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Knowledge and Awareness About Chronic Kidney Disease among Undergraduate Students in International Islamic University Malaysia Kuantan Campus

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ABSTRACT

Chronic kidney disease (CKD) causes 70% of all death globally. The prevalence of CKD has shown an increasing trend for the past 20 years in Malaysia. Thus, determining the knowledge and awareness of CKD among healthcare students in preparing them to be a good healthcare provider in the future is important. This study aimed to determine the association between knowledge and awareness about CKD among International Islamic University Malaysia (IIUM) undergraduate students. A cross-sectional study was conducted among 108 students using simple random sampling method. The questionnaire was given to the class representative to be self-administered to interested students. It had close-ended questions consisting of Part A to Part D. The scoring given for correctly answered items was one and the total score for Part C was 7 marks. Most of the students were female (70.4%). The mean knowledge score of CKD was 3.65 (SD = 1.12) with nearly half of the students (43.5%) classified as having poor knowledge. Most respondents were aware about CKD (99.1%) and have heard about it from medical personnel (48.1%) and the Internet (25.9%). Further analysis showed that only courses taken by the respondents were significantly associated with knowledge on CKD (p = 0.039). The level of knowledge among undergraduate students is still poor, yet they are aware about the existence of CKD and its aetiology. Therefore, the health sciences curriculum should

emphasise on CKD management from a multidisciplinary aspect of care. It is recommended to conduct similar research among different student populations to create awareness and obtain important baseline findings.

Keywords: *Knowledge, Awareness, Chronic kidney disease, Undergraduate*

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INTRODUCTION

Chronic kidney disease (CKD) is a health problem that constantly increases every year with most of the cases being undiagnosed (1, 2). Statistics show that 10% of the world population suffer from CKD and millions die due to it each year (2). The prevalence of end stage renal disease (ESRD-CKD stages 4 and 5) have been increasing from 71 per million population (pmp) to 1,059 pmp in 2013. For the past 20 years, the incidence and prevalence have shown an increasing trend in Malaysia (3). CKD is becoming a major health concern as it is associated with high cost of treatment, especially when it progresses to ESRD.

CKD is defined as kidney damage or decreased glomerular filtration rate (GFR) to less than 60 mL/min/1.73 m^2 for three months or more (1, 4). Diabetes mellitus and hypertension are the two major causes of CKD in Malaysia (4). Poor control of CKD along with having the said comorbidities will lead to the terminal stage of CKD, which is ESRD, and requires expensive treatment ranging from dialysis to kidney transplant.

Even though much research has been performed on incidence and prevalence of CKD, limited study has been conducted to measure the knowledge and awareness among the general population and students. Recent studies show that there is still limited knowledge of CKD among the public, healthcare providers, and students in the medical line itself (5–7). Healthcare professionals play a vital role in promoting CKD education and awareness by keeping themselves up-to-date with this issue; thus, it is important to conduct such studies.

The Health Belief Model (HBM) was used to derive the conceptual framework in this study (Figure 1). The HBM was developed in 1950 by social psychologists Hochbaum, Rosenstock and Kegels who worked in the U.S. Public Health Services in response to the failure of tuberculosis (TB) health screening programme (8, 9). The HBM is commonly used in health promotion programmes as it implies that individuals' perception of health gives a major influence on individuals' health behaviours. They can also influence other perceptions that may be associated with health action. Someone will also adopt healthy lifestyle if they know and are aware of being at risk for CKD. They will appreciate the serious implication of having CKD and value their health condition.

Thus, this study was conducted to measure the level of knowledge and awareness on CKD along with its association with socio-demographic background of the undergraduate students in International Islamic University Malaysia (IIUM), Health Campus, Kuantan, Pahang. This study aimed to identify the deficit in the areas of knowledge, which will help in identifying important highlights for education and improving the syllabus to equip the students with recommended knowledge. It is expected that this effort will contribute towards a better outcome of renal management in the future.

