Needs of Patients with Renal Stones Undergoing Percutaneous Nephrolithotomy

Asmaa Ahmed Mohamed [1], Baghdad Hussein Mahmoud [2], Enas Ebrahiem Elsayed[2]

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ABSTRACT

Background: Urolithiasis is a common disease in urology, which produce great adverse influence on people's lives and health. Management of renal stones can be classified into prevention and management that are focus on life-style modification. **Aim of the study:** The study aimed to assess needs of patients with renal stones undergoing percutaneous nephrolithotomy. **Design:** A descriptive exploratory research design was used in this study**. Setting**: The study was conducted in urology department at El Fayoum General Hospital. **Subjects:** A purposive sample of (80) adult patients from both sex were included in the study. **Tools**: Two tools were used for data collection. Tool I: Patients' structured interview questionnaire: which included (a) Patients' demographic data (b) Patients' health history Tool II: Needs assessment questionnaire: This tool was used to assess patient's needs (Physical, Psychological, Social, spiritual and learning needs). **Result:** The present study illustrates that, 53.8% of the studied patients had low level of needs, while 46.2% had high level of needs**,** regarding patients' medical history 72.5% of them were have renal colic. Also, 72.5 % of them took analgesics to relieve these symptoms**. Conclusion**: There were a highly statistically significant correlation between spiritual needs and physical needs of the studied patients **Recommendation**: Design educational program for patients with renal stones to increase awareness regarding the disease to prevent recurrence of renal stone.

Keywords: Nephrolithotomy, Percutaneous, Renal Stones.

1. Clinical Instructor in Technical Institute of Nursing Fayoum University, Egypt.
2. Assist Profs of Medical Surgical Nursing, Faculty of Nursing Helwan University, Egypt.

INTRODUCTION

Urolithiasis is a common urological disorder, which includes kidney stones, ureteral stones, bladder stones, and urinary tract stones. The main symptoms of urolithiasis are sudden onset of low back pain and hematuria. Urolithiasis may lead to serious consequences without timely treatment, such as hydronephrosis, uremia, infection, abscess, acute kidney injury, and renal failure, threatening patients' health and life. However, it is reported that the prevalence and incidence of urolithiasis are increasing worldwide, which is threatening human's live and health **(Hou, et al., 2023).**

Kidney stones (also known as urinary stones) are mineral deposits in the renal calyces and pelvis that are found free or attached to the renal papillae. They contain crystalline and organic components and are formed when the urine becomes supersaturated with respect to a mineral. Calcium oxalate is a major constituent of most stones, which form on calcium phosphate. Stone formation is very widespread. Kidney stones are affecting approximately 10% of adults globally and its incidence is increasing. Kidney stone forms as a result of imbalance of crystallization inhibitors and promoters.Calciumcontaining calculi represent approximately 80% of stones **(Durmus, 2022).**

Urinary stone formation is one of the most widespread diseases known to man. The disease has a multifactorial etiology that includes anatomic, environmental, genetic, infectious, metabolic, nutritional, and most importantly socio-economic factors. Caused by a biochemical imbalance in urine between stone-forming inhibitors and promotors in a process known as lithogenesis. The mechanisms underlying the formation begin by increased urinary supersaturation of lithiasis promoters in the urine, followed by nucleation and aggregation.The crystals combine with other crystals in solution to form agglomerates that accumulate in the kidney **(Kachkoul, et al., 2023).**

Many patients will remain asymptomatic until renal calculi travel from the renal pelvis downward through the ureters and into the bladder. Flank pain, which can radiate to the groin, is frequently the first noticeable symptom.Severe pain, also known as renal colic, along with nausea and vomiting, results from ureteral spasms and swelling of the kidney secondary to the obstructed urine flow created by the calculus.Obstruction may lead to urinary urgency and frequency with the onset of dysuria. Hematuria may result from small tears created by the movement of a calculus. Signs and symptoms of infection may also accompany renal calculi **(Coffman, et al., 2022).**

