unsatisfactory		Satisfactory			
	No	%	No	%		
Sex						
Male	68	68.0	6	50	1.549	0.213
Female	32	32.0	6	50		
Age: (years)						
60 - < 65 years	44	44.0	9	75.0	7.615	**0.006***
65 - < 70 years	29	29.0	3	25.0		
≥ 70 years	27	27.0	0	0.0		
Marital status						
Married	79	79.0	10	83.3	0.123	0.725
Widow	21	21.0	2	16.7		
Residence						
Urban	34	34.0	9	75.0	7.615	**0.006***
Rural	66	66.0	3	25.0		
Level of education						
Non educated	90	90.0	0	0	56.300	**0.001***
Educated	10	10.0	12	100		

** Mean statistical significant difference*

Table (1): Illustrated distribution of the studied patients according to their socio-demographic characteristics and past medical history. It was founded that (mean ± SD) of age for the studied sample was 65.46 ± 5.13. In addition the majority of the studied patients was; male, married, illiterate, and come from rural areas with percentages of (66.1%, 79.5%, 50.9% and 61.6% respectively). As regarding medical history of chronic diseases; it was founded that the commonest chronic diseases founded among them were; hypertension, diabetes, and cardiovascular diseases with a percentage of 67.9%, 50%, and 34.8% respectively.

Table (2): Showed distribution of the studied patients according to their history of urinary tract stones and present chief complaints. Results revealed 57.1% of them had a history of previous hospital admission with urinary tract stones, renal stones had a highest percentage as a stone location and 39.1% of them had recurrent urinary stones more than two times. Concerning present complains; it was cleared that the commonest manifestations observed among them were; dysuria, frequency of urination, general weakness and hematuria.

Figure (1): Showed subtotal and total knowledge score of the studied patients regarding urinary tract stones, extracorporeal shock waves lithotripsy procedure (ESWL) and disease prevention. It displayed that the majority of the studied patients (82%) had unsatisfactory level of knowledge**.**

Table (3): Showed total knowledge score of the studied patients regarding (urinary tract stone disease, ESWL procedure, and disease prevention) in relation to their socio-demographic characteristics. It was founded that there was statistical significant relation between total knowledge score of the studied patients and their; age, place of residence and education presented by P-value (0.006*, 0.006*, and 0.001*) respectively.

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 with high recurrences rates and complications reach to renal failure **(Yoshida & 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 to assess educational needs for elderly patients undergoing extracorporeal shock waves lithotripsy in order to

design an educational program as indicated by their knowledge.

Findings of the current study showed that the mean of age for the studied patients was 65.46 ± 5.13, 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. Also findings were in consistent with **Abd El-Hakim, (2007)** who founded that about half of studied patients undergoing ESWL procedure in Ein-Shams University hospital were aged person. 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 more than half of the studied patients 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 patients. This was in consistent with findings of **Abd El-Hakim, (2007)** who found that more than one third 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 majority of the studied patients was living in rural areas. This supported by findings of **Stamatiou et al., (2006),** & **Gamal et al., (2010)** who founded that the majority of the studied patients 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.

Concerning past medical history; result reflected that the commonest chronic diseases founded among them were; hypertension, diabetes, and cardiovascular diseases. This was highly agree with results of **Yokio et al., (2007)** 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. In addition in agreement with **Kennie, (2008)** who reported that elderly people with high blood pressure are up to three times more likely to develop kidney stones. While disagree with **Tag-Eldeen et al., (2005)** who studied causes and risk factors of urolithiasis and founded the commonest causes were gout and hyperparathyroidism.

As regarding history of urinary stones, results displayed that more than half of studied patients had past 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 patients 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. 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 patients were renal stones. Also confronted by findings of **Abd El-Hakim, (2007)** who founded that more than half of

the studied patients had a previous history of renal stones.

Also findings of the current study reflected that the commonest present manifestations reported by the studied patients were; (dysuria, frequency of urination, general weakness and hematuria). This is in approval with the results submitted by **Kamal et al., (2008)** who conducted a study on 500 Australian elderly patients with upper urinary tract stones, and founded that dysuria, hematuria, and renal colic were the commenst complaints among the studied sample.

