https://doi.org/10.21859/ModCareJ.23.2.26

Modern Care Journal

journal homepage: https://mcj.bums.ac.ir/

Volume 23, Issue 2

June 2026

Research Article

Effects of Structured Nursing Care Program on Uremic Pruritus, Sleep Quality, and Dialysis Adequacy in Patients Undergoing Hemodialysis: A Randomized Clinical Trial

Atefeh Fahraji[1], Hossein Shahdadi*[2], Abdolghani Abdollahimohammad[3], Mozhgan Rahnama[4], Mahin Naderifar[5]

[1] *Student Research Commitee, Zabol University of Medical Sciences, Zabol, Iran*
[2] *Zabol University of Medical Sciences, Zabol Iran*
[3] *Zabol University of Medical Sciences, Zabol Iran & Zabol Medicinal Plants Research Center, Zabol University of Medical Sciences, Zabol, Iran*
[4] *Zabol University of Medical Sciences, Zabol Iran & Toxicology and Addiction Research Center, Zabol University of Medical Sciences, Zabol, Iran.*
[5] *Zabol University of Medical Sciences, Zabol Iran & Pediatric Gastroenterology and Hepatology Research Center, Zabol University of Medical Sciences, Zabol, Iran.*

Received: 2026/01/03
Revised: 2026/03/13
Accepted: 2026/03/15

ABSTRACT

Introduction: Hemodialysis patients encounter significant complications, such as uremic pruritus and sleep disorders, addressing the need for improved nursing care strategies to enhance health outcomes.

Objectives: This study aimed to examine the effects of Structured Nursing Care Program (SNCP) on uremic pruritus, sleep quality, and dialysis adequacy in hemodialysis patients.

Methods: This randomized clinical trial was conducted at Ali Ibn Abitaleb Hospital, Zahedan, Iran. Participants were adults over 18 years old who had received hemodialysis for at least three months. A total sample size of 70 patients was determined through random allocation. Data collection involved demographic characteristics forms, the Five-Dimensional Itch Scale, the Pittsburgh Sleep Quality Index, and venous blood samples for assessing dialysis adequacy. Intervention sessions, each lasting 30 to 45 min, were conducted by the researcher during hemodialysis three times per week for five weeks. On the other hand, the control group received standard care. Data were analyzed using SPSS software (version 19), with significance set at $P<0.05$.

Results: In total, 70 patients undergoing hemodialysis participated in the study. The analysis of covariance indicated a significant difference between the intervention and control groups regarding the mean scores of uremic pruritus (10.59 Vs. 14.43; $P<0.001$), sleep quality (10.37 Vs. 14.82; $P<0.001$), and dialysis adequacy (1.29 Vs. 1.24; $P<0.001$).

Conclusions: The SNCP diminished uremic pruritus and enhanced sleep quality, and dialysis adequacy. This indicates the importance of SNCP in routine care for hemodialysis patients. Future research should investigate the long-term effects of SNCP in various clinical settings.

Corresponding Author: Zabol University of Medical Sciences, Zabol Iran.
Email: zb5950@gmail.com

Keywords: Dialysis adequacy, Hemodialysis, Nursing care, Sleep quality, Uremic pruritus

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]

Copyright Policy: This open-access journal is available under the Creative Commons Attribution-NonCommercial 4.0 (CC BY-NC 4.0) International License, which allows for the copying and redistribution of the material only for noncommercial purposes, provided that the original work is properly cited.

How to Cite: Fahraji A, Shahdadi H, Abdollahimohammad A, Rahnama M, Naderifar M. Effects of Structured Nursing Care Program on Uremic Pruritus, Sleep Quality, and Dialysis Adequacy in Patients Undergoing Hemodialysis: A Randomized Clinical Trial. Mod Care J 2026; 23 (2): 26-32. https://doi.org/10.21859/ModCareJ.23.2.26

1. Introduction

Chronic diseases continue to pose significant health challenges in developing countries (1), with chronic kidney disease (CKD) emerging as a predominant cause of morbidity and mortality (2). CKD is characterized by gradual kidney function decline that can lead to severe complications and ultimately end-stage renal disease (ESRD). The ESRD significantly impacts on the patients' quality of life and creates considerable healthcare burdens (2, 3). Moreover, CKD affects 9.1% of the global population and is responsible for 2.6 million deaths and 35.8 million disability-adjusted life years (4).

