Jurnal Keperawatan Suaka Insan (JKSI)
Volume 11, No 1, June 2026
P-ISSN : 2527-5798, E-ISSN : 2580-7633

Kidney Risk Education (KREN) as Audiovisual Edutainment to Enhance Adolescents' Knowledge of Chronic Kidney Disease Prevention: A Pre-Experimental Study

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Article Info

Article history:

Received March 07, 2026
Accepted May 23, 2026

Keywords:

CKD
Education
Audiovisual
Edutainment
Knowledge
Adolescents

ABSTRACT

The prevalence of Chronic Kidney Disease (CKD) is increasing globally, including among adolescents. Limited knowledge about CKD prevention may predispose to unhealthy lifestyle behaviors that increase the risk of kidney damage. This study aimed to examine the effect of Kidney Risk Education (KREN), an audiovisual edutainment-based intervention on adolescents' knowledge on CKD prevention at SMPN 21 Central Bengkulu, Indonesia. A pre-experimental one group pretest-posttest design was conducted involving 81 students. Knowledge was assessed using validated and reliable questionnaire administered before and after the intervention. KREN was delivered through audiovisual edutainment focusing on CKD risk factors, prevention strategies, and healthy lifestyle behaviors. Data were analyzed using the Wilcoxon signed-rank test. The results showed a statistically significant increase on students' knowledge scores after the intervention (p = 0.0001), indicating that KREN effectively enhanced adolescents' knowledge of CKD prevention. Audiovisual-based health education can serve as a practical and scalable health promotion strategy in school settings to support early prevention of chronic kidney disease. However, further studies with control groups are needed to strengthen the validity of these findings.

ABSTRAK

Prevalensi Penyakit Ginjal Kronik (PGK) terus meningkat, termasuk pada kelompok usia remaja. Rendahnya pengetahuan tentang faktor risiko dan pencegahan PGK dapat memicu perilaku hidup tidak sehat yang berdampak pada kesehatan ginjal. Penelitian ini bertujuan untuk menganalisis pengaruh Kidney Risk Education (KREN), yaitu program edukasi berbasis audiovisual edutainment, terhadap pengetahuan remaja tentang pencegahan PGK di SMPN 21 Bengkulu Tengah, Indonesia. Metode penelitian ini adalah pra-eksperimental dengan pendekatan one-group pretest–posttest dengan melibatkan 81 orang siswa. Tingkat pengetahuan diukur menggunakan kuesioner yang valid dan reliabel diberikan sebelum dan sesudah intervensi. KREN disampaikan melalui media audiovisual yang membahas faktor risiko, tanda dan gejala, serta upaya pencegahan PGK. Data dianalisis menggunakan uji Wilcoxon signed-rank. Hasil penelitian menunjukkan adanya peningkatan skor pengetahuan yang signifikan setelah intervensi (p=0.0001). KREN terbukti efektif dalam meningkatkan pengetahuan remaja tentang pencegahan PGK. Edukasi kesehatan berbasis audiovisual edutainment dapat menjadi strategi promosi kesehatan yang efektif untuk mendukung upaya pencegahan dini PGK di lingkungan sekolah. Penelitian lebih lanjut dengan melibatkan kelompok kontrol diperlukan untuk memperkuat validitas hasil penelitian ini.

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Introduction

Chronic Kidney Disease (CKD) is characterized by irreversible decline of renal function and is diagnosed based on laboratory findings, histopathological biopsy results, and imaging diagnostic procedures (Fashafsheh et al.,

2025). CKD is strongly associated with an elevated risk of cardiovascular disease and mortality (Nakamura et al., 2024). Globally, CKD is a progressive and irreversible condition affecting over 10% of the population, with an estimated burden of more than 800 million individuals worldwide (Cirillo et al., 2023). CKD has historically been regarded as a disease that predominantly affects older adults, with the highest prevalence and clinical burden observed among middle-aged and elderly populations. This trend is primarily associated with the cumulative effects of prolonged exposure to major risk factors, such as hypertension, diabetes mellitus, and vascular disease (Li et al., 2025). Although CKD has been recognized as a health condition that primarily affects middle-aged and older adults, recent research has highlighted the importance of early-life determinants in the progression of kidney disease. Increased exposure to modifiable risk factors during adolescence has raised concerns about the potential for kidney dysfunction at younger age. In this context, recent epidemiological evidence indicates a significant increase in both the incidence and prevalence of CKD among children and adolescents worldwide, especially among those aged 15–19 years. This emerging trend reflects the growing burden of hypertension, obesity, and diabetes mellitus in younger populations, which may accelerate kidney damage and contribute to the earlier onset and progression of CKD (Zhao & Li, 2024; Wang et al., 2025; Mackowiak et al., 2022; Ishpuz, 2019).