The treatment of renal stones, including external shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PNCL), and intrarenal retrograde surgery (IRS). However, each of these approaches has limitations and the development of new technologies is ongoing to offer personalized therapy adapted to each patient. Percutaneous approach remains more advantageous compared to IRS, such as for patients with urinary diversion (ileal conduit, neobladder), lower pole caliceal stone or stones in caliceal diverticulum **(Baboudjian, et al., 2022).**

Percutaneous Nephrolithotomy (PCNL) heralded a revolution in treating large renal stones. It gained popularity with comparable success rates to open renal stone surgery. Now it is the recommended treatment for renal stones larger than 2 cm and staghorn stones. The PCNL success rate is as high as that of open surgery. It is associated with a shorter hospital stay, less morbidity, and fewer complications than open surgery. Several modifications have been made in the PCNL techniques and instruments to reduce the morbidity of the procedure and increase cost-effectiveness **(Abdelgawad, et al., 2023).**

The nurse plays an important role in improve communication, care coordination and the provision of emotional support. Patients with urinary stone disease often experience a variety of problems relating to quality of life, and require complex, multi-staged treatment. This means that holistic, patient-centered care is particularly important. The provision of patient-centered care is important for patients with urinary stone disease, although their specific needs should be considered in relation to the personality and circumstances of the individual aspects of patient-centered care except the involvement of friends and family is very important **(Ayyad, 2022).**

SIGNIFICANCE OF THE STUDY

Urolithiasis is a common urinary system disease globally.It can be formed by the precipitation or crystallization of minerals and urinary constituents. It is the third most common urinary tract problem after urinary tract infections and prostate disorders.The incidence of this disease ranges from 7-13% in North America, 5-9% in Europe, 1-5% in Asia and in Saudi Arabia, its ratio is 20% of the whole population. In 2019, more than 115 million incident cases of urolithiasis occurred worldwide. The most common current treatments for renal stones include extracorporeal shock wave Lithotripsy (ESWL), PCNL, and retrograde intrarenal surgery**(Karkee, et al., 2023).**

Renal calculus disease has a prevalence of 1.7% to 18% in patients with chronic kidney disease (CKD) and renal calculus related CKD contributed to 3.2% of the total patients who started maintenance dialysis therapy. The classic presentation of renal calculus is abdominal or flank pain. Patient may have dysuria, urgency, and frequency depending upon whether patient have associated urinary tract infection. Approximately 30% of patients will report hematuria. Patients may be asymptomatic also **(Kumar, et al., 2022).**

Renal stones in the Europe is around 7–9%, Asia 1–5% and in North America 6–12%. The lifetime prevalence of renal stones in India is 5–11%. This prevalence represents threefold increment and 5–6% absolute increment in last 20–30 years. Increased in the number of cases is reported in all groups irrespective of gender, racial and ethnic variation. prevalence of urinary calculi was found to be higher in Egyptians (29.5%) rather than other nationalities during their study which carried out in Saudi Arabia about epidemiology of urolithiasis **(Sangolli, et al., 2021).**

AIM OF THE STUDY

The aim of this study was to assess needs of patients with renal stones undergoing percutaneous nephrolithotomy.

The aim of the study achieved through:

Assessment of Physical, Psychological, Social, spiritual and learning needs of patients with renal stones undergoing percutaneous nephrolithotomy.

SUBJECTS AND METHODS:

I- Technical item:

The technical design includes research design, setting, subjects and tools for data collection.

Research design:

Descriptive exploratory research design was used in this study.

Setting:

This study was conducted in urology department at El Fayoum General Hospital.

Subjects:

A purposive sample of (80) adult patients from both sex have been recruited in this study according to the following inclusion criteria

*__Inclusion criteria__ as: Adult patient from both genders undergoing percutaneous nephrolithotomy. Diagnosed with renal stones and scheduled for PCNL. Able to communicate verbally. Willing to participate in the study.

*__Exclusion criteria__ as: Psychiatric patients and patient with chronic complication. Patients insert percutaneous nephrostomy catheter for other purposes.

Tools for data collection are:

Two tools were used to collect data for this study:

This tool was adapted from **(Elkhateeb, 2021)** and was modified by the investigator based on a review of relevant literature and will be written in simple Arabic for data collection.