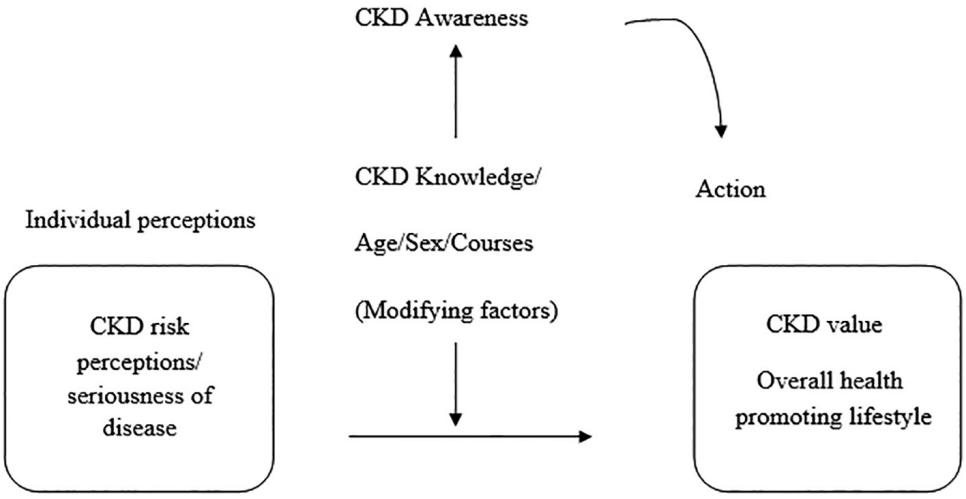

Figure 1: Conceptual framework derived from HBM

METHODS

Population and Setting

A cross-sectional study was conducted from March to June 2018 to explore the knowledge level and awareness about CKD among undergraduate students in IIUM Health Campus, Kuantan, Pahang. This study was approved by the Kulliyyah of Nursing Postgraduate and Research Committee (KNPGRC) and IIUM Research Ethics Committee (IREC) – ID: IREC 2018-015.

Inclusion and Exclusion Criteria

The inclusion criterion in this study was Year 3 undergraduate students from any courses (clinical and non-clinical) in IIUM Kuantan who willingly participated in this study. The clinical courses include Medicine, Nursing, Dental Surgery, Pharmacy, Speech-Language Pathology, Radiography and Diagnostic Imaging, Dietetics, Physiotherapy, Optometry, and Audiology. On the other hand, Biomedical Sciences, Biotechnology, Plant Science, Marine Science, Computational and Theoretical Sciences, Chemistry, and Physics were considered as non-clinical courses. This was based on the ballot procedure performed by the researcher using an envelope with pieces of paper written with the names of Year 1 to Year 4 students. The ballot procedure was chosen to ensure random sampling method was applied throughout the selection of potential participants.

Meanwhile, the exclusion criteria were all Year 1, Year 2, and Year 4 undergraduate students of any courses in IIUM, Kuantan, along with Year 5 students from Kulliyyah of Medicine and Kulliyyah of Dentistry. Next, students who had to extend their study and those who were posted for clinical attachment outside of Kuantan were also excluded from the study.

Research Instrument

A set of questionnaires consisting of four sections was adopted from a previous study done in Muar, Johor (6), which was originally developed in English by a researcher from Singapore for primary care patients (7). Part A had two questions for screening purposes to exclude respondents who did not fulfil the inclusion criteria and to determine if the students have already been diagnosed with CKD or juvenile CKD.

Next, Part B had 11 items on sociodemographic data and the health status of the respondents. The items asked include age, gender, race, religion, marital status, education, occupation, income (in

Ringgit Malaysia), and history of underlying diabetes (DM), hypertension (HTN), and CKD. Part B included questions on health status (e.g. DM, HTN, and underlying CKD) since we postulated that students might have a better knowledge on CKD if they have those comorbidities. This may be contributed by frequent follow-up with significant healthcare professionals.