Dialysis, especially hemodialysis, is the main supportive treatment for patients with CKD. Nearly 4 million people worldwide are undergoing hemodialysis (5, 6). Although effective in removing waste products and restoring some fluid balance, hemodialysis does not fully replicate the myriad functions of the kidneys, often resulting in various complications, such as uremic pruritus (7). Uremic pruritus-a condition characterized by intense itching-is reported to affect 28% to 70% of dialysis patients, significantly diminishing their quality of life (8). Compounding this issue, sleep disorders are prevalent among about 80% of hemodialysis patients (9, 10), further contributing to a decline in overall well-being and increasing the risk for serious comorbidities (11, 12).

Dialysis adequacy, conventionally quantified as net urea clearance, is a key factor in prescribing treatment. Kt/V_{urea} is the common clinical measure of adequacy worldwide (13, 14). Adequacy is critical for improving health outcomes among CKD patients (15). However, patients may be inadequately dialyzed (16), highlighting a need for enhanced nursing care approaches tailored to this population. Recent evidence suggests that comprehensive nursing strategies, which integrate patient-centered care and structured interventions, have improved health outcomes. Such approaches can help reduce complications, enhance knowledge regarding disease management, and improve patients' overall quality of life (17). SNCP includes education, nutrition and medication guidance, dialysis care, psychological intervention, and daily care (18, 19). As there was no study, if any, which investigated holistic nursing care on uremic pruritus, sleep quality, and dialysis adequacy in hemodialysis patients and given the significant impact of these factors on hemodialysis patients, and the paucity of research in this area, this study was conducted to evaluate the effect of SNCP on these outcomes

2. Objectives

This study evaluated the effects of SNCP on uremic pruritus, sleep quality, and dialysis adequacy in hemodialysis patients.

3. Methods

3.1 Study Design

This randomized controlled trial was conducted to evaluate the SNCP on uremic pruritus and sleep quality among hemodialysis patients at Ali Ibn Abitaleb Hospital, Zahedan, Iran.

3.2 Participants

The study included all patients from the hemodialysis department who consented to participate and met the inclusion criteria. Eligible participants were aged over 18 years, had undergone hemodialysis for at least three months via an arteriovenous fistula, attended sessions three times weekly (four hours each), and had no serious health conditions (e.g., Ischemic heart attack, pneumonia) within the month prior to the study. On the other hand, patients were excluded if they withdrew, died, traveled, developed serious complications, or required medications affecting uremic pruritus or sleep quality during the study period.

The sample size was determined using a mean difference formula (20), based on parameters derived from a pilot study. Assuming a 5% significance level (α), 80% statistical power (1-β), and anticipating a 30% attrition rate, the required sample size was calculated as 70 participants, with 35 allocated to each group.

A convenience sampling approach was employed for eligible participant selection. All eligible patients were identified and assigned sequential numerical identifiers. To ensure random allocation, a simple randomization procedure was implemented using a coin-toss method: patients with odd numbers were assigned to the intervention group, while those with even numbers were allocated to the control group. This method ensured each participant had an equal probability of being assigned to either group, minimizing selection bias.

3.3 Scales

Data were collected using the following tools:

3.3.1 Demographic Information Form: to capture such essential details as age, gender, education level, and dialysis history, established for validity and reliability with expert feedback.

3.3.2 Five-Dimensional Itch Scale (5D-itch): to assess uremic pruritus severity, yielding scores from 5 (no itching) to 25 (severe itching), validated in a prior study (21).

