Effect of Multimedia on Dietary Regimen for Patients with Urinary System Stones

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Abstract

Background: urinary stones are one of the most prevalent urological diseases worldwide. **Aim**: this study aimed to evaluate the effect of multimedia on dietary regimen for patients with urinary system stones. **Design:** A quasi experimental study. **Setting:** The study conducted at the Student Educational Hospital and Urology Department at Tanta Universal Teaching Hospital and both are affiliated to Tanta University Hospital. **Subjects:** A convenience sample of 60 adult conscious patients diagnosed with urolithiasis. **Tools:** Three tools were enrolled in the study for data collection: Tool (I) Socio-demographic and clinical data tool, Tool (II): Patients' knowledge assessment questionnaire, Tool (III): patients' perception assessment regarding using multimedia questionnaire**. Results:** there was a highly statistical significant difference in Patients' knowledge levels after application of multimedia through period of the study, pretest was (6.6%) which developed to (78.3%) posttest then become (80%) in follow up also the majority of the studied patients (81.7%) had satisfaction regarding using multimedia and only (18.3) didn't have satisfaction. **Conclusion:** the multimedia improved patients' knowledge and there was an increase in patients' satisfaction regarding using multimedia in health education. **Recommendation:** it was recommended that using multimedia and audio-visual materials in continuous health education regarding dietary regimen for urinary tract stone as it is important in improvement of patients' knowledge and nursing role.

Key words: dietary regimen, multimedia, urinary stone

Introduction

Urolithiasis or urinary stone is the third most prevalent disease of the urinary tract that becomes more common over the past decades [(1-2).] The worldwide kidney stone prevalence rate is 1.7% to 8.8% [(3).]It is a recurrent condition and stone formers are much more likely to have a further stone. The incidence of recurring rate of secondary stone formations estimated to be 10–23% per year, 50% in 5–10 years, and 75% in 20 years of the patient[(4)]. Urinary tract stones are classified into calcium oxalate, calcium phosphate, uric acid, cysteine, struvite, and mixed stones types, depending on the material of the stone [(5)].Calcium stones account for almost 70–80% of all urinary tract stone, struvite or magnesium ammonium phosphate occur to extent of 10-15 %, uric acid account approximately for 3-10% and cysteine related stone comprise less than 2% of all stone types [(6)].

Urinary tract stones have been associated with high risk of end-stage renal failure, chronic kidney diseases, cardiovascular diseases, hypertension and diabetes [(7)].There are several risk factors associated with

urolithiasis genetic, age, gender, body mass index (BMI), weight, water intake, medical morbidities, occupation, hot climate and dietary intake [8].Dietary and lifestyle changes are a major strategy for the prevention of kidney stone recurrences. Dietary intervention aims to correct urinary abnormalities known to induce lithogenesis[9,10].

Patient education increases patient understanding and adherence to medical instructions, which has a major impact on long-range outcomes [11].Effective teaching helps patients apply health-related knowledge to their lives and improve their quality of life [12].Over the past several decades, improvements in technology have dramatically increased the accessibility and quality of care that is available digitally [13].Multimedia-based interventions may provide a relatively low-cost, time-efficient, user-friendly and easily-accessible medium for patient education [14].Nurses play a trusted and critical role in educating patients and expected to plan, implement, and evaluate strategies for patient learning [15].

Nurses have the best opportunity to identify patients 'educational needs and can provide information and self-care education [16].

Significance of the Study

Prevalence of urolithiasis has been increasing in the past decades in both developed and developing countries [1]. This growing trend is believed to be associated with changes in lifestyle modifications such as lack of physical activity and dietary habits [17]. The likelihood of the reoccurrence of the urolithiasis is mainly related to the diet consumed by the patient. So, it is necessary that the patient should adhere to the dietary modification to prevent the reoccurrence and the complications of urinary tract stone.

Using multimedia can stimulate more than one sense at a time, and in doing so, may be more attention-getting and attention-holding and so, the study will be conducted to recognize patient knowledge and studying effect of using multimedia on dietary regimen.

Aim of the study

This study aimed to: Evaluate the effect of multimedia on dietary regimen for patients with urinary system stones.

Research hypothesis

1-Among patients with urinary system stones, the knowledge scores regarding dietary regimen is expected to be improved after multimedia has been provided when compared with base line (pretest) knowledge scores.

2- Among patients with urinary system stones, the level of perception regarding multimedia is expected to be increased.

Subjects and Method

Study design

A quasi- experimental design was utilized in this study.