Meanwhile, Part C consisted of seven questions to assess the knowledge on CKD with a total score of seven. The questions were: (a) how many healthy kidney(s) does a person need to lead a normal life?; (b) what is the function of a kidney in a human body?; (c) what can cause kidney disease?; (d) what is the early symptom of CKD?; (e) which of the following statement about kidney disease is correct?; (f) where can dialysis treatment be carried out?; and (g) what is the best medical treatment for end stage kidney failure?

The answers for these questions were: (a) one; (b) to filter waste products in the blood; (c) all of the above; (d) all of the above; (e) all of the above; (f) only in a dialysis centre; and (g) dialysis. Each correct answer was given one mark. Students who scored less than four (<4) have low knowledge level, those who scored four were regarded as having medium knowledge level, and a score of more than four to seven (> 4–7) was regarded as good knowledge level.

The last section was Part D, which consisted of two items to assess the awareness level of CKD. The questions were: (a) did you ever heard about chronic kidney disease (CKD)? and (b) where did you heard about it? The answers for both questions were: (a) yes or no; and (b) newspaper, internet, family/friends, medical personnel and health campaign. There was no scoring for this answer since we would like to determine their baseline level on the awareness on CKD and its resources.

Pilot Study

A pilot study was performed among 30 final year undergraduate students from Kulliyyah of Nursing (KON) in March 2018 to validate and check the reliability of the instrument prior to the real study. The reliability value was checked using Cronbach's alpha for internal structure reliability (r = 0.411), which was considered as moderate (10, 11). In terms of content validity, one of the authors had checked the suitability to adopt the questionnaire for the current study and found that the language and terms used were commonly used in the current situation. Since the medium of instruction in IIUM is English, the questionnaire was administered directly in its original language without having it translated into bahasa Malaysia. However, the reliability could be considered as moderate (r = 0.411) since it was piloted among 30 students only. The results of reliability may be different if a larger sample size was used.

Sample Size and Data Collection Procedure

The information was collected from the Deputy Dean of Student Affairs and Alumni of each Kulliyyah (Kulliyyah of Medicine, Kulliyyah of Nursing, Kulliyyah of Dentistry, Kulliyyah of Pharmacy, Kulliyyah of Allied Health Science, and Kulliyyah of Science) to obtain the number of undergraduate students in IIUM Kuantan for sample size calculation, which was 3,654. The sample size was then calculated using single proportion formula following a previous study (5). The required sample was only 92, but with addition of 20% attrition, the researcher needed 110 students. However, the actual sample size achieved was 108 since two of them were rejected as they did not have a valid consent.

The undergraduate students were randomly selected based on the year balloted. The researcher explained the procedure using the prepared information sheet and consent was taken once the respondents had agreed.

The researcher then directly distributed the questionnaire to the students and sometimes required the assistance from the class representative. Ample time was given to the respondents to answer the questionnaire.

Data Analysis

IBM Statistical Package Social Science (SPSS) version 20 was used to analyse and manage all the data. Quantitative variables were expressed as mean and standard deviation. Meanwhile, the categorical variables were expressed as percentage and frequency. The association of independent variables (age, gender, course, and awareness) with dependent variable (knowledge score) was determined using inferential statistics, namely independent *t*-test, one-way ANOVA, and Pearson correlation.

RESULTS

Sociodemographic Background of Respondents

The number of respondents who participated in this study was 108 undergraduate students with a response rate of 98.2%. Most of the respondents were female (70.4%), aged 23 years old (71.3%) followed by 22 years old (18.5%), were Muslims (100.0%), have finished secondary school (100%), were unemployed (100%), and had an income of less than RM 2,000 (100%). Most of the students involved were from Kulliyyah of Dentistry (19.4%) followed by Kulliyyah of Medicine (18.5%) (Table 1).

Knowledge of Respondents About CKD

Table 2 highlights the descriptive analysis for knowledge and awareness domains. The total score (numerical) for all seven items was 3.65±1.12 with almost half (43.5%) of the respondents having poor knowledge. The correct response rates were 63.9% (Question 1), 100.0% (Question 2), 80.6% (Question 3), 38.9% (Question 4), 33.3% (Question 5), 29.6% (Question 6), and 18.5% (Question 7).

