

The Impact of Health Education on Knowledge of Kidney Function and Health on Children at Yayasan Generasi Muslim Cendekia

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Abstract: The kidney is the main organ of the excretory system that performs a very vital function in the human body. Chronic Kidney Disease (CKD) is a disease that greatly affects human quality of life, especially children. The disease can be prevented with basic knowledge about kidneys, their functions, and how to maintain kidney health. This study aims to determine the effect of providing education on knowledge of kidney function and health integrated with educational materials and a simple educational board game of kidney function on students' knowledge. The research method used the quasi-experimental technique with one group pre-test and post-test design. Data analysis used an N-gain test to determine the improvement of students' critical thinking skills and a t-test to determine the effect of educational materials and a simple educational board game of kidney function on students' knowledge. The data was collected using a pretest-posttest involving 30 teenage students. The t-test results indicate a significant difference between pretest and posttest critical thinking skills ($p < 0,05$). A high category N-gain score of 0,972 was achieved. This study concludes that educational materials and a simple board game of kidney function effectively enhance student's knowledge.

Keywords: Health education; Kidney function; Kidney health; Knowledge.

Introduction

Health is a state of physical, mental and social well-being that is not only free from disease or disability. The human body is composed mostly of fluids. Almost 60 percent of an adult's body weight consists of fluid. The function of the kidneys here is needed because the kidneys are a vital organ in the body that functions as an excretory organ in the body (Yusuf and Nasution., 2023) The kidney is a vital and complex organ that has a far-

reaching effect on many physiological processes and systems in the human body (Dewi et al., 2019). Located in the lower back, one on each side of the spine, the kidneys are a pair of bean-shaped organs. They are mainly responsible for filtering the blood, removing waste, regulating electrolyte balance, controlling blood pressure, and producing hormones like erythropoietin. The kidneys are essential for the maintenance of general health and the homeostasis of the body. In the review by Ivy & Bailey (2014), The role that the kidney plays in

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regulating blood pressure over the long term. This regulation is multifaceted. It involves a complex interaction between the kidney, the cardiovascular system, and the autonomic nervous system.

From the Data of Kemenkes (2013), there were non-communicable diseases (NCD) that get high attention because these cases show a significant increase every year in Indonesia, one of which is CKD (2%). An increase in the prevalence of non-communicable diseases CKD (3.8%) was reported by Risesdas (2018). Chronic Kidney Disease (CKD) is a chronic non-communicable disease that is ranked 4th out of the top 5 most common diseases in 2018. In recent times, many cases of chronic kidney disease have attacked children aged 6 months to 18 years. The increase in cases occurred in the last 2 months. On October 18 2022, 189 cases were reported and were dominated by children aged 1-5 years. Symptoms found in children are fever, diarrhea, vomiting, coughs, colds and reduced urine output or even inability to pass urine (Cho., 2020). Cho, Myung Hyun. 2020. "Pediatric Acute Kidney Injury: Focusing on Diagnosis and Management." *Childhood Kidney Diseases* 24(1): 19–26. Chronic kidney disease is a progressive deterioration of kidney function due to various diseases, so that the kidneys are unable to maintain metabolism and fluid balance, which is indicated by an increase in urea levels (Rustandi et al., 2018). This leads to dependence on renal replacement therapy (RRT), such as peritoneal dialysis, which causes approximately 14.8% (2011-2014) of adults, with approximately 124,114 incident cases of hemodialysis being reported in 2015 (Hardy et al., 2018).

Based on the results, it appears that people who drink unhealthy water are more likely to develop CKD than those who drink water of good quality. Based on the results, it appears that people who are unhealthy living habits such as drinking drinks containing preservatives and poor water quality over the long term cause kidneys to work harder are more susceptible to develop CKD than those who have a healthy lifestyle by drink without preservatives and have a good quality of water. This is most likely due to the presence of chemicals and minerals in poor-quality water that are associated with impaired kidney function. Arsenic exposure is associated with the risk of end-stage renal disease (ESRD). This effect is modified by comorbidities, which should be treated at an early stage (Cheng et al., 2018). The results also showed that people who had a higher intake of fatty foods were more likely to have CKD. This is in line with a previous study which found that the consumption of a diet high in fat was associated with a significant increase in the likelihood of developing CKD (Asghari et al., 2018).

In addition, there was a recent spike in hospitalizations and deaths of children who developed acute kidney injury after consuming cough and fever syrups in Indonesia in 2022. Toxicological tests showed traces of diethylene glycol (DEG) or ethylene glycol (EG) in 7 of the 11 children tested, and a kidney biopsy was positive for calcium oxalate, a metabolite of DEG/EG produced by alcohol dehydrogenase was reported by WHO (2022).