3.3.3 Pittsburgh Sleep Quality Index (PSQI): to evaluate sleep quality, with scores ranging from 0 (good quality) to 21 (poor quality), also demonstrating established reliability (22, 23).

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]

3.3.4 Dialysis Adequacy: Dialysis adequacy was assessed using single-pool Kt/V (spKt/V) for urea. Blood urea nitrogen (BUN) samples were obtained from the arterial line immediately before the start of dialysis and at the end of dialysis. The post-dialysis sample was collected after reducing the blood flow rate to 50–100 mL/min and waiting 15 seconds. Kt/V was then calculated using the standard urea-based formula (13, 14) based on the mean of samples results.

3.4 Intervention

Eligible participants were identified and assigned unique identification numbers before informed consent was obtained. The demographic characteristics form, 5D-itch scale, and PSQI were administered initially. Blood samples were collected for BUN measurements to assess dialysis adequacy at the start and end of each dialysis session.

The control group received routine nursing care, while the intervention group participated in a detailed nursing program, including:

Health Education*:* Definition of chronic kidney disease, disease treatment methods, hemodialysis, kidney transplantation, disease complications, education on infection prevention, personal hygiene practices, recognizing signs of infection.

Nutrition and Medication Guidance: Assessment of nutritional indicators and kidney function was conducted, followed by education on a high-protein, low-salt, low-potassium, low-phosphorus diet, with an emphasis on balanced liquid intake and medication adherence.

Dialysis Care*:* Necessary training on checking vital signs, patient weight, monitoring fluid requirements during dialysis, checking required laboratory tests, adherence to sterile precautions during the dialysis process (tubing set, dialysate, and blood flow), managing potential complications during dialysis and taking appropriate measures when complications occur, ensuring patient comfort during dialysis, potential complications after dialysis completion.

Psychological *I*ntervention*:* Education on coping with financial problems, fear of death, sexual issues, stress management, communication skills training, importance of establishing social and empathetic relationships, assessment of the patient's body image perception regarding the fistula.

Daily *Care:* Education on potential symptoms and complications of the disease, education on signs indicating the need for emergency dialysis, education on performing daily activities, assisting the patient in coordinating daily activities and tasks with dialysis session schedules, education on fistula care (18, 19, 24-26).

Intervention sessions, each lasting 30 to 45 min, Were conducted by the researcher during hemodialysis three times per week for five weeks. To reduce information contamination between groups, sessions for the intervention and control groups were held during different shift sessions. The intervention group received ongoing support, including a contact number for inquiries and weekly follow-ups, while the control group received standard care. After three months, both groups were reassessed for itching severity, sleep quality, and dialysis adequacy using the same instruments. Within-group and between-group comparisons were performed. Participants who withdrew were replaced. At the study's conclusion, the control group was provided with an educational pamphlet summarizing the training.

3.5 Data Analysis

Data were analyzed using SPSS software (version 19). Descriptive statistics summarized demographic variables and study outcomes, while comparative statistics evaluated differences in uremic pruritus severity and sleep quality before and after the intervention, with a significance threshold set at $P<0.05$.

3.6 Ethical consideration

This study was approved by the Research Committee of Zabol University of Medical Sciences, Zabol, Iran with the ethics code IR.ZBMU.REC.1402.081.

4. Results

A total of 70 hemodialysis patients participated in this study. The mean age values of participants were 49.77 ± 2.66 and 50.08 ± 2.68 years in the intervention and control groups, respectively, with no significant difference between groups. Dialysis history was significantly longer in the intervention group (6.68 ± 1.01 years), compared to the control group (3.81 ± 0.55 years; P=0.016). Serum phosphorus levels were comparable between the intervention (6.07 ± 0.28 mg/dL) and control groups (6.25 ± 0.26 mg/dL), with no significant difference. Additional participant characteristics are presented in Table 1 Before examining the main study variables, the normality of the data was first assessed using the Shapiro–Wilk test. The results of this test are presented in Table 2.