Study Setting:

The study was carried out at two settings; the first one is the Student Educational Hospital, the second setting is Urology Department at Tanta Universal Teaching Hospital and both are affiliated to Tanta University Hospital.

Subjects

A convenience sampling of 60 adult conscious patients diagnosed with urolithiasis.

Inclusion criteria: were adult conscious patients (21-60) years old diagnosed with urinary stone

Exclusion criteria: were Patients had more than 3 times kidney stone recurrence. - Patients with uncontrolled hypertension. -

Patients with uncontrolled diabetes. - Patients with cancer.

Tools for data collection:

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

Tool I: Socio-demographic and clinical data

This tool was developed by the researcher after reviewing relevant recent literatures [18, 19]. It consisted of three parts as follow:

Part (1): Socio-Demographic characteristics of patients: This part concerned with patients age, sex, occupation, level of education, income, marital status, and residence data.

Part (2): Patients` Medical History: This part concerned with stone history as (onset of present urinary stone attack, types of previous therapy, and family history of urinary stone).Medical problems (gout-hyperparathyroidism-urinary tract infection Cohn's disease).Use of stone provoking drugs such as (diuretics, vitamins as C or D, antihypertensive drugs and others).

Part (3): Patient's laboratory tests which included: lab investigations such as urinalysis as (urine culture). Blood analysis which included (serum creatinine, urea) according patient hospital records.

Tool (II): Patients' knowledge assessment questionnaire

This tool was developed by the researcher after reviewing the related literatures **[4, 19, 20, and 21)**, it consists of 3parts

Part (1): Assessment of patients'` knowledge regarding urinary system stone disease (definition, types of kidney stone, symptoms, risk factors)

Part (2): Assessment of patients` knowledge regarding food items for prevention of complications of urinary system stone formation: which included eating more or less of these items of foods such as fruits , vegetables, sugary food, fish and seafood, red meat, dark chocolates.

Part (3): Assessment of Patients' knowledge related to fluids and beverages intake. such as drink plenty of fluid in hot weather situation, drink water before sleep or when you wake up at morning by a one or two cups , drinking a large amount of fluid in case of fever and severe diarrhea.

Two levels of scoring for questions were utilized as following:

-close ended questions. Correct answer scored (1), Incorrect answers scored (0). Each right answer was given one score. The total scores were 23.

The total scoring system of patients' knowledge was calculated and classified as the following:

- High level of knowledge (if total knowledge score > 70%).
- Moderate level of knowledge (if total of knowledge score from 55% to 70%).
- Low level of knowledge (if total knowledge score< 50%).

Tool (III): patients' perception assessment regarding using multimedia questionnaire. This part was adapted from Krauss and Alleys (2007)[22]modified Learning Object Review Instrument (LORI)This part consisted of 9 items to assess patient awareness regarding using multimedia such as (using multimedia was attractive, using graphics and animated movie was effective over any traditional approach, multimedia provided helpful on-line information when required, multimedia retained attention.

Two levels of scoring for questions utilized as following:

-Yes scored (1).

-No scored (0)

The total scoring system of Patient perception calculated and classified as the following:

-Satisfactory if total score from (5-9)

-Not satisfactory if total score from (0-4)

Method

1-An official permission was obtained from the Faculty of Nursing and was submitted to responsible authorities of the selected settings for permission to carry out the study.

2-Ethical and legal consideration

- An approval of ethical committee of faculty of nursing was obtained.
- Written consent was obtained from every patient included in this study after explanation of the aim of the study.
- Privacy and confidentiality were maintained regarding data collection.
- Nature of the study did not cause any harm or pain to the entire sample.
- Patients had the right to withdraw from the study at any time.

3-Tools I& II were developed by the researcher after reviewing recent related literatures.

4 -The developed tools were tested for content validity for clarity and applicability by7experts of Medical-Surgical nursing and modifications were done.

5- The pilot study was conducted on 10%of patients to test the applicability of the tools and to determine any obstacles that might be encountered during the period of data collection and needed modifications were done. Those patients were excluded from the actual study

6- Suitable test reliability was applied on the previously mentioned tools.

7-Data collection took about4- 6 months.