Data was collected through using the following tools:

Tool I: Patients' structured interview questionnaire:

This tool was consisting of two parts:

Part I: Patients' demographic data:

This part was assessed demographic characteristics of the patients as (age, gender, marital status, occupation, educational level, …etc.). It composed of (6) closed ended questions.

Part II: Patients' health history:

This part included (information about duration of illness, data related to previous hospitalization, sign and symptoms, methods of treatment, family history, stone analysis test…etc.). It composed of (12) closed ended questions.

Tool II: Needs assessment questionnaire:

This tool is adapted from **(Elkhateeb, 2021).**

This tool was used to assess patient's needs (Physical, Psychological, Social, spiritual and learning needs). This part includes (94) questions about assessment of patient's needs (Physical, Psychological, Social, spiritual and learning needs)**.** This part contains five sub items as the following**:** Assessment of physical needs which include (28) closed ended questions. Assessment of psychological needs which include (8) closed ended questions. Assessment of social needs which include (7) closed ended questions. Assessment of spiritual needs which include (4) closed ended questions. Assessment of learning needs which include (47) closed ended questions.

Scoring system

Scoring system for tool II (Patient's Needs Assessment Questionnaire): Needs that obtained from the studied patients was checked as (Yes) which scored 1 grade and (No) which scored Zero.

II- Operational Item:

The operational item included the preparatory phase, content validity and reliability of the developed tools, pilot study and field work.

A) Preparatory phase*:*

It was including reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection. During this phase, the investigator also visits the selected place to get acquainted with the personnel and the study setting. The development of the tools was under supervisor's guidance and experts' opinions were considered.

B) Validity:

The tools of the study were revised by a jury of 5 experts: assistant professors and lecturer of medical surgical nursing from faculty of nursing, Helwan University to review tools for clarity, relevance, comprehensiveness, understanding and applicability. Modifications of tools were done according to the panel judgment on clarity of sentence, appropriateness of content, sequence of items and accuracy of scoring.

Reliability:

Cronbach's Alpha was used to determine the internal reliability of the tool. The result was as the following: Patient's health history (0.802), Patient's needs assessment questionnaire (0.754). Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1. higher values of Cronbach's alpha (more than 0.7) denotes acceptable reliability.

C)*Pilot study:*

The pilot study was done on (10) % of the sample (8) patients to examine the clarity of questions and time needed to complete the study tools. Based on the results, subjects included in the pilot study will be included in the main study sample if No modifications will be done.

D) Field work:

-An approval was obtained from a scientific ethical committee of the Faculty of Nursing at Helwan University.

- An approval was obtained from the director of El Fayoum General Hospital.

-The purpose of the study was simply explained to patients under study prior to any data collection.

-The investigator was available in urology department at El Fayoum general hospital 3 days per week (Saturday, Monday and Thursday) from 9 am: 1 pm to collect data from patient within 3 months from September to November 2022.

-The study tools were filled in and completed by the investigator once.

III- Administrative Item:

Approval to carry out this study was obtained from the directors of El Fayoum General Hospital in which study will be conducted.

Ethical considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee. Participation in the study is voluntary and subjects was given complete full information about the study and their role before signing the informed consent. The ethical considerations were include explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs will be respected.

IV-Statistical Item:

Upon completion of data collection, data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 24 for analysis.

The P value will be set at 0.05. Descriptive statistics tests as numbers, percentage, mean ± standard deviation (± SD), will be used to describe the results.

RESULTS

Table (1): Frequency and percentage distribution of demographic characterstics for the studied patients. (n=80).