These modifiable risk factors are increasingly prevalent among adolescents, including those in Bengkulu, driven by lifestyle changes, such as poor dietary habits, lack of physical activity, and low health literacy. This condition can increase the risk of CKD at early age. Furthermore, increasing cases of CKD have been reported among children aged 6–18 years in Indonesia, with a total of 189 cases (Ministry of Health of the Republic of Indonesia, 2024). Data from major referral hospitals highlight the increasing clinical burden of CKD among children and adolescents requiring renal replacement therapy. Dr. Cipto Mangunkusumo National Hospital in Jakarta reported 30 patients undergoing routine hemodialysis, while Hasan Sadikin Hospital in Bandung documented 77 patients receiving regular hemodialysis. In addition, preliminary data from Dr. M. Yunus Hospital in Bengkulu reported two adolescents undergoing hemodialysis, highlighting the presence of adolescents CKD cases at the regional level. These data highlight the urgent need for early preventive intervention targeting adolescents at the community and schools.

CKD in adolescents is often asymptomatic during its early stages and is frequently diagnosed at more advanced stages of disease. Patients often present with several symptoms including fatigue, anemia, hypertension, and impaired growth (Ramadan et al., 2023; Riyami, 2025). Moreover, lifestyle changes among adolescents particularly unhealthy dietary habits, significantly increase the risk of CKD progression (Kuma & Kato, 2022). CKD among adolescents is a serious health concern, as it may impair growth and developmental processes during adolescence, increase the risk of depression, and significantly reduce quality of life (Kili, 2023; Karali, 2025). Early detection and comprehensive understanding of the causes and pathogenesis are crucial to preventing disease progression and long term complications in young patients (Todisco et al., 2024).

Low health literacy is prevalent among individuals with chronic kidney disease (CKD) and is associated with reduced disease self-management, poor health outcomes, increased mortality, and poorer quality of life (Billany et al., 2023). Previous research showed that limited knowledge and low health literacy among adolescents may contribute to delayed recognition of early symptoms and poor self-management behaviors, thereby increasing the risk of CKD progression (Zhong et al., 2019). Higher health literacy is associated with better self-management skills, suggesting that improved literacy from an early stage may support early recognition and effective management of health conditions. Health education is a structured learning process designed to provide individuals with knowledge and information aimed at improving health outcomes (Meidiana et al., 2018). Well-designed health education intervention can improve knowledge, strengthen health literacy, and encourage sustainable lifestyle modifications, thereby supporting early risk identification and prevention of CKD progression (Neto et al., 2025). Moreover, health education plays a crucial role in supporting achievement of Sustainable Development Goal (SDGs) 3, Good Health and Well Being, by promoting disease prevention, enhance health literacy (Muthmainnah et al., 2025). In this context, community nurses play a critical role in enhancing health literacy and promoting preventive behaviors among adolescents. As frontline providers of primary health care, nurses are well positioned to implement structured health education in both school and community setting. Therefore, integrating such interventions into nursing practice is a relevant strategy for strengthening early prevention against CKD.

Kidney Risk Education (KREN) has been developed as a structured educational intervention using audiovisual edutainment aimed at enhancing adolescents' knowledge of CKD, including its causes, early warning signs, and preventive strategies, and healthy lifestyle behaviors. Audiovisual media are considered effective educational tools because they simultaneously engage visual and auditory senses, thereby enhancing comprehension, improving information retention, and increasing learner engagement. Evidence from meta-analyses in health education demonstrates that video-based approaches significantly improve knowledge acquisition and skill development compared with non-video methods, highlighting their value in health teaching contexts (Adesope & Proença, 2024). Although, audiovisual health education is commonly used to improve health knowledge, many interventions primary focus on information delivery rather than providing structured, risk-based educational content tailored to adolescents. Most existing CKD education programs are general and do not specifically address adolescent-related risk factors or early prevention. In the context of CKD, most existing educational programs are designed for the general population and do not specifically address adolescent-related risk factors or emphasize early prevention strategies relevant to this age group.