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

a- Assessment phase:

This important initial phase involved the collecting data, to assess the situation before proceeding of developing the media of teaching about proper diet to prevent recurrence of urinary system stone. In this phase needs and problems of patients related to knowledge about urinary system stone diet were identified, as well as assessment of the study subjects' availability and agreement of the institution was assessed by using tool (I)

b- Planning phase

Based on the results of assessment phase as well as extensive literature review which included (healthy diet to help reducing the recurrence of urinary system stones), the researcher applied the study tool and multimedia content that help patients to acquire knowledge regarding healthy diet.

c- Implementation phase

In this phase schedule in order to assess patients' knowledge regarding healthy diet to help reducing recurrence of urinary system stones was developed 2 days /week. Patients' knowledge was assessed (pretest) using the tool developed by the researcher.

After completion of pretest, teaching sessions about diet to help reducing recurrence of urinary system stones were started using multimedia such **as recorded power point presentation, telephone, whats app program, text message, graphics and illustrated booklets. The session will cover the** theoretical knowledge of the proper diet and how its application helps in reducing urinary system stones recurrence. The post test was applied and collected from the participant immediately

and after 1month by using mobile phone and whats app for patients who had the application on their smart phone and can connect with the internet.

d- Evaluation phase

After 1 month the follow up was done for assessing patient perception regarding multimedia by using tool (III).

Statistical analysis

All statistical tests were conducted using SPSS for windows version 25.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation (SD). Categorical data were expressed in frequency and percentage. Chi-square test was used for comparison of variables with categorical data. Repeated measures ANOVA test was utilized to compare three or more group means where the participants are the same in each group. The Friedman Test is a test used to determine if 3 or more measurements from the same group are different from each other on a skewed variable of interest. Pearson correlation analysis was used for assessment of the inter-relationships among quantitative variables. To identify the independent predictors of the patient knowledge & perception multiple linear regression analysis was used after testing for normal distribution, normality, and analysis of variance for the full regression models were done. Statistical significance was set at $p<0.05$.

Results

Table (1): displays the socio-demographic characteristics of the study subjects, which consisted of 60 adult patients. The present study revealed that Mean± SD for age of the study group were (45.583 ± 10.165) Regarding gender, marital status, and residence; the majority of the subjects were married male and live in rural communities with (75%, 76.7%, and 68.3) consequently. In relation to occupation, the majority of the subjects (51.6%) were working manual work. Regarding education, about more than one third of the study subjects (40) were illiterate. The study results reported that more than half of the subjects (56.7%) had not enough income.

Table (2): illustrates Percent distribution of total level of knowledge regarding urinary stones among the studied groups**.** It shows highly statistically significant differences in patients' knowledge regarding urinary tract stones in relation to time (pretest, posttest and follow up) as **F= 379.327& p=0.000.**

Regarding overview of urinary stone, results found that nearly no one of patients had high knowledge Regarding overview of urinary stone pretest (0%) ,which developed to 38.3% posttest then become **(**86.7) in follow up**. With concerning with foods prevent urinary stone, the** study found that (15%) of the studied patients have high knowledge regarding foods that prevent urinary stone pretest, which developed to (90%) posttest, then become (98.3%) in follow up**. In relation to fluids prevent urinary stone, it** was found that less than quarter of studied patients (19%) have high knowledge regarding fluids that prevent urinary stone, which developed to (85%) posttest ,then become(90%) in follow up.

Figure (1): show Percent distribution of satisfaction regarding using multimedia among the studied groups. Results found that the majority of the studied patients (81.7%) have satisfaction regarding using multimedia and only (18.3%) don't have satisfaction

Table (3): Present relation between socio-demographic characteristics of the study group and their total knowledge (Posttest).

There was statistically significance between total knowledge posttest with age ,occupation and level of education when p-value <0.005.

Table (4): illustrate relation between socio-demographic characteristics of the study group and their total knowledge (follow up). There was statistically significance between total knowledge in follow up with occupation and level of education p-value <0.005.

Table (1): Percent distribution of socio–demographic characteristics among the studied groups (N=60)

Characteristics	N	%
Age (in years)		
Mean ± SD	**45.583 ± 10.165**	
Sex		
- Male	46	76.7
- Female	14	23.3
Marital status		
- Married	45	75
- Single	15	25
Residence		
- Rural	41	68.3
- Urban	19	31.7
Education		
- Read & write	9	15
- Illiterate	24	40
- Basic	3	5
- Diploma	14	23.3
- Higher education	10	16.7
Occupation		
- Governmental	7	11.7
- Manual	31	51.6
- Retired	1	1.7
- Not work	21	35
Income		
- Enough	26	43.3
- Not enough	34	56.7

Table (2): Percent distribution of level of knowledge regarding urinary stones among the studied groups.