Various types of very dangerous cases of kidney disease must be prevented using effective methods. One effective method used is socialization about the importance of maintaining kidney health. Providing education and outreach from adolescence is an effective solution in increasing knowledge about the kidney organ and its care. Adolescence is a stage between childhood and adulthood mature. Adolescence or also called Puberty is a period link between childhood and mature. In the cycle of life Puberty is a stage important in development towards adulthood (Proverawati and Misaroh, 2009).

Therefore the start in adolescence more well introduced how to maintain function kidneys well until adolescence. Now you can take care of your health one of them is maintaining a pattern eat and don't be lazy to drink water (Yusuf and Nasution, 2023). The prevention of kidney disease is considered to be an effective effort that can be made by the individual to maintain a good health status. Prevention includes educating people about kidney function and health so that knowledge can be used to change unhealthy lifestyles and help reduce the incidence of CKD. The efforts for the prevention of PTM can be carried out in the productive age group, because at present the trend of PTM is not only attacking the older age group, but it is also beginning to threaten the productive age group and the children.

Based on the description above, this research aims to see how educating and demonstrating kidney function can increase students' knowledge of Kidney Function and Health in Adolescents.

Method

The type of research used in this study is experimental, where the treatment is given to the research subjects and then the effect of the treatment is seen using a single-group pretest-posttest design. This design is used because there is a pretest before the health education is given and the kidney function is demonstrated. The results are better known by being able to compare them with the conditions before the health education and a simple demonstration of kidney function and health. The methodological steps in this study are as follows:

This study sample consisted of 30 students from Yayasan Generasi Muslim Cendekia. The students were randomly selected and ranged in age from 13 to 16 years. The tests are administered to collect data on the knowledge of the students. The test instrument contains descriptions of five valid items. The items consist of aspects that provide the basic and vital functions of the kidney organ.

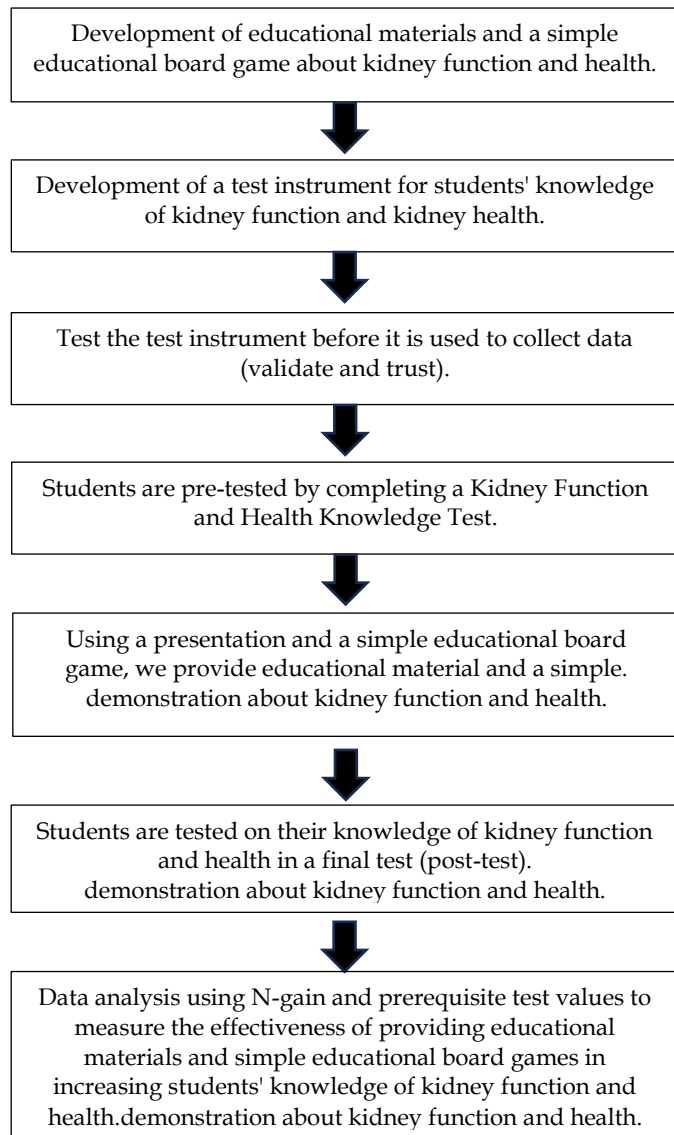


Figure 1. The methodological steps

Function and health learning uses a simple educational board game for enjoyment and entertainment. The engaging learning experience of playing an educational board game is a product of board game approaches designed to promote positive learning outcomes (Tsai et al., 2019; Yien et al., 2011).

