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Changes in Nutritional Diet Knowledge Following Video-Based Education Among Patients with Chronic Kidney Disease Receiving Maintenance Hemodialysis at Sekarwangi Regional Hospital

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ABSTRACT

Background: Patients receiving maintenance hemodialysis must manage complex dietary and fluid recommendations. This study assessed knowledge using a 15-item true/false questionnaire covering food sources and portions, protein, fats, carbohydrates, fluid intake, vitamin supplements, potassium-rich foods, legumes/soy products, and processed foods or beverages.

Objective: To assess within-participant changes in nutritional diet knowledge following video-based education among patients with chronic kidney disease receiving maintenance hemodialysis at Sekarwangi Regional Hospital.

Methods: This pre-experimental one-group pretest-posttest study included 16 purposively selected participants. The educational session comprised a 2-minute opening, a 5-minute diet-nutrition video delivered during hemodialysis, and a 5-minute closing discussion and oral evaluation. Knowledge was measured before and after education using the 15-item questionnaire. Difference scores were non-normally distributed; therefore, a Wilcoxon signed-rank test was used, with the paired t-test reported as a complementary estimate of mean change.

Results: Mean knowledge scores increased from 8.375 (SD = 2.125) to 11.125 (SD = 1.893). Fifteen participants had higher posttest scores and one had no change. The mean increase was 2.750 points (SD of differences = 2.236; 95% CI 1.558-3.942), $t(15) = 4.919$, $p = 0.0002$, Cohen's $dz = 1.23$ (95% CI 0.56-1.87). The Wilcoxon signed-rank test also showed higher posttest scores ($W = 0$, $p < 0.001$).

Conclusion: Nutritional diet knowledge scores were higher after the video-based education session. Because the study had no control group and assessed an immediate educational outcome, the observed change cannot be attributed exclusively to the video and does not demonstrate improved dietary adherence or clinical outcomes.

Keywords: Video-based education; Nutritional diet knowledge; Chronic kidney disease; Maintenance hemodialysis; Patient education

Introduction

Chronic kidney disease (CKD) is defined by abnormalities of kidney structure or function that persist for at least three months and have implications for health (Shirazian et al., 2023). People who progress to kidney failure may require kidney replacement therapy, including maintenance hemodialysis (Rezaei et al., 2026). Hemodialysis supports metabolic, fluid, and electrolyte control, but patients must also manage complex dietary and fluid recommendations over time (Fashafsheh et al., 2025).

CKD affects more than 10% of the global population and represents a substantial long-term health burden (Silalahi et al., 2025). In Indonesia, the 2018 Basic Health Research survey reported physician-diagnosed CKD in 0.38% of people aged 15 years or older (Sugiarto et al., 2023). This is a population-survey estimate and should not be directly compared with dialysis-unit service counts because the denominators and case definitions differ (Kementerian Kesehatan RI., 2020). At Sekarwangi Regional Hospital, the September 2025 sampling frame comprised 141 individual patients with CKD who were recorded as undergoing hemodialysis up to twice weekly.

Nutrition management is a central component of care for patients receiving maintenance hemodialysis, and recommendations differ from those for non-dialysis CKD (Wilaga et al., 2024). For metabolically stable adults receiving maintenance hemodialysis, the KDOQI nutrition

guideline recommends dietary protein intake of approximately 1.0-1.2 g/kg body weight/day, while energy, sodium, potassium, phosphorus, and fluid management should be individualized to nutritional status, comorbidity, laboratory findings, residual kidney function, and dialysis needs (Ezdha et al., 2023). The outcome in this study was narrower than the full clinical nutrition prescription. Nutritional diet knowledge was operationalized through 15 true/false items concerning fats and oils, protein sources and portions, carbohydrate portions, fluid intake, vitamin supplements, potassium-rich foods, legumes and soy products, and processed foods or beverages (Şanlıtürk, 2026). Dietary adherence, interdialytic weight gain, edema, and biochemical outcomes were not measured (Akeren et al., 2025).

Video-based education can provide standardized audiovisual information while patients remain seated during hemodialysis (Liu et al., 2024). The Cognitive Theory of Multimedia Learning proposes that coordinated verbal and visual information can support selection and integration of information when essential content is organized and extraneous cognitive load is limited (Ma et al., 2025). Evidence in hemodialysis, however, varies substantially in intervention dose, comparator, outcome, and follow-up. A systematic review identified marked heterogeneity across nutrition-education interventions (Tüzün Özdemir et al., 2025). Sarmadi et al., (2026) used a 20-minute renal-diet video shown seven times with follow-up extending to one year, while Tazeem Akhtar, (2024) evaluated a 10-minute animated nutrition video in a controlled design. Indonesian reports have used structured nutrition education, fluid education, and video-based education in CKD or hemodialysis settings, although populations, content, and intervention intensity differ (Yasari et al., 2024). These differences leave uncertainty about the short-term knowledge change observed after a single brief video during routine hemodialysis in a local hospital setting (Rizki et al., 2023).