Items	Studied patients (n = 80)	
	N	%
Age group:		
• 20-29 Yrs	11	13.8
• 30-39 Yrs	20	25
• 40-49 Yrs	27	33.7
• ≥50 Yrs	22	25.5
Mean ±S 34.235 ± 7.65		
Gender:		
• Male	46	57.5
• Female	34	42.5
Marital Status:		
• Single	8	10
• Married	62	77.5
• Divorced	3	3.7
• Widow	7	8.8
Level of Education:		
• Not read and write	8	10
• Read and write	23	28.7
• Intermediate education	28	35
• University education	21	26.3
Occupation:		
• Employee	43	53.7
• Worker	16	20
• Does not work	12	15
• Housewife	9	11.3
Place of residence:		
• Urban	36	45
• Rural	44	55

Table (1) shows that **33.7** of the studied patients were from 40-49years old while 13.8% were from 20-29 years old. and the mean age of studied patients was (34.235 ± 7.65) years old whenever, 57.5% of them were males and 77.5% of them were married. Also, 35% of the studied patients have intermediate education, 53.7 of them were employee and 55% of them were from rural area.

Table (2): Frequency and percentage distribution of medical history data for the studied patients (n=80).

Variable	Studied patients (n = 80)	
	N	%
Duration you know you had kidney stones.		
• Days	20	25
• Months	41	51.3
• Years	19	23.7
The disease discovered.		
• By chance	22	27.5
• Appearance of kidney stones symptoms	58	72.5
If the disease is discovered through symptoms, what are these symptoms? (n=58)		
• Renal colic	58	72.5

Variable	Studied patients (n = 80)	
	N	%
• High temperature	23	28.8
• Nausea, vomiting and loss of appetite	18	22.5
• Burning in the urine and hematuria	38	47.5
• Oliguria	11	13.8
Take medications to relieve these symptoms.		
• Yes	58	72.5
• No	22	27.5
If the answer is yes, what are these medications? (n=58)		
• Analgesics	58	72.5
• Antibiotics	30	37.5
• Anti-inflammatory	19	23.8
hospitalized because of kidney stones.		
• Yes	39	48.7
• No	41	51.3
If the answer is yes, what was the treatment method used? (n=39)		
• Medications	15	18.8
• Lithotripsy by shock waves	8	10
• Surgery	6	7.5
• Endoscope	10	12.5
The analysis done before to find out the presence of stones.		
• Yes	42	52.5
• No	38	47.5
Done previous surgery.		
• Yes	26	32.5
• No	54	67.5
If yes, what is the previous surgery? (n=26)		
• Appendectomy	6	7.5
• Cholycystectomy	4	5
• Tonsilectomy	3	3.8
• Renal stone	4	5
• CS	6	7.5
• Hernia	3	3.8
Times that you enter to the hospital because of renal stone.		
• Once	40	50
• Two times	13	16.3
• Three times	7	8.8
• More than three times	9	11.3

Table (2) shows that, 51.3% of the studied patients knows that they had kidney stones from months , 72.5% of them discovered by appearance of kidney stones symptoms and 72.5% of them were have renal colic. Also, 72.5 % of them took analgesics to relieve these symptoms, 51.3% of them have no history of hospitalization because kidney stones. Whenever, 52.5 % of the studied patients done analysis to find out the presence of stones , 67.5 % of them had no previous surgery and 50% of them enter the hospital one time because of renal stone.

Table (3): Frequency and percentage distribution of sub total needs of the studied patients(n=80).

Variable	Patient's needs			
	Low		High	
	N	%	N	%
Physical needs	46	57.5	34	42.5
Daily activities	41	51.3	39	48.7
Psychological needs	38	47.5	42	52.5
Social needs	64	80	16	20
Spiritual needs	62	77.5	18	22.5
Educational needs about disease (kidney stones)	38	47.5	42	52.5
Educational needs before performing the endoscopy	70	87.5	10	12.5
Educational needs about the operation and anesthesia	61	76.3	19	23.7
Educational needs after endoscopy	34	42.5	46	57.5
Educational needs for self-care after discharge	41	51.3	39	48.8
Total needs	43	53.8	37	46.2

Table (3) shows that, 53.8% of the studied patients had low level of needs, while 46.2% had high level of needs.

Figure (1): percentage distribution of the total needs of the studied patients (n=80).