The significance level for the dialysis adequacy variable in the control group was greater than 0.05, suggesting that it follows a normal distribution. In contrast, the significance levels for the variables of uremic pruritus and dialysis adequacy in both the intervention and control groups, as well as the quality of sleep in the intervention group before and after the intervention, and in the control group before the intervention, were less than 0.05, indicating that they

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]

did not follow a normal distribution,

Table 1: Demographic characteristics of patients by group

Variable		Intervention	Control	P-value
		n (%)	n (%)	
Gender	Male	12 (34.4)	16 (45.7)	0.46*
	Female	23 (65.7)	19 (54.3)	
Marital Status	Married	6(17.1)	8 (22.9)	0.76*
	Single	29 (82.9)	27 (77.1)	
Residence	City	34 (97.1)	34 (97.1)	1.00**
	Village	1 (2.9)	1 (2.9)	
Education level	Illiterate	15 (42.9)	10 (28.6)	0.38 **
	Primary	5 (14.3)	5 (14.3)	
	Diploma	12 (34.3)	14 (40)	
	Associate	0	3 (8.6)	
	degree	3 (8.6)	3 (8.6)	
	Bachelor			
Job	Housekeeper	22 (62.9)	17 (48.6)	0.612**
	Freelancer	2 (5.7)	3 (8.6)	
	Employee	2 (5.7)	4 (11.4)	
	Worker	1 (2.9)	3 (8.6)	
	Farmer	1 (2.9)	0	
	Others	7 (20)	8 (22.9)	

Chi-square test: **; Fisher's exact test

parametric tests were applied, while non-parametric equivalents were used for variables with non-normal distribution. Table 3 shows pre- and post-intervention comparisons for uremic pruritus, sleep quality, and dialysis adequacy (spKt/V), both between and within the intervention and control groups without controlling covariates. Analysis of covariance shows a significant difference between the intervention and control groups in the mean of uremic pruritus, sleep quality, and dialysis adequacy (all P<0.001), with controlling pre-test and dialysis history as covariates (Table 4).

5. Discussion

The present study aimed to determine the impact of SNCP on uremic pruritus, sleep quality, and dialysis adequacy in patients undergoing hemodialysis treatment. Dialysis, especially hemodialysis, is the main treatment for patients with CKD (6). Uremic pruritus and reduced quality of sleep are of the most significant complications in hemodialysis patients. Additionally, dialysis adequacy is recognized as an important indicator of patient health in this population (8, 10, 14, 27).

The findings indicate that interventions significantly reduced uremic pruritus in hemodialysis patients. In this context, the study by Ping Yang et al. (2022) also demonstrated the effectiveness of integrated nursing care in relation to the risk factors associated with uremic pruritus (28). Additionally, the finding of Zhang et al. (2017) showed that holistic nursing care could effectively lower blood urea levels in hemodialysis patients (29) which is in line conceptually with the SNCP intervention. Previous studies have also indicated a positive correlation between blood urea levels and uremic pruritus (30, 31). Furthermore, the educational components related to nutrition and medication adherence within the current SNCP intervention may have substantially influenced the reduction of uremic pruritus.

Furthermore, this study reflects a positive impact of SNCP on the sleep quality of hemodialysis patients. In alignment with current findings, Tao et al. (2024) demonstrated that a structured nursing intervention program-incorporating education, relaxation techniques, and counseling-significantly improved sleep quality in middle-aged and elderly hemodialysis patients (32). Similarly, Wu et al. (2025) reported that combining mindfulness meditation with progressive muscle relaxation, both of which can be components of comprehensive nursing care, significantly improved sleep quality, anxiety, and depression in patients undergoing hemodialysis (33). Previous research has consistently noted a connection between psychological disturbances and sleep problems (34, 35), suggesting that the psychological interventions included in the SNCP may explain the observed enhancement in sleep quality among hemodialysis patients.

