

Investigating the Effect of Socio-Demographic Characteristics on the Quality of Life Among Patients with Kidney Stones

*Sousan Mohammadi-Kebar¹, Frahad Pourfarzi², Saber Nasiri³

1. Department of Internal Medicine, School of Medicine, Ardabil University of Medical Science, Ardabil, Iran.

2. Department of Community Medicine, School of Medicine, Ardabil University of Medical Science, Ardabil, Iran.

3. School of Medicine, Ardabil University of Medical Science, Ardabil, Iran.

ARTICLE INFO	ABSTRACT
<p>Article type: Original Article</p> <hr/> <p>Article History: Received: 30 Jul 2024 Accepted: 3 Sep 2024</p> <hr/> <p>Keywords: Kidney stones, quality of life, SF-36 questionnaire</p>	<p>Introduction: Kidney stones represent a prevalent urological condition, impacting approximately 12% of the global population. While the quality of life has been examined in various urological disorders, research focusing specifically on patients with kidney stones has been limited. This study aims to assess the influence of socio-demographic factors on the quality of life among individuals suffering from kidney stones.</p> <p>Materials and Methods: This cross-sectional analysis involved 142 patients diagnosed with kidney stones. The quality of life was measured using the 36-Item Short Form Health Survey. The data collected were analyzed using SPSS version 25, with results presented as means and standard deviations for quantitative data and frequencies and percentages for qualitative data. The U-Mann-Whitney test was employed to compare quantitative variables between two groups, while the Kruskal-Wallis test was used to compare three or more groups. A sign test evaluated patients' quality of life pre- and post-treatment changes.</p> <p>Results: Patients' scores varied, with the lowest recorded in the physical role limitations subscale (39.1±37.4) and the highest in the mental health subscale (62.7±15.1). A significant association was found between patients' gender and the subscales of social functioning (P=0.038), bodily pain (P=0.004), and general health (P=0.001). Treatment for kidney stones was shown to impact a patient's quality of life significantly.</p> <p>Conclusion: Individuals with kidney stones experience a diminished quality of life. Factors such as female gender, age exceeding 50, and obesity were notably linked to a decline in quality of life, whereas no significant correlations were identified with other factors. The treatment of kidney stones significantly contributed to an improvement in the quality of life.</p>
<p>► Please cite this paper as: Mohammadi-Kebar S, Pourfarzi F, Nasiri S. Investigating the Effect of Socio-Demographic Characteristics on the Quality of Life Among Patients with Kidney Stones. <i>Journal of Patient Safety and Quality Improvement</i>. 2024; 12(3): 127-134. Doi: 10.22038/psj.2024.81544.1438</p>	

*Corresponding Author:

Department of Internal Medicine, School of Medicine, Ardabil University of Medical Science, Ardabil, Iran.

E-mail: susan.kebar2019@gmail.com

© Copyright © 2024 Mashhad University of Medical Sciences. This work is licensed under a Creative Commons Attribution-Noncommercial 4.0 International License <https://creativecommons.org/licenses/by-nc/4.0/deed.en>

Introduction

Kidney stones represent a prevalent medical condition, impacting approximately 12% of the global population. This condition is observed to be more common in men than in women, and its incidence is on the rise (1).

Individuals with a prior occurrence of kidney stones face a 50% increased likelihood of developing another stone within the subsequent five years (2). While some patients may remain asymptomatic, a significant number experience symptoms, including intense flank pain, urinary tract infections, and hematuria, often necessitating hospitalization and surgical intervention (3,4). This disease may hurt the kidney function of patients and can also impair their quality of life (5). Kidney stones and their manifestations, as well as the mentioned therapeutic interventions, such as ureteral stents, can affect the patient's quality of life to different degrees. In addition to the manifestations of the disease itself, patients with kidney stones may suffer from other problems such as depression and anxiety, loss of working days, and economic problems, which themselves lead to a lower quality of life (6). On the other hand, investigating and measuring the quality of life of people in the community is one of the important health topics. Today, attention is paid to using tools that measure the quality of life in terms of different dimensions in society, and epidemiological research has received much attention (7). The provided definitions of quality of life that are useful for use in health care can be divided into five general areas: normal life, happiness and satisfaction, achieving individual goals, being useful to society, and the level of capacity. In other words, the quality of life can be seen as the link between a person's health status on the one hand and the ability to pursue life goals (as values to improve physical life) on the other hand (8,9). Examining the quality of life of patients with kidney stones is important because it helps us understand how the disease affects daily life and the personal burden of the disease (10). It is related to the severity of the disease and symptoms, laboratory values and imaging results, and the patient's understanding of the disease and its treatment. Many psychosocial factors should be considered, and factors affecting