Kidney Risk Education (KREN) was developed to address this gap by providing a structured, adolescent-centered audiovisual education that emphasizes early detection and preventive behaviors to reduce the risk of CKD progression. By improving kidney health literacy during adolescence, KREN has the potential to support early detection efforts and contribute to reducing the long-term burden of CKD. Unlike general audiovisual health education programs, KREN adopts edutainment approach. Edutainment is learning approach that integrates educational and entertainment elements to enhance learners' engagement, learning motivation, and comprehension. This approach utilizes various engaging media such as animations, narrations, storytelling, and other audiovisual elements to create a more interactive learning experience and facilitate better understanding of health information (Ibukun et al., 2025).

A preliminary survey conducted at SMPN 21 Central Bengkulu identified a total enrollment of 84 students. Interviews with ten students revealed inadequate knowledge of CKD, only three demonstrated a basic understanding, while seven reported no knowledge of the disease or its underlying causes. These preliminary findings suggest a low baseline level of knowledge. Additionally, several students reported frequent consumption of energy drinks after school, a behavior that may reflect limited understanding of potential health risks. Access to reliable health information in this area is further limited by inadequate internet connectivity, potentially restricting students' exposure to accurate and evidence-based health resources. Such limitations may contribute to gaps in knowledge, particularly during adolescence. In response to these challenges, the present study aims to evaluate students' knowledge of chronic kidney disease (CKD) before and after the implementation of KREN, an audiovisual edutainment, at SMPN 21 Central Bengkulu. Research on educational interventions aimed at preventing chronic kidney disease (CKD) among adolescents remains limited, despite the recognized importance of health education in fostering preventive behaviors. Most research to date has focused on adults or general health promotion programs. Meanwhile, structured kidney health education programs specifically targeting adolescents are still limited. In addition, scientific evidence on the effectiveness of audiovisual edutainment in increasing adolescents' knowledge about chronic kidney disease (CKD) is still scarce. To address this gap, this study aimed examines the effectiveness of Kidney Risk Education (KREN) as an audiovisual edutainment in improving adolescents' knowledge about CKD prevention.

Research Methodology

Design

This study employed a quantitative pre-experimental one-group pretest–posttest design. As a preliminary study, the design was used to evaluate the effectiveness of the intervention in improving adolescents' knowledge of CKD prevention. The absence of a control group was considered appropriate given practical challenges in establishing a comparable control group within the school setting, the potential for contamination between students, and ethical considerations regarding unequal access to health education. Furthermore, the limited availability of structured health education programs in the school supported the decision to provide the intervention to all eligible students. Respondents were assessed before and after the intervention, with each

respondent serving as their own control. This within-subject design reduces inter-individual variability, improves statistical efficiency, and supports the adequacy of the sample size.

Population and Sample

The study was conducted at SMPN 21 Central Bengkulu. The study population comprised all students enrolled in grades VII-IX (*N*=84). Total sampling was employed because the population size was relatively small and all eligible students were invited to participate. The inclusion criteria were students who were enrolled in grade VII-IX, present during the data collection period, and willing to participate with informed consent. Students who were absent during data collection or did not complete both pretest and posttest assessments were excluded. Of the 84 eligible students, 81 participated and completed the study, resulting in a response rate of 96.4%. Three students were excluded due to absence during data collection. As total sampling was employed and nearly the entire study population participated, a formal a priori power analysis was not conducted. The high participation rate increased the representativeness of the sample.

Instruments

The instrument used in this study was the adolescent knowledge questionnaire on chronic kidney disease, it adapted from an instrument developed by Dian Wahyu Ummah (2019) in her research entitled The Relationship between Adolescents' Knowledge of Chronic Kidney Disease and Preventive Behaviors toward Chronic Kidney Disease. The questionnaire showed acceptable reliability, indicated by a Cronbach's alpha coefficient of 0.712, and satisfactory validity, with validity coefficients ranging from 0.645 to 0.862. The questionnaire consisted of 16 multiple choice items designed to assess adolescents' knowledge of CKD. Each correct answer was assigned a score of 1, while incorrect was 0, resulting in a total possible score ranging 0-16. The total score was converted into percentage by dividing the obtain score by the maximum possible score and multiplying by 100. Knowledge levels were then categorized as good (76-100%), moderate (56-75%), and poor (≤55%).