The Normalized N-Gain Test was used to measure the effectiveness of a presentation and a simple educational board game in improving students'

knowledge. Prerequisite tests, such as normality, homogeneity, and paired sample t-test, are conducted before the normalized n-gain test. To determine the effect of critical thinking skills on students, the paired sample t-test was performed. The magnitude of the student's increased knowledge is calculated using the N-Gain Score using the formula in Equation 1.

$$N - gain (g) = \frac{x_{posttest} - x_{pretest}}{x_{max} - x_{pretest}} \tag{1}$$

Then, using the following criteria, the results of the n-gain calculation are presented as a Table 1.

Table 1. N-Gain score criteria

Criteria	Value
$g < 0.70$	High
$0.30 < g \leq 0.70$	Medium
$g > 0.30$	Low

(Meltzer and David, 2002)

Based on the gain score criteria, the game is said to be effective if the students' learning results achieve an n-gain score >0.3 with medium or high criteria.

Result and Discussion

A pre- and post-test of the students' knowledge was used for data collection. Figure 2 shows the results of the tests of the students' knowledge, including the minimum score and the maximum score.

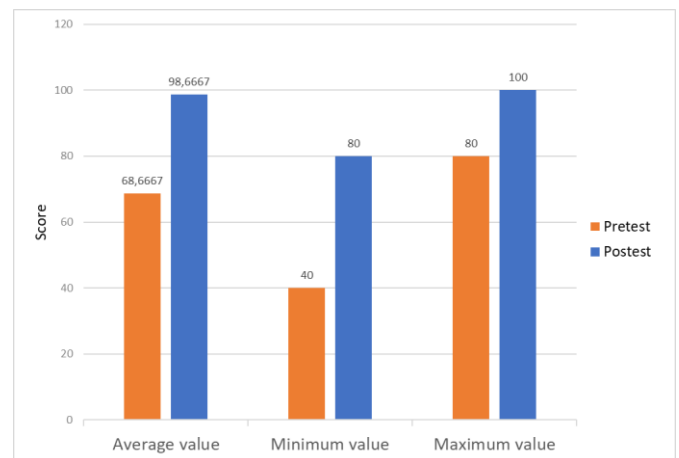


Figure 2. Data on students' Knowledge Test Result

Figure 1 shows the students' knowledge test scores before and after receiving health education about kidney function and health. Before receiving an explanation of the material, students scored an average of 68.67 on the pretest. The lowest pretest score was 40 and the highest pretest score was 80. After receiving educational materials and a simple educational board game about kidney function and health, students scored an average

of 98.67, with a low of 80 and a high of 100. From the knowledge test results, the students' ability increased after receiving educational materials and a simple educational board game about kidney function and health. The pretest average was 68.67 and the posttest average was 98.67 (posttest score > pretest score). This shows that the students have improved in learning about the kidney.

As shown in Figure 1, students' knowledge increased after learning using a presentation and a simple educational board game. The increase in students' knowledge determines the successful use of the simple educational board game designed by the researchers. To determine the effectiveness of the electronic module, a normalized N-gain test is performed. The prerequisite tests include the normality test, the homogeneity test, and the sample t-test before the normalized n-gain test is conducted. The significance value from the normality test is managed for interpretation of the results.

The data are normally distributed if the significance value (p) is greater than 0.05. The homogeneity test is for the determination of the data in the critical thinking skills of a homogeneous variable or vice versa. If the significance level (p) was lower than 0.05, the data variant was declared to be heterogeneous..If the significance level (p) was higher than 0.05 (p > 0.05), the data variant was declared to be homogeneous (Setyawan et al, 2020). The test scores of students' critical thinking skills in pretest and posttest are summarized in Table 2.

Table 2. Prerequisite Test Values

Tests performed	Significance	Conclusion
Normality (Shapiro-wilk)	Pretest = 0.58 Posttest = 0.83	Data are normally distributed
Homogeneity (Levene's Test)	0.09	The data is homogeneous
Differences of Pretest and Posttest results (Paired sample t test)	0×10^1	There is a significant difference between the pretest and posttest scores

The normality, homogeneity, and paired sample t-test assumptions tests were performed using the SPSS 23 software. The normality test was performed with the Shapiro-Wilk test. This is due to the sample number of not more than 50 participants. Based on the results of the normality test, the pretest had a significance value (p) of 0.581 (p > 0.05) and the posttest had a value (p) of 0.833

(p > 0.05). Since both the pre-test and post-test significant values (p) are more than 0.05, it may be concluded that the student data on their critical thinking abilities are typical.