A preliminaryobservationin the Dialysis Unit of Sekarwangi Regional Hospital on 3 October 2025notededema, increased body weight, and limited understanding ofdietary management among several patients. The source study did not document a formal sample size or structured instrument for this preliminary observation, sotheseobservations are presented only as clinical context and were not analyzed as study outcomes. Thestudy therefore aimed toassess changes innutritional diet knowledgefollowing video-based educationamong patients with CKDreceiving maintenancehemodialysis at Sekarwangi Regional Hospital.

Methods

Study Design

This quantitative study used a pre-experimental one-group pretest-posttest design. The same participants completed knowledge assessments before and afterone educational session (Notoatmodjo, 2019). The design permits estimation of within-participant change but, without a control group or random allocation, cannot establish that the video alone caused the observed change.

Setting

The study was conducted in the Dialysis Unit of Sekarwangi Regional Hospital, SukabumiRegency. Data collection for the 16 participants was conductedinDecember 2025, andthe educationalsessionwas deliveredduringroutine hemodialysis.The source study does not state a single standardized point within the dialysis session at which every participant received the intervention.

Research Subject

The source population comprised 141 patients with CKD recorded in September 2025 as undergoing hemodialysis up to twice weekly in the Dialysis Unit. The study protocol estimated a minimum sample of 16 using the Federer approach and planned 18 participants after an allowance for possible attrition. The final dataset contained 16 participants with complete pretest and posttest scores. No effect-size-based a priori power calculation was performed, and the source documentation does not provide the numbers screened, eligible, excluded, or declining participation before the final 16 were included. Purposive sampling was used to select

participants who met the study criteria and could complete the educational procedure. Inclusion criteria were: (1) CKD patients undergoing hemodialysis up to twice weekly, (2) willingness to participate, and (3) access to view the educational video. Exclusion criteria were unconsciousness/coma and unwillingness to participate.

Intervention

The educational activity followed the study teaching plan. It was delivered by the researcher, Unita, and consisted of a 2-minute opening, a 5-minute video segment, and a 5-minute closing phase. The opening included introduction, explanation of objectives, agreement on time, and elicitation of prior knowledge. The five-minute video addressed kidney function, causes of CKD, nutritional diet, and the purpose of dietary management. The closing phase allowed questions, oral evaluation, and a closing greeting. The intervention was delivered during hemodialysis and was viewed once per participant. The study record does not specify the video production source, display device, headphone use, language, or a separate formal validation process for the video, and it does not document whether routine clinical education occurred concurrently. The posttest was administered after the intervention within the study sequence, but the exact minute interval after video completion was not recorded.

Instruments

Nutritional diet knowledge was assessed before and after the intervention using the 15-item true/false questionnaire reproduced in the thesis appendix and attributed to (Ali et al., 2021). The items covered fats and oils, protein sources and portions, carbohydrate portions, fluid intake, vitamin supplementation, potassium-rich foods, legumes or soy products, and processed foods or beverages. Participant-level recorded totals were analyzed on the 15-item score scale, with higher scores representing greater knowledge. The study protocol categorized scores as good (>76%), moderate (56-75%), and poor (<55%); on a 15-item scale these thresholds correspond to 12-15, 9-11, and 0-8 points, respectively. The source thesis reports content validity using Aiken's V = 1.00 based on Akeren et al., (2025) and reliability using Cronbach's alpha = 0.702 based on (Silalahi et al., 2025). The thesis does not report the number or expertise of content validators, the rating scale used for Aiken's V, or the sample characteristics used to obtain alpha = 0.702. Therefore, these psychometric coefficients should be interpreted as previously reported evidence rather than validation conducted in the present 16 participants (Mardhiyah et al., 2026).

Data Analysis

Univariate analysis summarized sex, age, duration of hemodialysis, and knowledge scores. Age is reported continuously in the revised manuscript because the source thesis did not cite an operational framework for its non-standard age labels. The primary outcome was the participant-level posttest-minus-pretest knowledge score. All 16 participants had complete paired scores and no imputation was required. The Shapiro-Wilk test was applied to the difference scores, and a Q-Q plot was inspected because of the small sample. The difference scores were non-normally distributed ($W = 0.850$, $p = 0.0135$) with an upper-tail departure on the Q-Q plot. Therefore, the Wilcoxon signed-rank test was used for the primary inferential comparison. For comparability with the prespecified analysis and to quantify mean change, the paired-sample t-test is also reported with the mean paired difference, SD of the differences, 95% confidence interval, t statistic, exact two-sided p-value, and Cohen's dz. Statistical significance was set at $p < 0.05$. Analyses were based on the participant-level data recorded in the thesis and the original SPSS output.