Procedure

Prior to the intervention, participants' baseline knowledge of chronic kidney disease (CKD) was assessed using a validated knowledge questionnaire (pretest). Kidney Risk Education (KREN) was developed to provide adolescents with essential knowledge regarding CKD prevention. KREN was delivered using audiovisual edutainment. All materials were presented in simple language and supported by visual illustrations relevant to adolescents' daily lives. The educational content included basic kidney function, an overview of CKD, adolescent-related risk factors (including unhealthy diet, obesity, physical inactivity, hypertension, and type 2 diabetes mellitus), early signs and symptoms of CKD, preventive lifestyle behaviors, the importance of early detection and appropriate health-seeking behavior. The educational video began with animated illustrations of position and structure of the kidneys in the human body, accompanied by simple narration explaining the function of kidneys. The content then presents animations of the blood filtration process supported by infographics to facilitate understanding. An overview of CKD is introduced, followed by explanations of major risk factors such as hypertension, diabetes mellitus, unhealthy diet, and obesity. Short storytelling segments depicting adolescents' daily behaviors such as consuming sugary drinks, eating high-salt foods, and lack of physical activity. These illustrate behaviors that may increase the risk of CKD. The video also highlights of early signs and symptoms of CKD and emphasizes importance of early detection. At the end of the video, educational messages encourage adolescents to adopt healthy lifestyle behaviors to maintain kidney health and prevent CKD. Immediately following the educational session, respondents' knowledge was reassessed (posttest) to evaluate changes in knowledge levels, with the order of questionnaire items randomized to minimize recall bias.

Data analysis

The difference between pretest and posttest scores was used to determine the effectiveness of the KREN intervention on adolescents' knowledge of chronic kidney disease. Descriptive statistics were used to summarize respondents' characteristics, level of knowledge, including frequency and percentage. The Kolmogorov–Smirnov test was used to assess data normality due to a sample size greater than 50. As the data were not normally distributed, differences between pretest and posttest scores were analyzed using the Wilcoxon signed-rank test. Results were considered statistically significant at $p< 0.05$.

Ethical Considerations

Ethical approval for this study was obtained from the Research Ethics Committee of STIKES TMS Bengkulu (Approval No. 000663/KEPK/STIKES TMS Bengkulu/2025). Informed consent was obtained from all participants, and data confidentiality was maintained.

Result

Table 1.
Characteristics of Respondents (N=81)

Variable	Frequency *(n)*	Percentage (%)	*Mean±SD*
Age			13.67±1.00
12 years	8	9.9	
13 years	32	39.5	
14 years	22	27.2	
15 years	17	21.0	
16 years	2	2.5	
Male	39	48.1	
Female	42	51.9	
Grade			
VII	39	48.1	
VIII	23	28.4	
IX	19	23.5	
Total	81	100.0	

As shown in Table 1, the sample consisted of 81 adolescents with a mean age of 13.67 years (*SD* = 1.00). There was a slightly higher proportion of female participants (*n* = 42, 51.9%) compared to male participants (*n* = 39, 48.1%). The largest segment of the respondents was enrolled in Grade VII (*n* = 39, 48.1%).

Table 2

Distribution of Students' Knowledge Levels Pre- and Post-Intervention.

Level of Knowledge	Pre-Intervention		Post-Intervention	
	n	%	*n*	%
Good	5	6.2	67	82.8
Moderate	55	67.9	13	16.0
Poor	21	25.9	1	1.2
Total	**81**	**100.0**	**81**	**100.0**

Table 2 illustrates the shift in the students' knowledge levels regarding chronic kidney disease prevention before and after the intervention. Prior to the Kidney Risk Education (KREN) audiovisual edutainment, the majority of the respondents demonstrated a moderate level of knowledge (*n* = 55, 67.9%), and more than a quarter had a poor level of knowledge (*n* = 21, 25.9%). Following the intervention, there was a substantial improvement, with the vast majority of respondents achieving a good level of knowledge (*n* = 67, 82.8%) and only one student (1.2%) remaining in the poor knowledge category.