The current study also found that dialysis adequacy significantly improved. Previous research has established that nurse competency and quality of nursing care significantly influence dialysis adequacy, with improved nursing care leading to enhanced dialysis outcomes (36). Furthermore, Rayati et al. (2016) demonstrated that implementing integrated nursing education-which included content similar to that delivered to patients in our study-could effectively enhance dialysis adequacy (37).

Variable	Intervention -Before (n=35)	Intervention -After (n=35)	Control -Before (n=35)	Control - After (n=35)
	P-value	P-value		
Uremic pruritus	0.128	0.004	0.001	0.013
Sleep Quality	0.002	0.077	< 0.001	0.011
Dialysis Adequacy	< 0.001	0.005	0.001	<0.001

Table 2: Normality test of the main study variables **(**Shapiro–Wilk test)

5.1 Limitation

This study has several limitations that should be acknowledged. The relatively small sample size may limit the generalizability of the findings. In addition, the study was conducted in a single center, which may affect the external validity of the results. The follow-up period was also relatively short, preventing

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]

assessment of the long-term effects of the comprehensive nursing intervention. Furthermore, sleep quality was evaluated using a self-reported questionnaire, which may be influenced by individual perception and reporting bias. In addition, the participants might acquire the educational information from each other. Future studies involving larger samples, multiple centers, and longer follow-up periods are needed to provide more robust evidence.

Table 3: Comparison of Average Uremic Pruritus, Sleep Quality, and Dialysis Adequacy Scores in the Intervention and Control Groups

Variable		Intervention (n=35)	Control (n=35)	P-value
Uremic pruritus	Before	14 (13-15)	15 (13-16)	P= 0.702**, z= -0.38, r= 0.05
	After	11 (10-11)	15 (13-16)	P<0.001**, z= -4.63, r= 0.55
Wilcoxon		P<0.001, z= -5.01, r=0.85	P=0.333, z= -0.96, r=0.16	
Sleep Quality	Before	15 (14-16)	15 (14-16)	P=0.547**, z= -0.63, r= 0.08
	After	10.48±1.37	14.74±2.51	P<0.001*, t= -8.79, Cohen's d = -2.11
Wilcoxon		P<0.001, z= -5.09, r=0.86	P=0.399, z= -0.84, r=0.14	
Dialysis Adequacy	Before	1.27 (1.16-1.36)	1.21 (1.10-1.26)	P=0.724**, z= -0.353, r=0.04
	After	1.22 (1.10-1.35)	1.20 (1.11-1.26)	P=0.075**, z= -1.78, r=0.21
Wilcoxon		P<0.001, z= -4.47, r=0.76	P=0.36, z= -0.91, r=0.15	

*: Independent t-test (Mean±SD); **: Mann–Whitney (median (IQR)); Values of r = 0.1, 0.3, and ≥0.5 indicate small, moderate, and large effects, respectively; Cohen's d = 0.2, 0.5, and ≥0.8 indicate small, moderate, and large effects.

Table 4: Comparison of uremic pruritus, sleep quality, and dialysis adequacy means (all P<0.001), between the intervention and control groups with controlling pre-test and dialysis history as covariates.

Variable	Intervention Mean (95% CI)	Control Mean (95% CI)	95% CI difference	F score	P
Uremic pruritus	1.29 (1.28, 1.30)	1.24 (1.22, 1.25)	0.03, 0.72	33.09	< 0.001
Sleep quality	10.37 (9.90, 10.83)	14.82 (14.36, 15.29)	-5.12, -3.78	175.84	< 0.001
Dialysis adequacy	10.59 (10.05, 11.14)	14.43 (13.88, 14.97)	-4.061, -3.04	95.49	< 0.001

5.2 Conclusion

This study highlights the implementation of SNCP which reduced uremic pruritus and improved sleep quality, and dialysis adequacy. These results underscore the importance of SNCP into routine care for hemodialysis patients. Future research should continue to explore the long-term effects of SNCP in various clinical settings Acknowledgements

The authors appreciate all patients who participated in the current study. Statements

Statements

AI Use: The authors applied the AI tools for proofreading of this study.