Ethical Consideration

Ethical approval was obtained from the Health Research Ethics Committee of Universitas Muhammadiyah Sukabumi under approval number115/KET/KE-FKES/I/2025, as reported in the submitted manuscript. Separate institutional permission for the research was obtained from Sekarwangi Regional Hospital.Participants receivedan explanation of the study and provided

written informed consent before participation. Identifyinginformationwas protectedandstudydatawere treated confidentially.

Results

The study included 16 participants, with eight men (50.0%) and eight women (50.0%). Mean age was 50.19 years (SD = 10.77), median 50 years, and observed range 35-66 years. Eight participants (50.0%) had undergone hemodialysis for less than one year and eight (50.0%) for one year or longer. All 16 participants contributed complete paired pretest-posttest scores.

Table 1. Participant Characteristics (n = 16)

Characteristic	Statistic/category	n	Value
Sex	Male	8	50.0%
	Female	8	50.0%
Age (years)	Mean (SD); median; range	16	50.19 (10.77); 50; 35-66
Hemodialysis duration	< 1 year	8	50.0%
	>= 1 year	8	50.0%

Pretest scores ranged from 5 to 12, with a mean of 8.375 (SD = 2.125) and median of 8.50. Posttest scores ranged from 7 to 14, with a mean of 11.125 (SD = 1.893) and median of 11.50. When the protocol percentage cut-offs were applied to the participant-level raw scores, 8 participants (50.0%) were classified as poor, 7 (43.8%) as moderate, and 1 (6.3%) as good at pretest; at posttest, 2 (12.5%) were poor, 6 (37.5%) moderate, and 8 (50.0%) good. Fifteen participants (93.8%) had a higher raw score after education and one (6.3%) had no score change; none had a lower score. Eleven participants moved to a higher knowledge category and five remained in the same category.

Table 2. Nutritional Diet Knowledge Before and After Video-Based Education (n = 16)

Measure	Pretest	Posttest
Mean (SD)	8.375 (2.125)	11.125 (1.893)
Median (range)	8.50 (5-12)	11.50 (7-14)
Good: 12-15	1 (6.3%)	8 (50.0%)
Moderate: 9-11	7 (43.8%)	6 (37.5%)
Poor: 0-8	8 (50.0%)	2 (12.5%)

Table 3. NormalityAssessment of Posttest-Minus-Pretest DifferenceScores

Measurement	Shapiro-Wilk W	df	p-value
Posttest - pretest difference	0.850	16	0.0135

The differencescoresdid not meetthenormality assumption (Shapiro-Wilk p = 0.0135). Visual inspection of the Q-Q plot also showed an upper-tail departure, driven in part by one large positive change. The Wilcoxon signed-rank testwas therefore usedasthe primaryinferential comparison.

Table 4.Within-Participant Change inNutritional Diet Knowledge Scores

Statistic	Estimate	95% CI / df	p-value
Pretest mean (SD)	8.375 (2.125)	7.242-9.507	
Posttest mean (SD)	11.125 (1.893)	10.116-12.134	
Mean paired increase (post-pre)	2.750	1.558-3.942	
SD of paired differences	2.236		
Paired t-test	t = 4.919	df = 15	0.0002
Cohen's dz	1.23	0.56-1.87	
Wilcoxon signed-rank	W = 0	15 non-zero pairs	< 0.001

The mean knowledge score was 2.750 points higher after education (95% CI 1.558-3.942). The complementary paired t-test yielded t(15) = 4.919, exact two-sided p = 0.0002, with Cohen's dz = 1.23 (95% CI 0.56-1.87). The nonparametric analysis showed the same direction of change (Wilcoxon W = 0, p < 0.001). These results show a statistically large short-term within-group change in the measured knowledge score. They do not establish that the video was the sole cause of the change.

Discussion

At baseline, the recorded mean knowledge score was 8.375 of a 15-item scale. The sample was heterogeneous in dialysis experience: eight participants had been receiving hemodialysis for less than one year and eight for one year or longer. Duration of hemodialysis may be relevant to familiarity with dietary recommendations, but this study was not designed or powered to estimate subgroup effects. Age was likewise treated as descriptive context rather than a mechanism for knowledge change. These characteristics should therefore not be used to explain the pretest-posttest difference without further analysis (Sugiarto et al., 2023).

