

Factors Triggering Kidney Damage and Prevention Efforts at SMK Muhammadiyah 1 Palu

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Abstrak

This Community Service Program (PKM) aimed to improve students' knowledge regarding factors triggering kidney damage and practical prevention strategies. The activity was conducted at SMK Muhammadiyah 1 Palu on Tuesday, 13 January 2026, involving 52 participants (students, teachers, and school staff). The program included a preparation phase (committee formation, task allocation, leaflet development, pre-post test instrument preparation, and health screening equipment readiness), followed by an interactive educational session with a question-and-answer discussion. The activity concluded with free health screening and vitamin distribution. Program evaluation used pre-test and post-test questionnaires to measure changes in participants' knowledge. The results demonstrated an increase in mean knowledge scores from 31.5 to 77.5, representing a 46% improvement. These findings indicate that leaflet-assisted education combined with direct interaction effectively enhanced participants' understanding of kidney damage prevention. The PKM activity is expected to promote healthier behaviors, increase risk awareness, and strengthen early prevention efforts among school-aged populations.

Keywords: kidney damage, health education, prevention, students, pre-test and post-test

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INTRODUCTION

Kidney damage is a health problem that is increasingly encountered in the community and has broad impacts, not only on patients' quality of life but also on the socio-economic burden on families and the healthcare system. The kidneys are vital organs that continuously filter blood to remove metabolic waste and toxins through urine, maintain fluid and electrolyte balance, regulate blood pressure, and contribute to red blood cell production through erythropoietin and to bone health through vitamin D activation. When kidney function declines, various complications may occur, including accumulation of metabolic waste products, fluid imbalance, increasingly difficult-to-control hypertension, anemia, mineral and bone disorders, and increased cardiovascular risk. Chronic kidney disease may also progress slowly without clear symptoms, so many people are unaware that their kidney function is declining until the condition becomes severe (Mallamaci & Tripepi, 2024; KDIGO, 2024; Kushner et al., 2024).

Adolescence is an important period for establishing health-related habits. Various risk factors for kidney disease may begin to emerge from everyday lifestyle patterns that are often considered trivial. Frequent consumption of sugar-sweetened beverages, low physical activity, weight gain, and unhealthy dietary patterns may contribute to metabolic risk factors associated

with kidney disease. Recent evidence has shown an association between higher consumption of sugar-sweetened beverages and incident chronic kidney disease, while obesity and low physical activity are also modifiable risk factors (Heo et al., 2024; Dai et al., 2024; Iqbal et al., 2024; Seidu et al., 2023).

A culture of consuming instant foods and high-sodium foods in the school environment, such as snacks, instant noodles, fried foods, fast food, and high-salt sauces or seasonings, may promote excessive sodium intake. High sodium intake is associated with increased blood pressure and is an important modifiable factor in the prevention and management of kidney disease (Mallamaci & Tripepi, 2024; Theodorakopoulou et al., 2024).

One of the main triggers of kidney damage is uncontrolled hypertension. Persistently high blood pressure can increase glomerular pressure and contribute to structural kidney damage and progressive loss of kidney function. Diabetes mellitus is also an important factor because chronic hyperglycemia is associated with diabetic kidney disease and an increased risk of chronic kidney disease. The combination of hypertension and diabetes can accelerate the decline in kidney function (Theodorakopoulou et al., 2024; Ooi et al., 2024; Mallamaci & Tripepi, 2024).

In addition to comorbidities, daily lifestyle habits also contribute to kidney health. Excessive salt consumption can increase blood pressure, while dietary patterns with excessive energy intake and obesity can increase metabolic and kidney risks. Low physical activity may worsen these conditions. Therefore, maintaining a healthy body weight, controlling blood pressure, reducing excessive salt intake, and increasing physical activity are important components of kidney health promotion (Mallamaci & Tripepi, 2024; Iqbal et al., 2024; Seidu et al., 2023).

The habit of holding urine and poor hygiene may contribute to urinary tract infections (UTIs). UTIs involving the kidneys, particularly recurrent or complicated infections, may be associated with renal scarring. Therefore, preventing recurrence and providing appropriate evaluation and treatment are important, particularly in children and adolescents (Keren et al., 2015; Gkiourtzis et al., 2024).

Irrational use of medicines and health products is another factor that requires attention. Certain pain relievers, particularly non-steroidal anti-inflammatory drugs (NSAIDs), may impair renal perfusion and are associated with acute kidney injury, especially in susceptible individuals. Herbal medicines and other products may also contain nephrotoxic compounds or contaminants. Therefore, their use should be accompanied by appropriate information and caution (LaForge et al., 2023; Rao et al., 2023; Krishnan et al., 2024).

Smoking is a modifiable risk factor associated with kidney disease and may contribute to its progression through vascular and toxic mechanisms. Environmental exposure to heavy metals such as lead and cadmium has also been associated with an increased risk of chronic kidney disease. Although not all communities have the same exposure risks, basic education on smoking prevention and environmental safety remains relevant to kidney-disease prevention (Wu et al., 2024; Kuo et al., 2024).