the patient's quality of life should be carefully examined (6). Over the past 30 years, improving patients' quality of life has become an important part of treatment, and many tools have been developed to measure it. In this regard, several researchers worldwide have investigated the quality of life in patients with kidney stones (5,10-13). However, despite the importance of the topic, searching scientific databases inside Iran does not show any study in this field. Considering the limited information in this field in the country, the present study was conducted to investigate the impact of socio-demographic factors on quality of life among patients with kidney stones.

Materials and Methods

Study design

This descriptive and analytical study was conducted on all 142 patients referred to the nephrology clinic of Ardabil City Hospital in 1400 diagnosed with kidney stones. The sampling method was a census, and all patients were selected in this study; we have not used any formal sample size formula. First, the demographic characteristics of these patients, including sex, age, body mass index, marital status, education level, occupation, and income, were determined for all patients. Then, the patients were asked to complete the SF-36 questionnaire.

Research instruments and data analysis

The SF-36 questionnaire evaluates different areas of health-oriented quality of life in 8 areas, including general health, physical function, role limitation due to physical reasons, role limitation due to emotional reasons, physical pain, social function, energy and vitality, and mental health. The SF-36 questionnaire contains 36 questions. The number of questions for each area is as follows: general health (questions 1,33,34,35,36), physical performance (questions 3-12), role limitation due to physical reasons (questions 13-16), role limitation due to emotional reasons (questions 17-19), physical pain (questions 21,22), social functioning (questions 20,23), energy and vitality (questions 23,27,29, 31), and mental health (questions 1,33-36).

The questions are scored according to table 1-3. The score of each field is obtained from the sum of the scores of the questions in that field, which ranges from 0 to 100 for each field. Higher scores in this questionnaire indicate a higher quality of life (16). In addition, in order to investigate the relationship between the quality of life of the participants in the study and the treatment of kidney stones, the participants were asked to evaluate their quality of life before and after the treatment based on a 4-point Likert scale (poor, moderate, good, excellent). Data analysis was done using SPSS version 25 software. Quantitative variables were presented as mean and standard deviation, and qualitative variables were presented as frequency and percentage.

The Kolmogorov-Smirnov test was used to check the type of distribution of quantitative variables, which were all non-normal. Therefore, the U-Mann-Whitney test was used to compare quantitative variables between two groups, and the Kruskal-Wallis's test was used between three or more groups. A sign test was used to compare patients' quality of life before and after treatment. The significance level in all analyses was 0.05. Participation in this study was voluntary, and people were included if they had informed consent.

Results

Of all samples, 66.2% were men, 40.8% were overweight, and 57% were unemployed (Table 1).

Table 1. Demographic characteristics of the studied samples

variables	Levels	Number	Percentage
gender	Male	94	66.2
	Female	48	33.8
age category	30>	15	10.6
	30-50	58	40.8
	50<	69	48.6
BMI	Normal	36	25.4
	overweight	58	40.8
	Fat	48	34.6
marital status	Single	18	12.8
	married	124	87.3
education	illiterate	16	11.3
	Diploma and below	90	63.4
	collegiate	36	25.3
Job	Employee	11	7.7
	Unemployed	10	7
	freelance job	81	57
	Housewife	40	28.3

Table 2. The score of the study participants in the subscales of the SF-36 quality of life questionnaire

QOL subscale	n	lowest score	Top score	Average	standard deviation
Physical performance	142	5	100	53.4	23.9
Body role disorder	142	0	100	39.1	37.4
Emotional role disorder	142	0	100	43.2	41.2
Energy and vitality	142	0	85	49.7	19.1
emotional health	142	24	92	62.7	15.1
Social Performance	142	0	100	52.4	24.3
physical pain	142	0	100	44.9	24.1
general health	142	0	95	49.5	21.5

The patients recorded their lowest score in the role disorder subscale attributed to physical issues, with a mean of 39.1±37.4,

while the highest score was observed in the emotional health subscale, which had a mean of 62.7±15.1 (Table 2).

