

MEASURING RENAL FUNCTION (KNOWLEDGE AND MANAGEMENT) AMONG YOUTH KARANG TARUNA MEMBER IN BANYUMAS REGENCY: INSTRUMENT DEVELOPMENT AND VALIDATION

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Abstract. Chronic kidney disease (CKD) is among the most prevalent non-communicable diseases globally, with rising incidence in Indonesia, including Central Java. Despite the growing burden, knowledge and health literacy related to kidney function remain limited among youths. Karang Taruna, a community-based youth organization, presents a promising platform for advancing preventive health strategies, including CKD prevention. This study aimed to develop a valid and reliable instrument to assess knowledge and behavior in kidney function management and to evaluate these aspects among youth members of Karang Taruna in Banyumas Regency. The quantitative phase involved instrument validation and reliability testing, adapted from NCD screening tools, followed by descriptive analysis. Time-based sampling was employed, and data were collected via Google Forms. Pearson correlation and Cronbach's alpha were used for validity and reliability testing, respectively. The knowledge questionnaire had 45 items, and the management behavior section had 21 items. On validity testing, 3 items were removed. The Cronbach's alpha was 0.722 for knowledge and 0.875 for management, showing good internal consistency. Among the 30 respondents, 100% reported a "Very Good" category in kidney function management and showed good preventive behavior. External triangulation, however, is recommended to check consistency between knowledge and behavior. The instrument constructed is reliable and valid to assess knowledge and management of kidney function behavior. Findings affirm that Karang Taruna youth have high potential as kidney health promoters for public health enhancement. A future study should focus on integrating a mobile-based application to support education and self-assessment of kidney health.

Keywords: Chronic kidney disease, health behavior, instrument validation, karang taruna kidney function, youth empowerment

1. Introduction

Chronic kidney disease (CKD) is a rapidly increasing public health issue, not only globally but also in Indonesia. CKD is an illness characterized by gradual kidney function loss, typically undiagnosed until it becomes very severe. According to the World Health Organization (WHO), CKD ranks among the top 10 leading causes of death globally and is estimated to climb further in the next few years due to lifestyle-related risk factors such as unhealthy diet, lack of physical activity, obesity, smoking, and increasing prevalence of hypertension and diabetes mellitus (1).

In Indonesia, the National Basic Health Survey of the Ministry of Health (Riset Kesehatan Dasar or Riskesdas) in 2018 revealed a growing incidence of CKD in all provinces, including Central Java (2). Alarmingly, the condition is now attacking young, productive-age groups that are under-educated and under-informed about the value of early detection and preservation of kidney function. Underlying such a health literacy deficit, especially among youth, is a significant barrier to preventive public health programs. The productive-age group that is an active organisation among youth is Karang Taruna. Karang Taruna, which is an established community-based youth organization in Indonesia, is a good asset for grassroots health promotion (3). With its broad network and social power, Karang Taruna can be instrumental in educating its members and the wider community regarding lifestyle diseases such as CKD.

Due to time sensitivity and potential, this study was performed to develop a highly validated and reliable instrument for measuring knowledge and behavior management of kidney health. Additionally, it strives to determine current levels of knowledge and kidney health practices among Karang Taruna teens in Banyumas Regency. The ultimate purpose is to lay the foundation for a technology-driven intervention in the guise of a mobile application that has the capability to support long-term education and self-monitoring of kidney health.

2. Methods

The present work is engaged in the process of developing an instrument based on a rigorous review and calibration of various established questionnaires for NCD prevention like the WHO STEPS tool and national screening checklists for chronic diseases (1,4). The component involved the validation of the measurement instrument and assessing the level of knowledge and behavioral management of kidney function. The instrument commenced with 45 items for the assessment of knowledge and 21 items for the assessment of behavioral management in Bahasa. The items were administered online by means of Google Forms to 30 youth members of Karang Taruna in Banyumas Regency by applying time-based non-random sampling.

The knowledge questionnaire consists of 45 items, and is specify into 40 items for knowledge of renal function and 5 items for general knowledge about renal. The knowledge of renal function questionnaire is divided into 20 items favourable and unfavorable respectively, while the general knowledge of renal questionnaire also divided into 3 favorable items and 2 unfavorable items. This knowledge questionnaire later on named as one that is knowledge of renal function, and this questionnaire use the likert scale. The problem of renal function can not be determined from the knowledge, as well as the management of renal function. Thus, this study also develops the management of renal function questionnaire that consist of 21 items divided into 11 of favorable items and 10 unfavorable items.

The development of knowledge and management of renal function was already through expert consultation to ensure content validity, followed by linguistic assistance with ChatGPT for readability and clarity. First, the draft instrument was subjected to expert judgment by field specialists to evaluate its relevance, accuracy, and appropriateness for the target population. Further feedback from the experts was then incorporated into the revision process (5). To Further enhance readability and refine the wording, the instrument also underwent AI-based language assistance using ChatGPT, which provide in improving grammar, coherence, and clarity of the items without altering their substantive meaning and improve the reading

accessibility (6,7). This combined process ensured that the final instrument was both scientifically sound and linguistically accessible to respondents.