Table 3

Effect of KREN Audiovisual Edutainment on Adolescents' Knowledge Scores

Assessment	n	Min	Max	M	SD	p
Pre-test	81	4	14	9.26	2.15	< .001
Post-test	81	7	16	13.75	1.86	

The effect of the KREN intervention on the adolescents' knowledge scores is presented in Table 3. The results indicate a statistically significant improvement in knowledge following the implementation of the audiovisual edutainment program. The students' mean knowledge score increased from the pre-test (M = 9.26, SD = 2.15) to the post-test (M = 13.75, SD = 1.86), $p < .001$.

Discussion

The results showed that the majority of respondents (67.9%) had a moderate level of knowledge prior to implementation audiovisual edutainment-based Kidney Risk Education (KREN). A total of 25.9% of respondents in this study had poor knowledge, which may negatively affect their health status. This result suggests that a considerable proportion of adolescents had limited knowledge of kidney health prior to the intervention. The lack of knowledge among students was primarily due to their lack of prior exposure to information regarding CKD. Respondents reported that they had never previously received information related to CKD. This limited exposure to kidney health information may contribute to relatively low level of baseline knowledge observed in this study. Limited exposure to health information can hinder adolescents' ability to recognize disease risk factors and adopt preventive behaviors. The low level of knowledge among adolescents underscores the need to strengthen health education in school settings. Adolescence is a critical developmental stage marked by rapid physical, cognitive, and psychosocial changes, during which long-term habits and health-related behaviors are established (Taryzafitri et al., 2025).

Based on the results, the majority of respondents (82.7%) demonstrated a good level of knowledge after the implementation of Kidney Risk Education (KREN). The proportion of students with a good level of knowledge increased substantially after intervention, suggesting that audiovisual edutainment-based health education may serve as an effective strategy for improving adolescents' knowledge. Choosing effective, affordable, and comprehensive educational strategies to improve adolescent health remains a key priority for health policymakers worldwide. According to the Health Belief Model, greater knowledge and awareness of risk can motivate individuals to engage in preventive behaviors (Eghbal et al., 2023). Guided by this theoretical perspective, the Kidney Risk Education (KREN) was developed to increase adolescents' knowledge and risk perception regarding CKD as an early preventive strategy. By integrating structured kidney health content with audiovisual delivery, KREN enables participants to understand complex kidney health concepts more effectively. Use of edutainment as a teaching method promotes the type of engaged learning that is required in youth education (Ibukun et al., 2025).

During the educational intervention, students viewed 9 minutes educational video about kidney function, an overview of CKD, adolescent-related risk factors including unhealthy diet, obesity, physical inactivity, hypertension, and type 2 diabetes mellitus, early signs and symptoms of CKD, preventive lifestyle behaviors, and the importance of early detection. Visual depictions of kidney damage and disease progression help students understand the consequences of uncontrolled risk factors, while audio explanations reinforce the importance of prevention. From the perspective of the Health Belief Model, the educational content addressed several key constructs. Information about adolescent-related risk factors increased perceived susceptibility, while animated visual illustrations of kidney damage and disease progression enhanced perceived severity by showing the potential consequences of unhealthy behaviors. Moreover, the audiovisual acted as a cue to action by reinforcing risk awareness and encouraging healthier choices. Through this theory-informed design, KREN not only improved knowledge but also supported the cognitive factors that influence preventive behavior.

The 9-minute KREN audiovisual can be integrated into existing school activities, such as health education, biology or physical education classes, or extracurricular programs, without significantly increasing class time. As a video-based audiovisual edutainment intervention, KREN offers several advantages in the learning process. It is more effective in supporting learning process because it provides a more concrete and realistic learning experience compared to audio or visual media only. By delivering information through both sound and visual elements at the same time, audiovisual media help students understand process information more effectively (Siswati et al., 2022). Moreover, the use of audiovisual media makes the learning process more engaging and enjoyable (Meidiana et al., 2018). Feedback from respondents suggested that the educational video was highly useful, not boring, easier to understand than just reading. It allowed them to visualize real conditions through animations and sound. The video helped them understand disease process more clearly. Previous research showed a significant effect of audiovisual media on increasing knowledge of chronic kidney disease (CKD) in patients with diabetes mellitus (DM) (Mi et al., 2025).