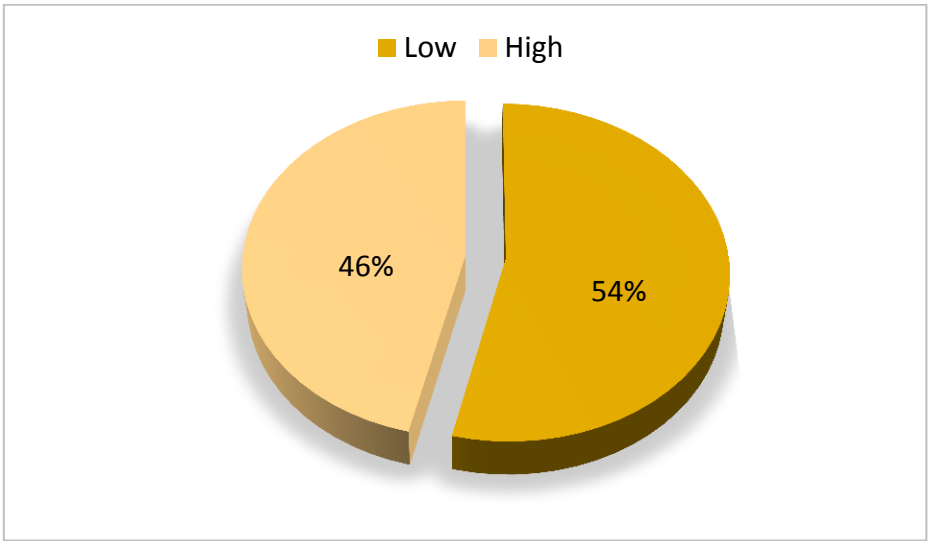

Figure (1) shows that, 53.8% of the studied patients had low level of needs, while 46.2% had high level of needs.

Table (4): Correlation between physical needs and psychological, social, spiritual & educational needs.

Variable	Physical Needs	
	Correlation Coefficient	*P*-value
Psychological Needs	-0.066	0.561
Social Needs	0.175	0.120
Spritual Needs	-0.300	**0.007***
Educational Needs	0.063	0.579

*: Significant at P ≤ 0.05

Table (4) indicates that, there is a highly statistically significant correlation between spiritual needs and physical needs of the studied patients at P (0.007).

DISCUSSION

Regarding to the demographic characteristics of the studied patients, there were one third of studied sample were in age group from 40-49 years old with mean±SD was (34.235 ± 7.65). This finding disagreed with ***Mohamed, et al., (2022):*** who

conducted a study in Egypt, and found that the age of the studied patients was more than 40 years with the mean age (42.1±8.7).

In relation to their gender males represented more than half which was may be interpreted by as the possibility of, higher incidence of urinary out flow obstruction & urinary stones especially in men older than 50 years.

This finding agreed with ***Mostafa, et al., (2022):*** who conducted a study in Egypt, and found that the nearly three quarters of them were males, this result is contradicted with ***Abdelwahab, et al., (2021)*** who stated that, renal stone disease affected females more than males. In relation to their residence this study finding can clarify the fact that more than half of them were from rural area. This finding was may be due to in availability of tertiary health care settings. In addition to lack of education, poor sanitation, and poor media in rural areas place people at higher risk for diseases, also this may be because the large areas of Fayoum governorate are rural areas.

This result was in accordance with ***Mahmoud, et al., (2019)*** who clarified that, around two thirds of patients were lived in rural areas.

Regarding medical history of the studied patients, our result showed that about nearly three quarter of them discovered by appearance of kidney stones symptoms, having renal colic and took analgesics to relieve these symptoms this finding was agreed with ***Glenn, (2018)*** who stated that, pain is the most common symptom when passing a kidney stone and it occurs with obstruction, in which the urine cannot pass freely from the kidney to the bladder and if be worsen called renal colic.

This finding disagreed with ***Ali, et al., (2019)*** who reported that, In relation to past medical history, almost three quarters of the studied patients were had chronic renal illness, and more than one half of them had chronic illness since 5 years ago, more than half of studied patients were previously hospitalized and most of them previously underwent surgical procedures which include PCNL and open surgery.