total level of knowledge	Pretest		Posttest		Follow up		Significance
	No	%	No	%	No	%	
Overview of urinary stone							
- Low	58	96.7	22	36.7	0	0	X^2=100.607 p=0.000**
- Moderate	2	3.3	15	25	8	13.3	
- High	0	0	23	38.3	52	86.7	
Food items prevent urinary stone							
- Low	34	56.7	2	3.3	0	0	X^2=105.454 p=0.000**
- Moderate	17	28.3	4	6.7	1	1.7	
- High	9	15	54	90	59	98.3	
Fluids prevent urinary stone							
- Low	20	33.3	2	3.3	1	1.7	X^2=99.368 p=0.000**
- Moderate	21	35	7	11.7	5	8.3	
- High	19	31.7	51	85	54	90	
Total knowledge							
- Low	49	81.7	6	10	3	5	X^2=102.052 p=0.000**
- Moderate	7	11.7	7	11.7	9	15	
- High	4	6.6	47	78.3	48	80	
Mean knowledge ± SD	**11.016 ± 3.170**		**21.400 ± 1.428**		**22.766 ± 0.945**		**F= 379.327 p =0.000****

X^2 refers to Friedman test, F refers to Repeated measures ANOVA test, * refers to significance if p value < 0.05, ** refers to highly significance if p value < 0.001

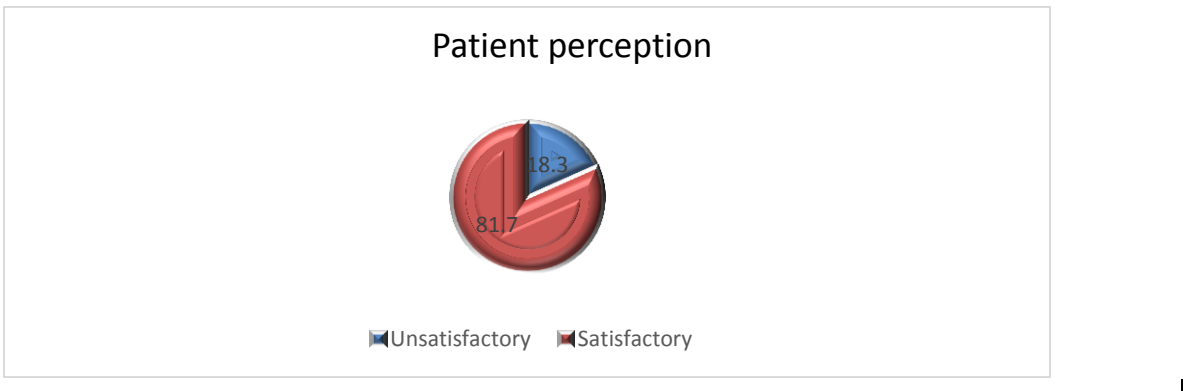

Figure (1): Percent distribution of level of satisfaction regarding using multimedia among the studied groups(n=60)

Table (3) : relation between socio-demographic characteristics of the study group and total knowledge (Posttest).

Characteristics	Low		Moderate		High		Significance
	N	%	N	%	N	%	
Age (in years)							
- 20-30	2	3.3	0	0	5	8.3	
- 31-40	1	1.7	0	0	12	20	X^2=13.861
- 41-50	3	5	1	1.7	15	25	p=0.031*
- 51-60	0	0	6	10	15	25	
Sex							
- Male	5	8.3	4	6.7	37	61.7	X^2=1.752
- Female	1	1.7	3	5	10	16.7	p=0.416
Marital status							
- Married	4	6.7	4	6.7	37	61.7	X^2=1.760
- Single	2	3.3	3	5	10	16.7	p=0.415
Residence							
- Rural	4	6.7	6	10	31	51.7	X^2=1.108
- Urban	2	3.3	1	1.7	16	26.7	p=0.575
Education							
- Read & write	0	0	4	6.7	5	8.3	
- Illiterate	1	1.7	2	3.3	21	35	X^2=16.612
- Basic	1	1.7	0	0	2	3.3	p=0.034*
- Diploma	3	5	0	0	11	18.3	
- Higher education	1	1.7	1	1.7	8	13.3	
Occupation							
- Governmental	0	0	0	0	7	11.7	X^2=14.807
- Manual	4	6.7	1	1.7	26	43.3	p=0.022*
- Retired	0	0	1	1.7	0	0	
- Not work	2	3.3	5	8.3	14	23.3	
Income							
- Enough	3	5	1	1.7	22	36.7	X^2=2.745
- Not enough	3	5	6	10	25	41.7	p=0.253

X^2 refers to Chi square test, * refers to significance if p < 0.05, ** refers to highly significance if p < 0.001

Table (4): relation between socio-demographic characteristics of the study group and total patient knowledge (Follow up).