These findings suggest that structured audiovisual interventions such as KREN may enhance knowledge by providing engaging, multisensory learning stimulation. The Video integrates educational content with entertaining elements such as animations, storytelling, infographics, and relatable narratives, making information easier to remember and understand. Students acknowledged that audiovisual learning media enhanced their engagement and comprehension, as it allowed them to simultaneously listen to explanations and observe visual representations. A study involving adolescents in Indonesia reported that edutainment based education based health education significantly increased students' knowledge (Muthmainnah et al., 2025). Previous studies have shown that edutainment can enhance adolescents' comprehension by presenting educational content in a more engaging way (Port et al., 2022).

Improved knowledge following the intervention is expected to encourage adolescents to adopt healthier behaviors, enhance early symptoms recognition, and seek timely medical consultation. Previous studies have shown that structure health promotion improve health literacy and health promoting behaviors (Öztürk el al., 2023). This is consistent with evidence that audiovisual health education contributes to changes in health behavior and preventive actions, as shown in research on cervical cancer early detection where audiovisual education significantly improved both knowledge and preventive behavior (Bas et al., 2024). Compared with conventional lecture-based methods, audiovisual is often perceived as more engaging, which may encourage active participation and better focus. This increased engagement can contribute to improved knowledge acquisition, particularly among adolescents and those with limited prior exposure to health information (Khairunnisa et al., 2025). Overall, the KREN intervention delivered through audiovisual edutainment demonstrated effectiveness in improving knowledge of CKD. The structured content, combined with an engaging audiovisual edutainment, highlights its potential as a preventive health education. These findings emphasize the broader value of audiovisual edutainment not only in enhancing cognitive outcomes but also in supporting individuals toward more proactive health management.

Study Limitations

Several limitations in this study should be acknowledged. First, the Kidney Risk Education (KREN) intervention was delivered through audiovisual edutainment in a single educational session, which limits the ability to assess long-term knowledge retention and sustained behavioral change. Additionally, this study employed a pre-experimental design without a control group, thereby limiting the ability to attribute the observed improvements in knowledge solely to the KREN intervention. The methodological constraints are further compounded by the use of the same questionnaire for both the pretest and posttest, which may have led to a testing effect, even though the order of the questions was randomized during the posttest to minimize recall bias. Finally, the study was conducted in a single setting with relatively homogeneous respondents, which may limit the generalizability of the findings to broader and more diverse populations.

Conclusion

Based on the results of this study, it can be concluded that Kidney Risk Education (KREN) based on audiovisual edutainment may be an effective approach for improving adolescents' knowledge of chronic kidney disease prevention at SMPN 2 Central Bengkulu. This conclusion is supported by the differences in pre-test and post-test scores after the intervention. Future studies should incorporate control groups, extend follow-up durations, and more diverse populations to better evaluate the effectiveness of KREN interventions. For Nursing practitioners, particularly those involved in school and community health, it is recommended to integrate audiovisual edutainment-based intervention into routine health education programs to enhance adolescents' knowledge of chronic kidney disease prevention. For school administrators, incorporating structured health education programs, such as KREN into extracurricular activities may support early prevention efforts and foster health awareness among students.

Acknowledgment

The authors sincerely thank to the Faculty of Mathematics and Natural Sciences, D3 Nursing Program, The University of Bengkulu for the support in conducting this research.

Conflict of Interest

The author declares no conflict of interest in this study.

Credit Author Statement

Bardah Wasalamah: Conceptualization, methodology, validation, project administration, writing-original draft**; Titin Aprilatutini:** Formal Analysis, Investigation, editing**; Encik Putri Ema Komala:** Validation, data curation**; Esti Sorena:** Investigation, writing-review; **Nova Yustisia:** Investigation**; Selina Aprilia:** Investigation.