Table 1: Sociodemographic characteristics of the respondents (*n* = 108)

Variable	Freq (%)
Age (categorical)*	
21 years old	1 (0.9)
22 years old	20 (18.5)
23 years old	**77 (71.3)**
24 years old	7 (6.5)
25 years old	2 (1.9)
26 years old	1 (0.9)
Gender	
Male	32 (29.6)
Female	**76 (70.4)**
Course	
Medicine	20 (18.5)
Dentistry	**21 (19.4)**
Audiology	20 (18.5)
Biomedicine	11 (10.2)
Dietetics	14 (13.0)
Nursing	11 (10.2)
Marine	4 (3.7)
Physiotherapy	7 (6.5)
Religion	
Islam	**108 (100.0)**
Buddhism	–
Christianity	–
Hindu	–
Others	–
Marital Status	
Single	**106 (98.1)**
Married	1 (0.9)
Divorced/separated/widowed	1 (0.9)
Education	
None	–
Up to primary school	–
Up to secondary school	–
Above secondary school	**108 (100.0)**

(*Continued on next page*)

Table 1 (*Continued*)

Variable	Freq (%)
Occupation	
Professional/executive	–
Non-professional	–
Unemployed	**108 (100.0)**
Retired	–
Income (Ringgit Malaysia)	
Less than RM 2,000	**108 (100.0)**
RM 2,000–RM 4,999	–
RM 5,000 and above	–
Do you have diabetes mellitus?	
Yes	–
No	**108 (100.0)**
Do you have hypertension?	
Yes	–
No	**108 (100.0)**
Do you have underlying chronic kidney disease?	
Yes	–
No	**108 (100.0)**

Note: *Mean (SD) = 22.93, (SD = 0.67)

Awareness About CKD

Majority of respondents have heard of CKD (99.1%) and most of them heard about it from their medical personnel (48.1%) and the Internet (25.9%), as highlighted in Table 2.

Association between Sociodemographic Background and Awareness Domain with Knowledge of Respondents About CKD

Selected sociodemographic variables were run for univariate analysis to determine any significant associations on the knowledge domain. There was no association between age and total knowledge score (p = 0.682) or gender (p = 0.814), as shown in Table 3. However, there was an association between courses taken while studying in IIUM and the total knowledge score (p = 0.039) (Table 3). Lastly, no association was found between awareness in obtaining information on CKD with the total knowledge score (p = 0.605).

Table 2: Knowledge and awareness domains on CKD (n = 108)

Variable	Freq (%)
KNOWLEDGE DOMAIN	
Total score (categorical)#	
Poor	**47 (43.5)**
Moderate	39 (36.1)
Good	22 (20.4)
Description of questions	
1. How many kidney(s) does a person need to lead a normal life?	
• One*	**69 (63.9%)**
• Two	39 (36.1%)
• I don't know	–
2. What is the function of a kidney in a human body?	
• To break down food	–
• To produce substances that break down fats	–
• To filter waste products in the blood*	**108 (100.0)**
• I don't know	–

(*Continued on next page*)

Table 2 (*Continued*)