Another important problem is limited risk screening and delayed detection. Many people seek medical attention only when severe symptoms appear, even though kidney disease in its early stages may be asymptomatic. Simple assessments such as blood pressure measurement, serum creatinine/eGFR, and urine albumin-to-creatinine ratio in at-risk groups can support

earlier detection and appropriate counseling and management (Farrell & Vassalotti, 2024; Kushner et al., 2024; KDIGO, 2024).

Needs assessment at SMK Muhammadiyah 1 Palu was conducted before the educational intervention using a pre-test questionnaire administered to 52 participants. The mean pre-test score was 31.5, indicating that participants' baseline knowledge regarding factors triggering kidney damage and prevention efforts was still limited. The available baseline data focused on knowledge; systematic measurements of consumption of sugar-sweetened beverages and high-salt foods, water-drinking habits, delayed urination, physical activity, NSAID use, smoking status, and blood pressure were not recorded. Therefore, this article does not present prevalence estimates for these behaviors. Instead, the low baseline knowledge score was used as the documented needs-assessment finding supporting the educational intervention. Based on this finding, the community service program themed "Factors Triggering Kidney Damage and Prevention Efforts" was designed to strengthen kidney-health literacy through interactive education, discussion, and health screening.

METHOD

The community service activity was conducted on Tuesday, 13 January 2026, at SMK Muhammadiyah 1 Palu. A total of 52 participants attended, consisting of students, teachers, and school staff. Before the educational intervention, an initial needs assessment was conducted using a pre-test questionnaire to identify participants' baseline knowledge regarding factors triggering kidney damage and prevention efforts. The implementation stages were as follows:

1. Preparation Stage

At this stage, all requirements for the community service activity were prepared. Lecturers, assisted by students, prepared the equipment and materials to be used at the service site. The preparation process included forming the committee, assigning responsibilities, developing the educational leaflet, preparing the pre-test and post-test questionnaires, preparing health-screening equipment, arranging transportation, and preparing refreshments. The pre-test was used as the documented initial needs-assessment instrument for the activity.

2. Implementation Stage

The Community Service Program was conducted on Tuesday, 13 January 2026. The material delivered covered triggers/risk factors for kidney damage (kidney failure) and prevention efforts, presented by Apt. Indah Kurnia Utami, M.Farm.

3. Monitoring and Evaluation

Participants' understanding was assessed using questionnaires administered before and after the educational session. The pre-test was used as the initial needs assessment, while the post-test was used to evaluate changes in knowledge after the intervention.

RESULT AND DISCUSSION

The community service activity began with a simple needs assessment as pre test to identify participants' baseline knowledge. 52 participants took the pre-test. The mean pre-test score was 31.5, indicating that baseline knowledge regarding factors triggering kidney damage

and prevention efforts was still limited. This finding provided documented evidence for selecting kidney-health education as the intervention topic at SMK Muhammadiyah 1 Palu.

Table 1. Results of participants' pre-test and post-test measurements.

Participant	pre test Result	post test Result	Percentage Increase in Scores
1.	30	80	50 %
2.	30	90	60 %
3.	30	90	60 %
4.	20	80	60 %
5.	20	90	70 %
6.	20	90	70 %
7.	50	70	20 %
8.	50	80	30 %
9.	20	90	70 %
10.	20	70	50 %
11.	20	80	60 %
12.	60	70	10 %
13.	60	80	20 %
14.	20	90	70 %
15.	20	90	70 %
16.	20	70	50 %
17.	50	80	30 %
18.	50	80	30 %
19.	20	70	50 %
20.	20	70	50 %
21.	20	90	70 %
22.	20	80	60 %
23.	60	80	20 %
24.	60	70	10 %
25.	20	70	50 %
26.	20	80	60 %
27.	30	90	60 %
28.	30	70	40 %
29.	30	50	20 %
30.	20	80	60 %
31.	20	80	60 %
32.	50	80	30 %
33.	50	60	10 %
34.	20	70	50 %
35.	20	80	60 %
36.	20	70	50 %

37.	20	80	60 %
38.	60	80	20 %
39.	20	90	70 %
40.	20	50	30 %
41.	30	80	50 %
42.	20	80	60 %
43.	50	80	30 %
44.	50	60	10 %
45.	20	70	50 %
46.	20	80	60 %
47.	50	70	20 %
48.	50	80	30 %
49.	20	80	60 %
50.	20	80	60 %
51.	20	80	60 %
52.	50	80	30 %
Total	1640	4030	2390
Average	31,5	77,5	46 %

Based on the results of participants' knowledge assessment, the percentage increased by 46%, from 31.5% to 77%. This indicates that the outreach activity led to an improvement in students' understanding. This finding is consistent with the community service activity conducted by Rahman, which reported an increase in community understanding before and after education on chronic kidney failure prevention among people with diabetes mellitus and hypertension (Rahman 2024)

Below is documentation of the stages of the community service (PKM) activity: the session began with education, followed by a question-and-answer discussion. At the end, a health screening was conducted and vitamins were distributed.





Figure 1. Education Session with student

CONCLUSION

The conclusion of this PKM activity was that it increased student knowledge general information on the triggering factors and preventive efforts related to kidney damage by measuring a 46% increase in student understanding..

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