References

Adesope, O., & Proença, L. (2024). Video-based approaches in health education : a systematic review and meta-analysis. *Scientific Report, 14*(1), 23651. https://doi.org/10.1038/s41598-024-73671-7

Bas, F., Kleden, S., & Hamu, A. (2024). The Effect of audiovisual health education on early detection and prevention of cervical cancer on female students' knowledge. *Journal of Tropical Disease and Health Science, 4*(1), 1–5. https://doi.org/10.31965/jtdhs.v4i1.2181

Billany, R. E., Thopte, A., Adenwalla, S. F., March, D. S., Burton, J. O., & Brown, M. P. M. G. (2023). Associations of health literacy with self-management behaviours and health outcomes in chronic kidney disease : a systematic review. *Journal of Nephrology*, *36*(5), 1267–1281. https://doi.org/10.1007/s40620-022-01537-0

Cirillo, L., De Chiara, L., Innocenti, S., Errichiello, C., Romagnani, P., & Becherucci, F. (2023). Chronic kidney disease in children: an update. *Clinical Kidney Journal*, *16*(10), 1600–1611. https://doi.org/10.1093/ckj/sfad097

Dryjanska, N., & Kili, K. (2023). Depression in children and adolescents with chronic kidney disease-review of available literature. *Journal of Clinical Medicine, 12, 3554.* https://doi.org/10.3390/jcm12103554

Eghbal, S. B., Kenari, Z. A., Ashouri, A., Tonekaboni, N. R., & Kasmaei, P. (2023). The effectiveness of educational program based on health belief model on promotion of puberty health concepts among teen girls: a cross-sectional study in north of Iran. *BMC Women's Health*, 1–9. https://doi.org/10.1186/s12905-023-02391-3

Fashafsheh N, Chui P, Danaee M, Ayed A, Lai L. (2025). Enhancing knowledge in adolescents undergoing hemodialysis in palestine: the Impact of a video-assisted educational program. *Hemodialysis International, 30*(1), 215-223. https://doi.org/10.1111/hdi.70015

Ishpuz, M. (2019). Association of adolescent hypertension with future end-stage renal disease. *JAMA International Medication,* 179(4), 517-523. https://doi.org/10.1001/jamainternmed.2018.7632

Khairunnisa, Y., Jeki, A. G., Wulansari, A., & Indrawati, I. (2025). The effect of nutrition education via video on adolescents' knowledge of balanced nutrition at SMAN 7 Batang Hari. *Jurnal Akademika Baiturahim Jambi, 14*(2), 307–313. https://doi.org/10.36565/jab.v14i2.939

Kuma, A., & Kato, A. (2022). Lifestyle-related risk factors for the incidence and progression of chronic kidney disease in the healthy young and midle age population. *Nutrients, 14*(18), 3787. https://doi.org/10.3390/nu14183787

Kementerian Kesehatan Republik Indonesia. (2024). *Kasus Gagal Ginjal Akut Pada Anak Meningkat, Orang Tua Diminta Waspada*. *021*, 2024–2026.

Li, Z., He, R., Wang, Y., Qu, Z., Liu, J., Yu, R., & Yang, S. (2025). Global trends of chronic kidney disease from 1990 to 2021: a systematic analysis for the global burden of disease study 2021. *BMC Nephrology, 26*(385). https://doi.org/10.1186/s12882-025-04309-7

Mackowiak, K., Danuta, L., Nowicka, O., & Zaorska, K. (2022). Chronic kidney disease predictors in obese adolescents. *Pediatric Nephrology*, 37(1), 2479–2488. https://doi.org/10.1007/s00467-021-05403-2

Meidiana, R., Simbolon, D., & Wahyudi, A. (2018). The effect of education through audiovisual media on the knowledge and attitudes of overweight adolescents. *Jurnal Kesehatan, 9*(3), 478–484.