Table 3. Relationship between the quality of life of study participants and gender

Variable	Quality of life subscale	P-Value
gender	Physical performance	0.23
	Body role disorder	0.78
	Emotional role disorder	0.08
	Energy and vitality	0.82
	emotional health	0.43
	Social Performance	0.039
	physical pain	0.004
	general health	0.001
U-Mann-Whitney test		

The gender of patients showed a significant relationship with some areas of quality of life, such as the score of female patients in the subscales of social performance (P=0.039), physical pain (P=0.004), and general health (P=0.001), which was significantly lower than that of male patients (Table 3).

Table 4. Relationship between the quality of life of study participants and age

Variable	Quality of life subscale	P-Value
age category	Physical performance	0.014
	Body role disorder	0.087
	Emotional role disorder	0.38
	Energy and vitality	0.28
	emotional health	0.85
	Social Performance	0.33
	physical pain	0.22
	general health	0.27
Kruskal-Wallis's test		

Age had a significant relationship with the subscale of their physical performance (P=0.014), so the patients' scores in this subscale decreased with increasing age (Table 4).

Table 5. The relationship between the quality of life of the study participants and the weight group

Variable	Quality of life subscale	P-Value
weight	Physical performance	0.03
	Body role disorder	0.07
	Emotional role disorder	0.3
	Energy and vitality	0.16
	emotional health	0.8
	Social Performance	0.6
	physical pain	0.022
	general health	0.032
Kruskal-Wallis's test		

The patients' weight demonstrated a notable correlation with the subscales of physical performance (P=0.03), physical pain (P=0.022), and general health (P=0.032). Consequently, the scores of obese patients in these subscales were significantly lower compared to those of normal-weight or overweight patients (refer to Table 5). Furthermore, the quality of life among the patients did not show a significant association with marital status, educational attainment, or occupational status.

Table 6. The relationship between the quality of life of the study participants and the treatment of kidney stones.

		Quality of life before treatment									
		weak		medium		Good		Excellent		Total	
		n	%	n	%	n	%	n	%	n	%
Quality of life after treatment	weak	3	2.1	0	0	0	0	0	0	3	2.1
	medium	24	16.9	14	9.9	3	2.1	0	0	41	28.9
	Good	37	26.1	40	28.2	0	0	0	0	77	54.2
	Excellent	4	2.8	12	8.5	5	3.5	0	0	21	14.8
	Total	68	47.9	66	46.5	8	5.6	0	0	142	100

The results showed that kidney stone treatment had a significant positive effect on the patient’s quality of life ($P < 0.001$ and $Z = 10.554$); for example, before the treatment, none of the patients considered their quality of life excellent, while This ratio increased to 14.8% after treatment. Likewise, the good quality of life ratio increased from 5.6% before treatment to 54.2% after treatment (Table 5).

Discussion

Kidney stones represent a prevalent urological condition that can lead to various complications, including discomfort, intense pain, nausea, vomiting, hematuria, dysuria, urinary obstruction, urinary tract infections, sepsis, and potential damage to the ureter (14). While research has been conducted on the quality of life for patients suffering from other urological disorders such as overactive bladder, urinary incontinence, benign prostatic hyperplasia, and prostate cancer, there is a notable scarcity of studies focusing on individuals with kidney stones (6). It is particularly significant given the absence of such research within the context of Iran.

In this study, we used the SF-36 questionnaire, whose psychometric validity has been confirmed (15) and which is very sensitive in evaluating the positive and negative aspects of a patient's health (16), to evaluate the quality of life of patients with kidney stones. Assessing quality of life with valid forms is an accepted approach in clinical studies and population-based research, and previous studies have repeatedly used the SF-36 questionnaire to assess patients' quality of life (12,15). The results of the present study showed that the level of quality of life of patients with kidney stones in five areas, including physical role disorder, emotional role disorder, energy and vitality, physical

pain, and general health, is lower than average and in two areas including physical function and social function. It was at the average level, and the patients had slightly higher scores than the average level only in emotional health. In the first study conducted by Penniston and Nakada to evaluate the quality of life in patients with kidney stones (17), it was shown that the level of quality of life of patients with kidney stones in the two domains of physical pain and general health is significantly lower than was the control group. In another study conducted by Bensalah et al. (12), patients with kidney stones had a significantly lower quality of life regarding physical function, social function, physical role disorder, emotional role disorder, and general health compared to healthy individuals. They were. The results of Bryant et al.'s study (18) showed that the quality of life of kidney stone patients compared to the general population was significantly lower in the following six domains: physical function, social function, physical role disorder, physical pain, general health, and vitality. Gvozdić et al.'s study (13) showed that the quality of life of patients with administrative system stones, including kidney, ureteral, and bladder stones, had significantly decreased in all eight areas of quality of life. In general, the overall results of the above studies and the present study show the significant negative impact of kidney stones on the quality of life of patients, and in this sense, there is complete agreement among the studies.