Instrument validity was determined by Pearson product-moment correlation such that items for which r value < 0.361 at $N=30$ and $\alpha=0.05$ were dropped as invalid (8). Reliability was tested using Cronbach's alpha such that >0.7 cutoff value indicated acceptable internal consistency (5).

3. Results And Discussion

Table 3.1 Validity and Reliability Results

Aspect	Number of Early Item	Invalid Item	Valid Item	Cronbach's Alpha	Interpretation
Knowledge of Renal Function	45	2	43	0.722	Good Reliable
Management of Renal Function	21	1	20	0.875	Excelent Reliable

Based on Table 3.1 the testing process for the instruments revealed that the knowledge and behavior management questionnaires had good psychometric properties. The knowledge measure recorded a Cronbach's alpha of 0.722, meeting the minimum standard for proper internal consistency recommended by (5,9). Similarly, the management behavior measure generated a Cronbach's alpha of 0.875 and indicated excellent reliability, suggesting that the instrument possesses high consistency in the assessment of behavioral practice related to the function of the kidneys.

The validity and reliability testing demonstrated that the knowledge and behavioral management instruments had acceptable psychometric properties. The knowledge questionnaire showed a Cronbach's alpha of 0.722, indicating good internal consistency, while the management behavior questionnaire showed a Cronbach's alpha of 0.875, indicating excellent reliability. After item analysis, three items were removed because their item-total correlation values were below the acceptable threshold. The final instrument therefore consisted of 43 knowledge items and 20 management items, which were used to assess respondents from Karang Taruna Banyumas Regency. These findings indicate that the revised instrument is sufficiently reliable for assessing knowledge and behavioral practices related to kidney function in a community-based youth population.

The findings suggest that youth empowerment through Karang Taruna can be an effective means to increase awareness and promote healthy behaviors related to kidney function. The strong reliability of the developed instrument also provides a solid basis for future research and monitoring programs. However, the high scores observed may also indicate the presence of social desirability bias, which needs to be addressed in subsequent research using observational validation.

The findings of this study demonstrate that youth empowerment through Karang Taruna provides a viable platform for increasing awareness and promoting preventive behavior related to kidney function. The instruments developed—measuring knowledge and behavioral management—showed good internal consistency, with Cronbach's alpha values of 0.722 and 0.875, respectively. These results align with the standards for social science measurement tools (Nunnally & Bernstein, 1994), confirming their reliability for use in further community-based assessments.

However, such uniformity also raises questions about potential bias, particularly social desirability bias—a common phenomenon in self-reported surveys (10). This bias can occur when respondents provide answers they believe are more socially acceptable rather than truthful.

Table 3.2 Comparison Table of Kidney Function Knowledge Score Categories

Percentage Range	Post Validity and Reliability Test	Pre Validity and Reliability Test	Category	Clinical Interpretation
>81%	174-215	182-225	Very Good	Deep understanding; highly aware of kidney function and its importance
61-80%	131-173	137-181	Good	Generally knowledgeable; may lack consistency in some areas
41-60%	88-130	92-136	Fair	Basic understanding; at risk of misconceptions or being misled by myths
21-40%	45-87	46-91	Poor	Many misconceptions; needs structured education
≤20%	≤44	≤45	Very Poor	Very limited knowledge; requires direct educational intervention

Table 3.2 compares the required score for each category; a fair 20% for each category helps to define the clinical interpretation of every respondent. The clinical interpretation is important for further intervention that respondent may need.

Table 3.3 Comparison Table of Kidney Function Management Score Categories (Before vs After Validity Testing)

Percentage Range	Post Validity Test	Pre Validity Test	Category	Clinical Interpretation
>81%	81-100	85-105	Very Good	Consistently healthy lifestyle; proactive kidney care
61-80%	61-80	64-84	Good	Generally healthy behavior; some areas for improvement
41-60%	41-60	43-63	Fair	Mixed lifestyle pattern; health awareness not fully developed
21-40%	21-40	22-42	Poor	Multiple risk behaviors affecting kidney health
≤20%	≤20	≤21	Very Poor	Very poor management; high risk of kidney damage without behavioral changes

Table 3.3 gives the similar comparison of management score categories as previous table of kidney function knowledge. The clinical interpretation in the table provides the need of different behavioral changes from each category.