Physical needs for the studied patients As regards to symptoms of stone, reported by studied patients in the present study the majority of the studied subjects mentioned acute renal colic followed by their effect on sleep, daily activity and appetite, This finding disagreed with ***Abd El-Wahid, et al., (2018)*** who found that, the majority of studied subjects mentioned acute renal colic followed by dysuria and vomiting.

Regarding to Psychological needs for the studied patients the present study clarified that the most of the studied patients were worry about their health condition, feel afraid of the complications from operation and the frequent use of medications. Also, more than half of them refuse to participate in recreational activities. This finding may be due to sensation of a pain, and the worry of complication.

This finding was in accordance with ***Mu, et al., (2021)*** who mentioned that, higher score of patients represented a worse psychological state (depression and anxiety).

Regarding to social needs for the studied patients the present study clarified that all the studied patients had inadequate level of self-care practices regarding social interaction and work performance**,** two third of the studied patients their health condition effects participation on social activity, while more than three quarter of them their health condition effect on performance at work, also more than half their monthly income is not sufficient to meet their needs two third not receive any governmental or non-governmental financial support to assist with the surgery and treatment.

Furthermore, less than of them their health condition affect on their marital relationship, this may be due to unpleasant sensations and pain during sexual intercourse and ejaculation, which could be caused by ureteral pain. Also, may be due to symptoms related to surgery.

This finding was in accordance with ***Michel-Ramírez, et al., (2020),*** who found that, ureteral stent-related symptoms had a negative impact on the patient's economy and reported that, more than half of patients had reduced work capacity due to the discomfort of the surgery and nearly half of them were unable to work. Also, half of the patients sought medical attention for the surgery-related symptoms.

Spiritual needs for the studied patients Regarding to spiritual needs for the studied patients the present study clarified that about two third of the studied patients feel uncomfortable these results may be due to the patients under the pain of surgery, will have anxiety feel uncomfortable and depression, and also have poor sleep quality.

So, comfort care is patient-centered, which follows the physiological and psychological characteristics of patients, integrates the love and responsibility of nursing staff into nursing work, meets the basic nursing requirements of patients, and at the same time, takes targeted measures to solve patients' psychology, sleep quality and pain, thus reducing postoperative pain and relieving patients' bad emotions.

This finding was in accordance with ***Mei, et al., (2022)*** who found that most patients have anxiety feels uncomfortable.

Regarding educational needs, the current study showed that the majority of studied patients had medically insufficient knowledge about treatment, prescribed diet, life style changes for kidney stones, don't have knowledge about signs and symptoms, advantages of the procedure or prescribed drugs, post procedure, life style changes, following prescribed diet and complications.

This finding was in accordance with ***Abd-Eldayem, (2018)*** who found that the most persistent educational needs in more than half of studied patients.

Regarding to correlation between physical needs and psychological, social, spiritual & educational needs for the studied patients the present study clarified that there highly statistically significant correlation between spiritual needs and physical needs of the studied patients from the researcher's point of view, when the physical condition improves the psychological condition will improves, the spiritual condition rises, and vice versa.

This finding was supported by **Fathy, *et al., (2019),*** who reported that, there was a strong statistically significant positive correlation between spiritual needs and physical needs of the studied patients in their study.

CONCLUSION

Based on the results of the current study, the following can be concluded:

The result of the present study indicate that nearly half of the studied patients had low level of needs while more than two fifth of them had high level of needs, and there was a highly statistically significant correlation between spiritual needs and physical needs of the studied patients at $P \leq 0.05$.

RECOMMENDATIONS

Based upon the results of the current study, the following recommendations were suggested:

- Health educational intervention about needs of patients with renal stones undergoing percutaneous nephrolithotomy
- Educational classes at urology department focusing on improving their awareness regarding needs of patients with renal Stones undergoing percutaneous nephrolithotomy.

Recommendation for further researches:

- A replication of the study on a larger sample from different hospitals setting in Egypt to generalize the study results.
- Further study about effect of instructional guidelines on patients suffers from renal stones undergoing percutaneous nephrolithotomy.

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