However, the results of the research in terms of areas of quality of life that are most affected negatively by this disease are not completely consistent, and there are differences in this regard among the studies.

Among the causes of this difference, we can mention the difference of the studies in terms of gender and age distribution of the investigated populations, stone characteristics (type, size, location, and some others), the cultural and social status of the patients and their understanding of the quality of life. The results of the present study showed that some areas of the quality of life of patients with kidney stones have a significant relationship with their gender in such a way that the score of women in the three areas of social functioning, physical pain, and general health was significantly lower than that of men. Similar to this finding of ours, some previous studies have also shown a lower quality of life in women compared to men. Among them, in Salman et al.'s study (16), the scores of women with kidney stones in the three subscales of physical function, social function, and emotional role disorder were significantly lower than men. In their studies, Penniston and Nakada (17) and Bensalah et al. (12) reported that women with kidney stones scored significantly lower than men in all quality-of-life domains. The results of Bryant et al.'s study (18) showed that women with kidney stones have a lower quality of life than male patients in the three areas of physical pain, vitality, and emotional role limitation. Here, the results of the studies have generally shown that the quality of life in women with kidney stones is lower compared to men, but the studies are not completely consistent with each other in terms of the areas in which women have a lower quality of life.

It is not easy to understand why such differences exist between the two sexes. Perhaps chronic pain caused by kidney stone disease has more emotional effects on women compared to men and affects their quality of life more (18). The results of the present study showed that the quality of life of patients with kidney stones in the physical function subscale decreases significantly with age. Salman et al.'s study (16) observed a negative correlation between the age of kidney stone sufferers and quality of life, which is consistent with our findings.

In Bensalah et al.'s study (12), a decrease in the quality of life scores of patients with kidney stones was observed with increasing age, which aligns with our findings. Contrary

to the results of our study and the studies above, no relationship between age and quality of life scores was reported in the study of Penniston and Nakada (17).

The higher occurrence of diseases in the elderly population and social factors such as retirement may be the reason for the lower quality of life score in the older age group (16). In the present study, there was no significant relationship between marital status, education level, occupation, and income and the quality of life of kidney stone patients.

The relationship of these variables with the quality of life of patients with kidney stones has been less evaluated in previous studies. Among them, Diniz et al.'s study (19) also showed that marital status and education level of kidney stone sufferers are not related to quality of life, but they showed that kidney stone patients with low socio-economic status have lower quality of life. They show a lower quality of life in emotional health, functional capacity, general health, and vitality, which is inconsistent with our findings. In the study of Patel et al. (20), it was reported that patients with kidney stones who have lower incomes have a lower quality of life, but we did not observe a significant relationship between these two variables in our study. Patel et al. used a different questionnaire (PROMIS) to determine patients' quality of life, which may be the cause of the difference between the two studies.

The results of the present study showed that the body mass index of patients with kidney stones has a significant effect on some areas of their quality of life, so obese patients have a significantly lower quality of life in the areas of physical performance, physical pain, and They had general health.

The relationship between obesity and quality of life in kidney stone patients has rarely been studied. In this regard, the results of Arafa and Rabah's study (21) showed that obesity significantly negatively impacts the quality of life of patients with urinary system stones. In the study of Bensalah et al. (12), the body mass index of patients with kidney stones had a significant negative correlation with five domains of quality of life, including physical function, physical role disorder,

physical pain, general health, and vitality, meaning that with increasing Body mass index, quality of life of patients in these areas decreased significantly. Also, Penniston and Nakada (22) reported in their study that obesity significantly negatively affects kidney stone sufferers' quality of life measures.

The results of all three studies are consistent with our findings. Similar observations have been seen in the general population.

It is thought that due to the association of some comorbidities with obesity and also because there are negative feelings such as stigma, shame, anxiety, and sadness in many people with obesity, the set of these factors, along with the problems related to kidney stone disease itself can lead to a decrease in self-esteem, disruption in work and social life, and ultimately a decrease in overall well-being and quality of life of obese people (23).