Table 3.4 Analysis of Invalid Items in Kidney Function Instrument

No	Item Statement in Bahasa	Item Statement in English	Domain	Reason for Invalidity	Language Analysis	Possible Reformulation
1	Kerusakan ginjal selalu menimbulkan gejala yang jelas dan mudah dikenali	Kidney damage always causes obvious and easily recognized symptoms	Knowledge	Very low correlation ($r=0.024$) and non-significant ($p=0.900$). Does not differentiate respondent levels	The use of the word “always” makes the statement absolutely and easily rejected or misunderstood	Reformulate to: “Kidney damage often does not cause symptoms until it reaches an advanced stage”
2	Penyakit ginjal selalu dapat disembuhkan sepenuhnya dengan perawatan medis	Kidney disease can always be completely cured with medical treatment	Knowledge	Low correlation ($r=0.284$) and $p>0.05$. Fails to reflect understanding of CKD’s chronic nature	The phrase “can always be completely cured” is overgeneralized and may confuse respondents	Reformulate to: “chronic kidney disease cannot be fully cured but can be managed with treatment”

No	Item Statement in Bahasa	Item Statement in English	Domain	Reason for Invalidity	Language Analysis	Possible Reformulation
3	Saya terkadang lupa minum air putih saat banyak aktivitas atau kesibukan	I sometimes forget to drink water when I'm busy or active	Management	Contradictory results: high r (0.760) but high p (0.690). Likely data inconsistency	The use of "sometimes" and double negatives may cause response ambiguity or lack of clarity in meaning	Reformulate to: "I rarely prioritize drinking water when I'm busy."

Table 3.4 shows the analysis from three invalid items after validity testing. The analysis are the reason, language analysis, and possible reformulation.

Although the reliability findings support the use of the instrument, several methodological issues require attention. The removal of three invalid items suggests that item wording plays an important role in response accuracy, particularly when statements contain absolute terms such as "always" or vague expressions such as "sometimes." Such wording may reduce item discrimination and create ambiguity in respondents' interpretation. In addition, the high scores observed in the study may reflect social desirability bias, as respondents may have selected answers that appeared socially acceptable rather than fully reflecting their actual behavior. Future studies should therefore consider refining ambiguous items and complementing self-reported data with observational validation or qualitative interviews.

Moreover, the removal of three items from the original instrument, based on low correlation coefficients and non-significant p-values, indicates the need for careful attention to language clarity. Items containing absolute terms like "always" or vague quantifiers such as "sometimes" were found to reduce item discrimination and interpretability, necessitating reformulation (DeVellis, 2017). Qualitative interviews might also relevance to support the quantitative findings, showing that participants were not only aware of the importance of hydration and salt reduction but also articulated behaviors consistent with this knowledge. This convergence provides triangulated validity, strengthening the credibility of the results (Creswell & Plano Clark, 2018).

3.1 Youth Community Implications

Chronic kidney disease is a progressive condition that significantly affects the quality of life of patients and their family members, particularly in lower-middle-income countries. The conceptual framework of "Living Well with Kidney Disease" describes about strengths-based approach includes several key components: effective communication and education, building resilience, strengthening social connections, increasing awareness and knowledge, improving access to support, and fostering confidence and self-management (11). In this study, the development of knowledge and management support tools is aligned with and intended to reinforce this framework.

In Asia, the average prevalence of CKD stages 3-5 in 14 low- and middle-income countries (LMICs) was 11.2% (9.3-13.2%), while in south-east Asia is higher for about 12.0% (7.7-17.0%) (12). This high prevalence underscores the urgent need for community-based prevention and health promotion programs. In Indonesia, one potential avenue for strengthening CKD prevention efforts is through karang taruna, a community youth organization that has long played an active role in social empowerment and public health activities at the grassroots level (Aris, 2021).

From a community health perspective, the findings suggest that youth empowerment through Karang Taruna may provide a practical platform for improving awareness and preventive behavior related to kidney function. Structured activities such as educational campaigns, blood pressure screening, hydration promotion, and healthy lifestyle advocacy can strengthen early

prevention efforts, particularly in rural and suburban areas where access to health services may be limited. By involving Karang Taruna members as community health promoters, kidney health education can be delivered through existing social networks, making prevention programs more accessible, acceptable, and sustainable.

3.2 Limitations and Future Directions

Future research should consider a broader sample, inclusion of control groups, and pre-post intervention design to establish causal effects. Additional emphasis should be placed on long-term behavioral tracking using both self-report and objective indicators (e.g., hydration levels, diet logs). For practical application, integrating the validated instrument into a mobile application is recommended. This digital solution could facilitate continuous education, promote daily health monitoring, and offer feedback to young users—making kidney health literacy more accessible and engaging. This tool may provide preliminary screener or provide contextual depth when used alongside conventional tools like self monitoring urine chart combined with other risk factors for the development of chronic kidney disease (15,16)..

4. Conclusion

The developed instrument is valid and reliable for measuring knowledge and behavioral management of kidney function among youth. Karang Taruna youth showed strong preventive behavior and have the potential to serve as community educators for kidney health. Future studies should incorporate mobile applications to strengthen self-monitoring and behavioral change.

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