Authors' Contribution: Study design: A.F., H. Sh., and M. R.; Data collection: A. F.; A.A; Manuscript preparation: A.F., H.SH., and M. R.; Manuscript revision: M. R., A.A., and M. Conflict of Interests Statement: The authors declare that they have no conflict of interest.

Data Availability: The data supporting the findings of this study are available from H. Sh.

Ethical Approval: The present study was approved by the Ethics Committee of Zabol University of Medical Sciences, Zabol, Iran (IR.ZBMU.REC.1402.081).

Funding/Support: This study received no funding/support.

Informed Consent: Informed consent was obtained from all participants.

RCT Code: IRCT20231021059797N1

References

1. Nugent R. Chronic diseases in developing countries: health and economic burdens. Ann N Y Acad Sci. 2008 Jun;1136(1):70–9. [DOI: 10.1196/annals.1425.027]
2. Kovesdy CP. Epidemiology of chronic kidney disease: an update 2022. Kidney Int. 2022 Apr 1;12(1):7–11. [DOI: 10.1016/j.kisu.2021.11.003]
3. Winearls CG. Chronic kidney disease: definition and staging–an orthodox view. Clin Med. 2009 Dec 1;9(6): 563- [DOI: 10.7861/clinmedicine.9-6-563]
4. GBD Chronic Kidney Disease Collaboration. Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2020 Feb 29;395(10225):709–33. [PMID: 32061315; PMCID: PMC7049905.] [DOI: 10.1016/S0140-6736(20)30045-3]

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]