Knowledge scores were higher after the educational session, with 15 of 16 participants showing an increase. The audiovisual format can be interpreted through the Cognitive Theory of Multimedia Learning, which proposes that learners process verbal and visual information through limited-capacity channels and benefit when essential information is selected, organized, and integrated without unnecessary cognitive load (Wilaga et al., 2024). This framework offers a plausible explanation for immediate knowledge acquisition, but the present study did not measure attention, cognitive load, or knowledge retention. The source study also did not document that the video itself was formally developed according to this theory, so the framework is used only to interpret the observed learning pattern.

The intervention dose in this study was substantially lower than in several recent reports. Herawati et al., (2024) used a 20-minute renal-diet video shown seven times to 128 analyzed hemodialysis patients and followed metabolic and educational outcomes for up to one year. Areva et al., (2025) used repeated video training over 12 weeks in a clustered randomized controlled trial, although the primary outcomes were symptom burden, comfort, and quality of life rather than renal-diet knowledge. Serli et al., (2021) evaluated a nurse-led animated nutrition video in 107 hemodialysis patients using a controlled pretest-posttest approach and assessed both knowledge and fluid-diet adherence. Other renal video studies have addressed pruritus management, fistula self-care, or feasibility of animated nutrition media rather than this specific 15-item diet-knowledge outcome (Ma et al., 2025). Thus, similarities in direction should not be interpreted as equivalence of effect because intervention content, dose, comparator, instruments, sample size, and follow-up differ.

Systematic reviews indicate that nutrition education can improve knowledge and selected self-management outcomes in dialysis populations, but intervention formats and effect estimates are heterogeneous. In the present study, the mean increase of 2.750 points corresponded to Cohen's dz = 1.23, but no established minimally important difference was identified for this study-specific 15-item questionnaire. The magnitude should therefore be interpreted as a standardized statistical change in knowledge, not as a validated threshold for educational or clinical benefit. Knowledge is an intermediate outcome. The study did not test dietary adherence, interdialytic weight gain, edema, serum potassium, serum phosphorus, nutritional status, hospitalization, or other clinical endpoints, so improved clinical management cannot be inferred from these data.

Several limitations affect interpretation. First, the one-group Silalahi et al., (2025) pretest-posttest design is vulnerable to testing effects, history, maturation, regression to the mean, and Hawthorne effects, so the change cannot be isolated from other influences. Second, purposive sampling, a final sample of 16, and single-site recruitment limit precision and generalizability. The protocol planned 18 participants after an attrition allowance, but only 16 complete

participants appear in the final dataset, and the source documentation does not reconstruct the full screened-eligible-declined flow or explain why the planned 18 were not reached. No effect-size-based a priori power analysis was performed. Third, the difference scores were non-normal and included one relatively large positive change; the revised analysis therefore used a Wilcoxon signed-rank test in addition to the originally planned paired t-test. Fourth, the exact posttest interval, video device, headphone use, language, video-development process, and separate video-validation procedure were not documented. Dialysis-room fatigue, distractions, clinical interactions, and the closing question-and-answer session could have influenced immediate posttest performance. Fifth, the questionnaire's previously reported Aiken's V and Cronbach's alpha were not validated in the current 16 participants, and detailed validator and reliability-sample information was unavailable in the study record. Finally, the study assessed immediate knowledge only and did not measure retention, dietary behavior, or objective clinical outcomes.

Conclusion

Nutritional diet knowledge scores were higher after the five-minute video-based education session among 16 patients with CKD receiving maintenance hemodialysis at Sekarwangi Regional Hospital. Mean scores increased from 8.375 to 11.125, and 15 of 16 participants had higher posttest scores. The within-participant change was statistically significant using both nonparametric and complementary parametric analyses. Because there was no control group and only immediate knowledge was assessed, the findings do not establish that the video alone caused the change and do not demonstrate improvement in dietary adherence or clinical outcomes.

SUGGESTIONS

Dialysis nurses may consider brief video education as an adjunct to individualized counselling, provided that content is reviewed against current renal-nutrition guidance and adapted to patient needs (Ikizler et al., 2020; KDIGO CKD Work Group, 2024). Video should not be presented as superior to usual education because this study did not include a comparator. Future studies should use adequately powered controlled or randomized designs, document intervention fidelity and the viewing environment, use fully characterized validated instruments, assess retention, and include behavioral and clinical outcomes such as dietary adherence, interdialytic weight gain, nutritional status, and relevant biochemical indicators.

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DECLARATION OF INTEREST

The authors declare that there are no financial, professional, personal, or institutional conflicts of interest that could have influenced the design, implementation, analysis, interpretation, or publication of this study.

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