Abbagni et al., (2013) discussed that elderly patients not usually presented by typical manifestations of diseases, either because of physiological changes that takes place with aging, or the signs and symptoms of disease in older individuals may be non-specific or hidden by underlying chronic conditions. Hence fever had low percentage in our study explained by the changes in the immune response that modified the usual signs and symptoms of infections (e.g. body temperature may not become significantly elevated until in cases of severe infection).

The current study findings revealed a great lack of elderly patients' knowledge about (urinary tract stone disease, ESWL procedure, and disease prevention), and more than three quarters of the studied patients had unsatisfactory level of knowledge which indicate the need for educational program. **Koketsu et al., (2012)** reported that, an accurate assessment of the patient's educational level must be made before an effective educational program can begin.

These findings were in agree with **Colella et al., (2011)** who founded that the majority of the studied patients had unsatisfactory level of knowledge about urinary tract stones, ESWL procedure among the studied patients. Also supported by **Ahmed, (2007)** who studied the most effective treatment modalities for management of urolithiasis in Cairo University and founded that the majority of the studied patients had poor knowledge about lithotripsy as an effective safe treatment modality for elders.

In addition our results are in the same line with **Pak & Andersen, (2013)** who conducted a study in Belgica for assessing the effectiveness of lithotripsy in management of renal stones among elders, and founded lack of knowledge about instructions that should be followed prior-during and after lithotripsy among the participants. These findings could be attributed to lack of educational level in which the majority of the studied sample was illiterate.

Recent literatures by **Pietrow and Preminger, (2011) & Pak & Andersen, (2013)** 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.

Concerning total knowledge score of the studied sample in relation to socio-demographic characteristics, results reflected that there was highly statistical significant relation between total knowledge score of the studied sample in relation to their age presented by P-value (0.006*). This agreed with **Gentle & Leslie,** (**2009),** and **Rajkumar and Schmitgen, (2012)** who founded statistical significant relation between mean of total knowledge score and age in their studies, and related that to normal physiological changes with aging that affecting cognitive abilities. Also in consistent with **Yoshida & Okada, (2008)** who reported that learning takes place differently depending on a person's age and added that the person's ability to receive, remember, analyze, and apply new information diminished with aging.

As regards place of residence, results revealed that there was statistical significant relation between total knowledge score of the studied sample and place pf residence presented by P-value (0.006*). These findings were highly in consistent with those of **Gentle & Leslies, (2009)** who found that the majority of elderly patients with urolithiasis living in rural areas had poor knowledge regarding the disease and methods of its prevention, and explained that lower socioeconomic status may predispose to lack of awareness either because of shortage of mass media or difficulty for accessing to health services in their own rural areas. But disagree with **Carthy et al., (2008)** who conducted a study on 500 patients in Tokio and reported that all participants patients lived either in urban or rural areas were had negative awareneness regarding caused, risk factors, advanced treatment modalities of urolithiasis.

In addition findings showed there was statistical significant relation between total knowledge score and educational level with P-value (0.001*). These findings were highly consistent with **Gentle and Leslies, (2009)** and **Rajkumar & Schmitgen, (2012)** who found high relation between educated patients and their mean of knowledge score. Also supported by **Fouad (2004)**, who stated that limited knowledge was observed in patients with lower educational levels regarding ESWL.

While there is no statistical significant relation between knowledge of the studied patients and their

sex. This was supported by **Ahmed, (2007)** who founded there was no statistical significant relation between total knowledge score of the studied patients in relation to their sex presented by P-value (0.073). while disagree with **Carthy et al., (2008)** who conducted study in Canada on 500 patients about prevention of urolithiasis among older adults, and founded that male patient had high knowledge score than female patients with P-value (0.003*).

Conclusions

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

- Patients had unsatisfactory level of knowledge regarding urolithiasis, extracorporeal shock waves lithotripsy (ESWL) and disease prevention.
- Educational program for elderly patients undergoing ESWL is necessary to achieve satisfactory level of knowledge and success free rates of stone after ESWL.

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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