5. Bello AK, Okpechi IG, Osman MA, Cho Y, Htay H, Jha V, et al. Epidemiology of haemodialysis outcomes. Nat Rev Nephrol. 2022 Jun;18(6):378–95. [DOI: 10.1038/s41581-022-00542-7]
6. Murdeshwar HN, Anjum F. Hemodialysis. [Updated 2023Apr 27]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: [URL:https://www.ncbi.nlm.nih.gov/books/NBK563296/]
7. Ko M-J, Peng Y-S, Wu H-Y. Uremic pruritus: pathophysiology, clinical presentation, and treatments. Kidney Res Clin Pract. 2022 May 4;42(1):39. [DOI: 10.23876/j.krcp.21.189]
8. Santos-Alonso C, Martín MM, Villanueva RS, García LÁ, Gallardo MA, Rubio MA, et al. Pruritus in dialysis patients. Review and new perspectives. Nefrologia (Engl Ed). 2022 Jan 1;42(1):15–21. [DOI: 10.1016/j.nefroe.2022.02.004]
9. Sabry AA, Abo-Zenah H, Wafa E, Mahmoud K, El-Dahshan K, Hassan A, et al. Sleep disorders in hemodialysis patients. Saudi J Kidney Dis Transpl. 2010 Mar 1;21(2):300–5. [PMID: 20228517]. [URL: https://pubmed.ncbi.nlm.nih.gov/20228517/]
10. Pawar YS, Gattani VS, Chaudhari KS, Chheda B, Vankudre AJ. Impact of Hemodialysis on Sleep Disorders in Patients With End-Stage Renal Disease in a Tertiary Care Academic Hospital. Cureus. 2023 Aug 30;15(8). [DOI: 10.7759/cureus.44416]
11. Eslami AA, Rabiei L, Khayri F, Nooshabadi MR, Masoudi R. Sleep quality and spiritual well-being in hemodialysis patients. Iran Red Crescent Med J 2014 Jul 5; 16(7):e17155. [DOI: 10.5812/ircmj.17155]
12. Alshammari B, Alkubati SA, Pasay-An E, Alrasheeday A, Alshammari HB, Asiri SM, et al., editors. Sleep quality and its affecting factors among Hemodialysis patients: a Multicenter cross-sectional study. Healthcare; 2023 Sep 14 ;11(18):2536. [DOI: 10.3390/healthcare11182536]
13. Bharati J, Jha V. Achieving dialysis adequacy: A global perspective. Semin Dial. 2020 Nov;33(6):490-498. [DOI: 10.1111/sdi.12924]
14. Churchill BM, Patri P. The Nitty-Gritties of Kt/Vurea Calculations in Hemodialysis and Peritoneal Dialysis. Indian J Nephrol. 2021 Mar 1;31(2):97-110. [DOI: 10.4103/ijn.IJN_245_19]
15. Bakari AI, Yahaya JJ, Matobogolo BM, Abraham ZS, Mpondo B. Adequacy of haemodialysis and associated factors among patients with end-stage kidney disease in Tanzania. J Taibah Univ Sci s. 2024 Apr 1;19(2):287-95. [DOI: 10.1016/j.jtumed.2023.12.008]
16. Rajagopalan A, Raja N, Mohan G, Rajagopalan Sr A. Dialysis Adequacy: A Cross-Sectional Study to Assess the Reliability of the Online Clearance Monitor to Measure Dialysis Dose. Cureus. 2024 Jan 15;16(1):e52328. [DOI: 10.7759/cureus.52328]
17. Shahdadi H, Balouchi A, Sepehri Z, Rafiemanesh H, Magbri A, Keikhaie F, et al. Factors affecting hemodialysis adequacy in cohort of Iranian patient with end stage renal disease. Glob J Health Sci. 2016 Dec 17;8(8): 55781. [DOI: 10.5539/gjhs. v8n8p50]
18. Liao B, Zhao L, Peng Y, Chen J, Chen W, Wang X. Effect of comprehensive nursing intervention on negative emotion, quality of life and renal function of hemodialysis patients. Int J Clin Exp Med. 2020 Jan 1;13(2):949-57. [URL:https://ecentury.us/files/ijcem/13/2/ijcem0101591.pdf]
19. Renghea A, Cuevas-Budhart MA, Yébenes-Revuelto H, Gómez del Pulgar M G, Iglesias-López MT. " Comprehensive Care" Concept in Nursing: Systematic Review. INVESTIG EDUC ENFERM. 2023 Feb 9;40(3):e05. [PMID: 36867778; PMCID: PMC10017140]. [DOI: 10.17533/udea.iee.v40n3e05]
20. Abdollahimohammad A, Firouzkouhi M. Sample size estimation in randomized clinical trials (RCTs). J. Diabetes Nurs. 2019; 7 (1) :737-739. [URL: http://jdn.zbmu.ac.ir/article-1-353-fa.html]
21. Yoosefinejad AK, Karjalian F, Momennasab M, Ezzatzadegan Jahromi SE. Reliability and validity of the Persian version of 5-D itching scale among patients with chronic kidney disease. BMC Nephrol. 2021 Jan 7;22(1):16. [DOI: 10.1186/s12882-020-02220-x]
22. Shadzi MR, Rahmanian M, Heydari A, Salehi A. Structural validity of the Pittsburgh Sleep Quality Index among medical students in Iran. Sci Rep. 2024 Jan 11;14(1):1538. [DOI: 10.1038/s41598-024-51379-y]
23. Farrahi Moghaddam J, Nakhaee N, Sheibani V, Garrusi B, Amirkafi A. Reliability and validity of the Persian version of the Pittsburgh Sleep Quality Index (PSQI-P). Sleep Breath. 2012 Mar;16(1):79-82. [DOI: 10.1007/s11325-010-0478-5]
24. e Carvalho LP, Melo SLF, da Silva ÉM, da Silva BH, dos Santos LT, Batista Filha AJA, et al. Health education in the prevention of infections in hemodialysis patients: an experience report. Seven Editora. 2026;1-9. [DOI: 10.56238/sevened2026.001-001]
25. Fırıncık S, Gürhan N. Effects of solution-focused counseling provided for patients with chronic renal failure on their coping with and adaptation to the