Characteristics	Low		Moderate		High		Significance
	N	%	N	%	N	%	
Age (in years)							
- 20-30	0	0	1	1.7	6	10	
- 31-40	0	0	2	3.3	11	18.3	X^2=4.896
- 41-50	1	1.7	1	1.7	17	28.3	p=0.557
- 51-60	2	3.3	5	8.3	14	23.3	
Sex							X^2=6.700
- Male	3	5	4	6.7	39	65	p=0.035*
- Female	0	0	5	8.3	9	15	
Marital status							X^2=2.926
- Married	3	5	5	8.3	37	61.7	p=0.232
- Single	0	0	4	6.7	11	18.3	
Residence							X^2=2.073
- Rural	3	5	7	11.7	31	51.7	p=0.355
- Urban	0	0	2	3.3	17	28.3	
Education							
- Read & write	1	1.7	5	8.3	3	5	
- Illiterate	1	1.7	2	3.3	21	35	X^2=16.886
- Basic	0	0	0	0	3	5	p=0.031*
- Diploma	0	0	1	1.7	13	21.7	
- Higher education	1	1.7	1	1.7	8	13.3	
Occupation							
- Governmental	0	0	2	3.3	5	8.3	
- Manual	1	1.7	1	1.7	29	48.3	X^2=27.093
- Retired	1	1.7	0	0	0	0	p=0.000**
- Not work	1	1.7	6	10	14	23.3	
Income							X^2=2.421
- Enough	0	0	4	6.7	22	36.7	p=0.298
- Not enough	3	5	5	8.3	26	43.3	

X^2 refers to Chi square test, * refers to significance if p < 0.05, ** refers to highly significance if p < 0.001

Discussion

urolithiasis is a public health concern worldwide with a prevalence of 5–10% [(23)]. The likelihood of the reoccurrence of the renal calculi is mainly related to the diet consumed by the patient. So it is necessary that the patient should adhere to the dietary modification to prevent the reoccurrence and the complications of renal calculi [(2)].

Consequently, there is a remaining need for effective educational tools that can be efficiently used by healthcare providers to present information to patients or that patients can access independently to learn about the urinary stone risk factors dietary habits for prevention of recurrence of urolithiasis. Multimedia-based teaching allows content to be easily understood and learned, especially those with low literacy levels and difficulty concentrating [(24)].

Concerningsocio-demographic characteristics of patients with urolithiasis, the findings of the present study revealed that urinary stones were most common among age group(50-60) by Mean& SD **(45.583 ± 10.165),** this finding is justified by this may be related to the fact that prevalence of urolithiasis increased with aging. This finding was in agreement with Ismy et al., (2021) [25] who studied the correlation between demographic factors and urolithiasis composition in a tertiary hospital and stated that the mean age of studied groups were (45.52± 13.90). This result is inconsistent with another study done by Luck man et al., (2019) [26] in their book about "medical surgical nursing, psychophysiological approach" stated that, early middle adulthood between the 20-40 years old urinary stones occurred. This may be attributed to that people depend on delivery and fast food in this age.

As regard to sex, the present study showed that Most of the study group was males. This finding may be related to increased physical stress and exposure to ambient temperature in male. This result was similar with Javed et al., (2022) [27] who reported that most patients with urolithiasis were male. On the other hand, this finding was in contrast with Abdelwahab et al., (2021) [28] who studied Effect of Implementing Evidence-Based Guidelines on Lifestyle Modification for Adult Patients with Renal Stone Undergoing ESWL Procedure. And their results revealed that most of the studied groups were female

In relation to marital status, the findings of the current study revealed that the majority of the study was married. This finding may be because our communities focus on marriage, so we find that most of the elderly clients are married. This finding was supported by the results of Trongmatee et al .,(2022) [29] who found that the prevalence of urolithiasis was significantly higher in married patients.

As regard to residence, about two third of the study group resided in rural communities. This may be due to geographical place of Tanta University Hospital which near to patients from rural areas .This result was similar to Lakshmi et al., (2020) ([30] who studied Effectiveness of self-care intervention for patients with urolithiasis on their practices regarding nutrition and reported that about two third patients with urolithiasis resided in rural communities.