Our research findings indicate that managing kidney stones leads to a notable enhancement in the quality of life for patients. Limited studies have focused on assessing the quality of life in individuals with kidney stones post-treatment. In this context, Rabah et al. (24) examined the quality of life among kidney stone patients following treatment, revealing that those who underwent successful treatment experienced a quality of life comparable to that of healthy individuals, which aligns with our results. Similarly, Arafa and Rabah (21) noted that effective treatment of kidney stones markedly improves patients' quality of life, corroborating our observations. These patients develop a heightened awareness of their health, both physically and emotionally, resulting in a significant improvement in their quality of life compared to the period prior to treatment (12). Such observations about improving the quality of life with the successful treatment of kidney stones encourage patients and doctors. This study could only examine some possible variables affecting the quality of life. Examining other variables can give a more complete view of the effective factors. This study was conducted only on patients with kidney stones, so its results cannot be generalized to other patients.

Conclusion

The current study indicates that kidney stone treatment significantly enhances patients' quality of life. Conversely, factors such as female gender, age over 50, and obesity were found to impact quality of life adversely. Additionally, variables such as education level, income, marital status, and occupation did not correlate with the patient's quality of life. It is recommended that quality of life considerations be prioritized for all kidney stone patients, particularly for women, individuals over 50, and those who are obese.

These patients should undergo screening to identify quality-of-life issues and receive appropriate guidance and support. Given the notable positive impact of kidney stone treatment on quality of life, timely intervention for these patients is crucial. Further research with larger sample sizes, longitudinal approaches, and a broader range of variables influencing the quality of life in kidney stone patients is also recommended.

Ethical Considerations

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgments

The author would like to thank all participants in this study.

References

1. Lotan Y. Economics and cost of care of stone disease. *Adv Chronic Kidney Dis.* 2009;16(1):5-10. doi: 10.1053/j.ackd.2008.10.002. PMID: 19 095200.
2. Romero V, Akpınar H, Assimos DG. Kidney stones: a global picture of prevalence, incidence, and associated risk factors. *Rev Urol.* 2010; 12(2-3): e86-96. PMID: 20811557; PMCID: PMC29 31286.
3. Sorokin I, Mamoulakis C, Miyazawa K, Rodgers A, Talati J, Lotan Y. Epidemiology of stone disease across the world. *World J Urol.* 2017;35(9):1301-1320. doi: 10.1007/ s00345-017-2008-6. Epub 2017 Feb 17. PMID:28213860.
4. Sakhaee K, Maalouf NM, Sinnott B. Clinical review. *Kidney stones 2012: pathogenesis,*