Mi, A., Luh, N., Ariastuti, P., Ayu, K., Sari, K., & Sawitri, A. S. (2025). The influence of audiovisual media on increasing knowledge about chronic kidney disease in diabetes mellitus patients at RSUD Dr. Soedomo Trenggalek Regency. *Jurnal Medika Udayana, 14*(01), 57–65. https://doi.org/10.24843/MU.2025.V14.i1.P12

Muthmainnah, M., Salim, L. A., Nurmala, I., Nadia, A., & Salsabila, A. C. (2025). Enhancing health education using edutainment: a quantitative study in Malang Regency, Indonesia. *Media Publikasi Promosi Kesehatan Indonesia,* 8(5), 326-336. https://doi.org/10.56338/mppki.v8i5.7134

Nakamura, J., Kaseda, R., Takeuchi, M., Kitabayashi, K., & Narita, I. (2024). Adolescents and parents' knowledge of chronic kidney disease: the potential of school-based education. *Clinical and Experimental Nephrology*, *29*(3), 292–300. https://doi.org/10.1007/s10157-024-02574-8

Neto, V., Martins, B., Branquinho, A., Figueiras, A., & Teresa, M. (2025). Educational interventions for the adoption of healthy lifestyles and improvement of health literacy: a systematic review. *Public Health, 245(1)*. https://doi.org/10.1016/j.puhe.2025.105788

Öztürk FÖ, Doğan E, Gedikaslan E, Yılmaz HY. The effect of structured health promotion education given to adolescents on health literacy and health-promoting behaviors. (2023). *J Pediatr Nurs,* 73, 579-585. https://doi.org/10.1016/j.pedn.2023.10.036.

Port, L., Public, B. M. C., Port, A. Le, Seye, M., Heckert, J., Peterman, A., Tchamwa, A. N., Dione, M., Fall, A. S., & Hidrobo, M. (2022). A community edutainment intervention for gender-based violence , sexual and reproductive health, and maternal and child health in rural Senegal: a process evaluation. *BMC Public Health*, *22*(1165), 1–15. https://doi.org/10.1186/s12889-022-13570-6

Ramadan, Y., Elkoofy, N., Sabry, S., Mansour, G., & Anwar, N. El. (2023). Fatigue assessment and its predictors in pediatric patients with chronic kidney disease stages III to V. *Egyptian Pediatric Association Gazette*. *71*(3).https://doi.org/10.1186/s43054-022-00155-6

Riyami, M. S. Al. (2025). Anemia in children with chronic kidney disease. *Asian Journal of Pediatric, 7*(2)*,* 34–39. https://doi.org/10.4103/ajpn.ajpn

Siswati, T., Olfah, Y., Kasjono, H. S., & Paramashanti, B. A. (2022). Improving adolescent knowledge and attitude toward the intergenerational cycle of undernutrition through audiovisual education: findings from RESEPIN study in Yogyakarta Indonesia. *Indian Journal of Community Medicine, 47*(2), 196–201. https://doi.org/10.4103/ijcm.ijcm_1229_21

Önal HG, Önal M, Nalçacioğlu H, Tekcan Karali D. (2025). Growth and puberty development in pediatric chronic kidney disease patients. *Medicine, 104*(16). https://doi.org/10.1097/MD.0000000000042159

Taryzafitri, N., Meihartati, T., & Astutik, W. (2025). The effect of audiovisual educational media on adolescent girls' knowledge of anemia at SMAN 1 Berau. *Journal of Sosial Science Research, 5*(2), 3752–3764.

Todisco, T., Ubertini, G. M., Bizzarri, C., Loche, S., & Cappa, M. (2024). Chronic kidney disease and growth failure in children. *Children, 11*(7), 808. https://doi.org/10.3390/children11070808

Wang, T. (2025). An epidemiological trend of chronic kidney disease due to hypertension among adolescents and young adults: global burden and future 2035 projections. *Front Public Health, 4*(13*)*:1618416.

https://doi.org/10.3389/fpubh.2025.1618416

Wang, Z., You, Q., Wang, Y., Wang, J., & Shao, L. (2025). Global, regional, and national burden of chronic kidney disease among adolescents and emerging adults from 1990 to 2021. *Renal Failure*, *47*(1). https://doi.org/10.1080/0886022X.2025.2508296

Zhao, W., & Li, X. (2024). Global , regional and national burden of CKD in children and adolescents from 1990 to 2019. *Nephrology Dialysis Transplantation*, *39*(8), 1268–1278. https://doi.org/10.1093/ndt/gfad269

Zhong, Y., Patel, N., Ferris, M., & Rak, E. (2019). Health literacy, nutrition knowledge, and health care transition readiness in youth with chronic kidney disease or hypertension: A cross- sectional study. *Journal of Child Health Care. 24*(2): 246-259. https://doi.org/10.1177/1367493519831493