Regarding educational level, most of the study group which constitutes (40%) was Illiterate. This finding may be due to a lot of patients admitted to general hospital were poor. This result was in agreement with AL-Jumaily et al., (2019) [31] who studied Knowledge and Attitudes of Patients with Urolithiasis among Lithotripsy and stated that the most of the patients were unable to read and write and constitute about (20%) from total patients.

In relation to occupation, the findings of the current study revealed that half of the study group had manual work; this finding is justified by exposure to ambient temperature, excessive sweeting and decrease fluid replacement during long working hours. This finding was in harmony with Maddahi et al .,(2017) [32] who studied Major Dietary Patterns and kidney stone formation among Iranian men and reported that the prevalence of urolithiasis was significantly higher in workers.

Finally, in relation to income, the results of the current study revealed that more than half of the study group did not have enough

income; this finding is justified by the patients from higher income had chosen healthier food than those from lower income status. This finding was in line with Sowtali et al., (2022) [33] who studied Knowledge, Awareness and Practice on Dietary Management among Patients with Urolithiasis and reported that the prevalence of urolithiasis was significantly higher in patients with lower socioeconomic status than patients with higher socioeconomic status.

Concerning total patients pretest knowledge level, the current study illustrated that majority of studied patient group had low level of knowledge about urinary stone and dietary habits for prevention of recurrence of the disease. The distribution of the patients according to their score was categorized as follows: 49(81.7%) were in the low awareness level, 7 (11.7%) were in the medium level, and only 4(6.6%) participants were in the high level of awareness**.**

These results were in parallel with Baatiah etal., (2020) [34] who studied Urolithiasis: Prevalence, risk factors, and public awareness regarding dietary and lifestyle habits and has found that the distribution of the participants according to their pretest score was categorized as follows: 1279 (64.1%) were in the low awareness level, 704 (35.3%) were in the medium level, and only 11 (0.6%) participants were in the high level of awareness. From researcher point of view this finding may be interpreted by lack of information and recommendation about dietary habits for prevention of urinary stone provided by health care personal and lack of patients search about preventive ways to decrease recurrence of urinary stones. After implementation of health education to patients in study group, it was prominent that there was marked improvement in knowledge level for the studied patients.

A highly statistically significant difference was noticed in the knowledge of the studied group immediately and one month after of implementing multimedia based-health education. This can return to using audiovisual multimedia which could be easily understood and learned and provided a unique method for communicating with patients, especially those with low literacy levels and has difficulty concentrating. Also these media could help patients retain and recall needed information about preventive measures to decrease recurrence of urolithiasis.

This finding was parallel with Chiou et al., (2012) [35] who found that efficacy of the developed multimedia interactive DVD in significantly improving end-stage renal patient knowledge and reducing patient uncertainties and post decision regret.

Regarding patients' perception for using multimedia. The findings of the current study revealed that the majority of the studied patients have satisfaction regarding using multimedia and stated that multimedia was useful, interactive while only (18.3%) did not report satisfaction regarding multimedia. this finding was parallel with a study applied by Eneanya et al.,(2020)[36] for using of a Supportive Kidney Care Video Decision in older patients and the results indicated that patients who received video education reported high satisfaction and acceptability ratings.

Our study results also match with a study conducted by Kayler et al .,(2023) [37] who found that animated video education is promising to improve diverse individuals' knowledge, ease of learning concerns, and

communication confidence about kidney transplantation and is highly acceptable. Videos were helpful in percentage 98%, visually attractive 92%, interesting and engaging96%.

Concerning the relation between socio demographic characteristics of studied patients and their total knowledge score after implementation of multimedia, it was found that illiterate patients and manual work patients had higher mean scores of knowledge immediately(post-test) and 1month(follow up) after educational program. This finding may be related to that those patients form the majority of the studied patients. Also illiterate patients found that this educational program using video animation was easy to understand and the only way for getting enough information about their disease and healthy diet for prevention of recurrence of urinary stone due to lack of time available for health care provider regarding health education. For manual work patients group, from the researcher point of view those patients are more concerned about their health to prevent recurrence of hospitalization to earn their livings.

Conclusion

According to study results and the research hypothesis, a significant improvement in the total level of knowledge for the study group were observed after the program implementation .Also there was increase in patient's perception regarding using multimedia in health education.

Recommendation

Based on the findings of the present study the researcher recommend replication of the study using a larger probability sample to generalize the results and recommend Continuous health education programs should be planned and implemented on regular basis for patients with urinary stone in outpatient clinics and urology department.

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