- diagnosis, and management. *J Clin Endocrinol Metab.* 2012;97(6):1847-60. doi: 10.1210/jc.2011-3492. Epub 2012 Mar 30. PMID: 22466339; PMCID: PMC3387413.
5. Penniston KL, Antonelli JA, Viprakasit DP, Averch TD, Sivalingam S, Sur RL, et al. Validation and Reliability of the Wisconsin Stone Quality of Life Questionnaire. *J Urol.* 2017;197(5):1280-1288. doi: 10.1016/j.juro.2016.11.097. Epub 2016 Nov 23. PMID: 27889419.
 6. New F, Somani BK. A Complete World Literature Review of Quality of Life (QOL) in Patients with Kidney Stone Disease (KSD). *Curr Urol Rep.* 2016;17(12):88. doi: 10.1007/s11934-016-0647-6. PMID: 27771854; PMCID: PMC5075340.
 7. Asadollahi A, Ismaeli A, Fani Saberi L. Validity and Reliability of Quality-of-Life Test Among Ahwaz Older Adults In 2016. *Journal of sociology studies.* 2016;8(32):7-15.
 8. Theofilou P. Quality of life: definition and measurement. *Europe's journal of psychology.* 2013; 9(1):1-10.
 9. Karimi M, Brazier J. Health, Health-Related Quality of Life, and Quality of Life: What is the Difference? *Pharmacoeconomics.* 2016; 34(7): 645-9. doi: 10.1007/s40273-016-0389-9. PMID: 26892973.
 10. Ahmad TR, Tzou DT, Usawachintachit M, Reliford-Titus S, Wu C, Goodman J, et al. Low Income and Nonwhite Race are Strongly Associated with Worse Quality of Life in Patients with Nephrolithiasis. *J Urol.* 2019;202(1):119-124. doi: 10.1097/JU.000000000000233. Epub 2019 Jun 7. PMID: 30865567.
 11. Streeper NM, Wertheim ML, Nakada SY, Penniston KL. Cystine Stone Formers Have Impaired Health-Related Quality of Life Compared with Noncystine Stone Formers: A Case-Referent Study Piloting the Wisconsin Stone Quality of Life Questionnaire Among Patients with Cystine Stones. *J Endourol.* 2017;31(S1):S48-S53. doi: 10.1089/end.2016.0564. Epub 2016 Nov 8. PMID: 27717296.
 12. Bensalah K, Tuncel A, Gupta A, Raman JD, Pearle MS, Lotan Y. Determinants of quality of life for patients with kidney stones. *J Urol.* 2008;179(6):2238-43; discussion 2243. doi: 10.1016/j.juro.2008.01.116. Epub 2008 Apr 18. PMID: 18423704.
 13. Gvozdić B, Milenković-Petronić D, Lađević N, Vuksanović A, Durutović O. The examination of the quality of life changes of patients with urolithiasis regarding different methods of treatment. *Vojnosanitetski pregljed.* 2020; 77(2): 158-64. <https://doi.org/10.2298/VSP180309060G>
 14. Abbagani S, Gundimeda SD, Varre S, Ponnala D, Mundluru HP. Kidney stone disease: Etiology and evaluation. 2010;1(1):175-182.
 15. Lins L, Carvalho FM. SF-36 total score as a single measure of health-related quality of life: Scoping review. *SAGE Open Med.* 2016;4: 2050312116671725. doi: 10.1177/2050312116671725. PMID: 27757230; PMCID: PMC5052926.
 16. Salman MY, Tandogdu Z, Fazlioglu A, Cek MJM. Patient's quality of life following open surgery and percutaneous nephrolithotomy for renal calculi: Short form-36 study. *Asian Pacific Journal of Health Sciences.* 2017; 2:61-4.
 17. Penniston KL, Nakada SY. Health related quality of life differs between male and female stone formers. *J Urol.* 2007;178(6):2435-40; discussion 2440. doi: 10.1016/j.juro.2007.08.009. Epub 2007 Oct 15. PMID: 17937947.
 18. Bryant M, Angell J, Tu H, Goodman M, Pattaras J, Ogan K. Health related quality of life for stone formers. *J Urol.* 2012;188(2):436-40. doi: 10.1016/j.juro.2012.04.015. Epub 2012 Jun 14. PMID: 22704108.
 19. Diniz DH, Blay SL, Schor N. Quality of life of patients with nephrolithiasis and recurrent painful renal colic. *Nephron Clin Pract.* 2007; 106(3):c91-7. doi: 10.1159/000102995. PMID: 17522476.
 20. Patel N, Brown RD, Sarkissian C, De S, Monga M. Quality of life and urolithiasis: the patient - reported outcomes measurement information system (PROMIS). *Int Braz J Urol.* 2017;43(5):880-886. doi: 10.1590/S1677-5538.IBJU.2016.0649. PMID: 28792186; PMCID: PMC5678519.
 21. Arafa MA, Rabah DM. Study of quality of life and its determinants in patients after urinary stone fragmentation. *Health Qual Life Outcomes.* 2010;8:119. doi: 10.1186/1477-7525-8-119. PMID: 20959005; PMCID: PMC2974666.
 22. Scales CD Jr, Smith AC, Hanley JM, Saigal CS. Urologic Diseases in America Project. Prevalence of kidney stones in the United States. *Eur Urol.* 2012;62(1):160-5. doi: 10.1016/j.eururo.2012.03.052. Epub 2012 Mar 31. PMID: 22498635; PMCID: PMC3362665.
 23. Vallis M. Quality of life and psychological well-being in obesity management: improving the odds of success by managing distress. *Int J Clin Pract.* 2016;70(3):196-205. doi: 10.1111/ijcp.12765. Epub 2016 Feb 4. PMID: 26842304; PMCID: PMC5067635.
 24. Rabah DM, Alomar M, Binsaleh S, Arafa MA. Health related quality of life in ureteral stone patients: post-ureterolithiasis. *Urol Res.* 2011; 39(5):385-8. doi: 10.1007/s00240-011-0375-9. Epub 2011 Apr 3. PMID: 21461963.