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]

illness: a randomized controlled trial. Psychol Health Med. 2026 Feb 6:1-20.
[DOI: 10.1080/13548506.2026.2622638]

26. Arasu R, Jegatheesan D, Sivakumaran Y. Overview of hemodialysis access and assessment. Can Fam Physician. 2022 Aug 1;68(8):577-582.
[DOI: 10.46747/cfp.6808577]
27. Cheng AY, Wong LS. Uremic pruritus: from diagnosis to treatment. Diagnostics. 2022 Apr 28;12(5):1108. [DOI: 10.3390/diagnostics12051108]
28. Yang QP, Chen YY, Li Z, Xu M. Major risk factors analysis of pruritus complicated by type 2 diabetes mellitus and the effect of comprehensive nursing intervention. Front surg. 2022 Feb 15;9:842884.[PMID: 35242808; PMCID: PMC8887712.]
[DOI: 10.3389/fsurg.2022.842884]
29. Zhang H, Lin C, Yuan S, Wang Q, Yang J. Application of Holistic Nursing in Uremic Patients with Hematodialysis Related Malnutrition. Iran J Public Health. 2017 Apr;46(4):500-505. [PMID: 28540266; PMCID: PMC5439039].
[URL:https://pubmed.ncbi.nlm.nih.gov/28540266/]
30. N Besely W, Abd El Gawad Ali Rabie E, Aly Maharem D, Fathy Amr E. Clinical Assessment and Risk Factors of Uremic Pruritus among Hemodialysis Patients. Egypt J Health Care 2024; 15 (3): 1083-1095.
[DOI: 10.21608/ejhc.2024.384697]
31. Elsayed MM, Elgohary IE, Abdelhamid HHS, Zaki SA. The effectiveness of sertraline in alleviating uremic pruritus in hemodialysis patients: a randomized clinical trial. BMC Nephrol. 2023 Jun 3;24(1):155.[PMID: 37270517; PMCID: PMC10239082.]
[DOI: 10.1186/s12882-023-03212-3]
32. Tao LL, Zeng CH, Mei WJ, Zou YL. Sleep quality in middle-aged and elderly hemodialysis patients: Impact of a structured nursing intervention program. World J Clin Cases. 2024 Sep 6;12(25):5713-5719.[PMID: 39247744.]
[DOI: 10.12998/wjcc.v12.i25.5713]
33. Wu Y, Zhang H, Jiang L, Liu Z, Li X, Guo B,et al. Effects of mindfulness meditation combined with progressive muscle relaxation on sleep disorders, anxiety, and depression in patients with sarcopenia undergoing hemodialysis. Front Psychiatry. 2025 Jun 13;16:1542028. [PMID: 40585548; PMCID: PMC12202325.]
[DOI: 10.3389/fpsyt.2025.1542028]
34. Freeman D, Sheaves B, Waite F, Harvey AG, Harrison PJ. Sleep disturbance and psychiatric disorders. Lancet Psychiatry. 2020 Jul;7(7):628-637. [PMID: 32563308].
[DOI: 10.1016/S2215-0366(20)30136-X]
35. Krystal AD. Psychiatric disorders and sleep. Neurol Clin. 2012 Nov;30(4):1389-413. [PMID: 23099143; PMCID: PMC3493205].
[DOI: 10.1016/j.ncl.2012.08.018]
36. Hermalia I, Yetti K, Adam M. Nurses competence and hemodialysis adequacy achievement. Enferm Clin. 2021 Apr 1;31:S126-9.
[DOI: 10.1016/j.enfcli.2020.12.006]
37. Rayati M, Milani MJ, Pishgooei A, Pakfetrat M. Evaluation of the effect of integrated trainings on nutritional status and dialysis adequacy in hemodialysis patients. Med Surg Nurs J 2016 Jul 1;5(2) e68005.
[URL:https://brieflands.com/journals/msnj/articles/68005]

[Downloaded from mcj.bums.ac.ir on 2026-11-01]

[DOI: 10.21859/ModCareJ.23.2.26]