Homogeneity was also tested using this type of Levene's test. The results of the homogeneity tests showed a significance value (p) of 0.092 (p > 0.05), indicated that the data were homogeneous. Then, a paired sample T-test was conducted to search for significant indications of differences in the knowledge of the students before and after the treatment with the educational materials and a simple educational board game. Based on the results of the paired sample T-test, a significance value (p) of 0.000 (p < 0.05) indicates a significant difference in students' knowledge. After the pre-test, the normalized N-Gaintest is used to assess the students' increasing motivation to learn. The N-gain score for knowledge about the kidney was 0.972, and this score was considered high, which indicates that the educational materials and a simple educational board game has a positive effect on students' knowledge (Meltzer and David, 2002).

In this study, learning was conducted in the classroom by providing educational materials and simple demonstrations on kidney function and health discussions, while experimental or practicum activities were carried out using educational board games. The educational board used is a board that is visually designed to resemble a simplified nephron pathway. The pathways are divided to represent different parts of the kidney, such as the proximal tubule, arch of Henle, distal tubule, and collecting duct. The following is an overview of the learning activities and research practices.

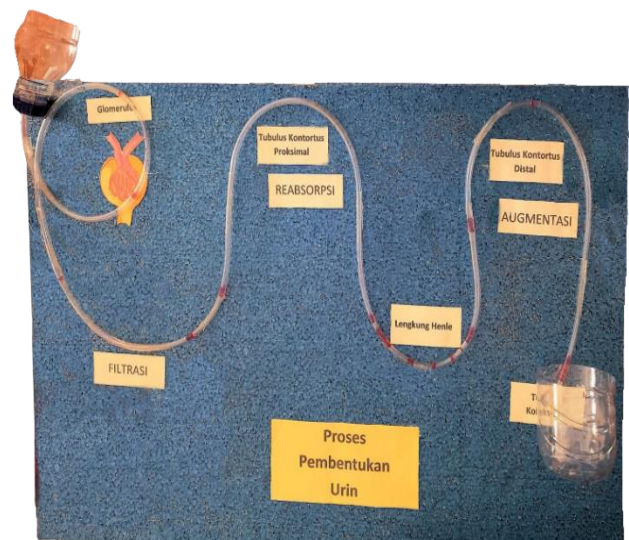


Figure 3. Research practice with an educational board game of kidney function and health



Figure 4. Student activities with educational board game of kidney function and health

Learning with the educational board game makes students more active and enjoyable because learning comes from real-life problems, so learning is not abstract and more relevant to students' lives. Moreover, the educational board game is a learning experience that has enabled the teacher to reveal teaching strategies despite the limited resources and also to develop students who can help students to mature conceptually and gain knowledge. More importantly, it helped students familiarize with kidney organ parts and their respective functions, and facilitated students with interactive and enjoyable communication and social learning atmosphere, so that students can more easily understand and remember the material presented.

Most of the students in this study had inadequate knowledge about kidney function and health, but following the outreach, there was a significant increase in their level of knowledge was observed.

Conclusion

Based on the results of the study, teaching about kidney function and health can improve students' knowledge about kidneys as indicated by the N-gain results. Before the N-gain test, normality, homogeneity, and t-test were first conducted. In the normality test, the data is normally distributed. In the homogeneity test, the data is homogeneous. Based on the paired sample t-test, it shows that there is a significant difference between pretest and posttest critical thinking skills with a sig. (2-tailed) <0.05 , which indicates that education on knowledge of kidney function and health has a positive effect on students' knowledge. By obtaining an N-gain score of 0.972 in the high category, the Education on Knowledge of Kidney Function and Health integrated with educational materials and a simple educational

board game of kidney function and health is helping to strengthen students' knowledge.

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Author Contributions

Conceptualization, E. S. P., A. H., and K. T.; methodology, H., M. S., and A. I.; software, P. B. A. S., F. A. M., and M. F. R.; validation, E. S. P.; formal analysis, P. B. A. S and S. Z. N.; investigation, P. B. A. S., H. and E. H.; resources, P. B. A. S.; data curation, K. T., F. A. M., and M. F. R.; writing—original draft preparation, P. B. A. S.; writing—review and editing, P. B. A. S., F. A. M., and S. Z. N.; visualization, E. S. P.; supervision, E. S. P. and M. M.; project administration, H. and E. H.; funding acquisition, E. S. P., A. H. and M. M.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this paper.

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