Variable	Freq (%)
3. What can cause kidney disease?	
• High blood pressure	2 (1.8)
• Diabetes mellitus	15 (13.9)
• All of the above*	**87 (80.6)**
• I don't know	4 (3.7)
4. What is the symptom of early kidney disease?	
• Reduce in urination	39 (36.1)
• Back pain	3 (2.8)
• Can present without any symptoms/complaints	17 (15.7)
• All of the above*	**42 (38.9)**
• I don't know	7 (6.5)
5. Which of the following statement about kidney disease is CORRECT?	
• Kidney disease can be prevented.	**58 (53.7)**
• Kidney disease can be cured with medications.	5 (4.6)
• Kidney disease can be cured with surgery.	3 (2.8)
• All of the above*	35 (32.4)
6. Where can dialysis treatment be carried out?	
• In a dialysis centre or at home	**72 (66.7)**
• Only in a dialysis centre*	32 (29.6)
• Only at home	–
• I don't know	4 (3.7)
7. What is the best treatment for End Stage Kidney Failure?	
• Medication	–
• Dialysis*	20 (18.5)
• Kidney transplant	**82 (75.9)**
• I don't know	6 (5.6)
AWARENESS DOMAIN	
8. Have you ever heard about chronic kidney disease (CKD)?	
• Yes	**107 (99.1)**
• No	1 (0.9)
9. Where did you hear about it?	
• Newspaper	–
• Internet	28 (25.9)
• Family/friends	13 (12.0)
• Medical personnel	**52 (48.1)**
• Health campaign	15 (13.9)

Note: #Mean (SD) = 3.65 (SD = 1.12); *Answer key for question 1 to 7 in knowledge domain

Table 3: The relationship/association between selected sociodemographic background and awareness domain towards the total knowledge score on CKD (*n*=108)

	Mean (SD)	Mean diff (95% CI)	*t*-stats (df)	*p*-value
Gender				
Male	3.69 (0.99)	0.06 (–0.42, 0.53)	0.24 (106)	0.814
Female	3.63 (1.18)			
Courses				
Non-clinical	4.20 (0.86)	0.64 (0.03, 1.25)	2.09 (106)	**0.039**
Clinical	3.56 (1.14)			
Age	22.93 (0.67)		0.04#	0.682
Awareness (heard about CKD)				
Internet	3.71 (1.05)		0.62 (3, 107)*	0.605
Family/friends	4.00 (1.16)			
Medical personnel	3.56 (1.21)			
Health campaign	3.53 (0.92)			

Note: Significance level was set at $p<0.05$; #Correlation test value; *One-way analysis-*F*-test value

DISCUSSION

This study was conducted among IIUM undergraduate students. The majority of the students involved were female with mean age 22.93 (SD = 0.67), Malays, single, and Muslims who had completed their secondary school and were unemployed. This is a common scenario in the higher education sector where there are more females than males, especially in health-related fields. As highlighted by a study in Abia State, Nigeria, the male-to-female student ratio in nursing programme is almost 1:14.5 (12).

The current study divided the students according to their courses (clinical and non-clinical courses). The clinical courses are Nursing, Medical, Dentistry, Audiology, Physiotherapy, and Dietetics. Meanwhile, the non-clinical courses are Marine and Biomedicine. During data collection, some of the students were undergoing industrial placement at other institutions outside of IIUM, which may contribute towards sampling bias. Thus, the sampling involved only interested students who were available during data collection. Other than that, all students claimed to be healthy, which means that they were not diagnosed with DM, HTN, CKD, or other chronic diseases.

The findings highlighted that nearly half (63.9%) of the students answered that normal people may live while only having one kidney and 100.0% answered correctly that the function of the kidney is to filter waste in the blood. This shows that the students retain their knowledge on the anatomy and physiology of human body or pathology, which they learned during their first year of foundation study and revisited during their second or third year of undergraduate studies. Furthermore, the respondents know that both DM and HTN contribute towards the occurrence of CKD. This shows that their knowledge on the risk factors or comorbidities is quite good, which is perhaps due to clinical exposure or information from the Internet, which help inculcate lifelong learning and memory retention (12–14).

However, only 38.9% of the students were aware on the sign and symptoms of CKD development, i.e. decreased urination, back pain, or sometimes symptomless. Similarly, the students' knowledge on CKD treatment was quite poor, with only 32.4%

of them knowing that kidney problems can be prevented, treated with medication, or repaired via surgery. Only 29.6% of them knew that dialysis can only be performed in a dialysis centre and 18.5% knew that dialysis is the best treatment for end stage kidney failure. Perhaps, the degree of exposure in the curriculum or having a real experience of taking care of anyone with CKD will make one recognise the signs, symptoms, and treatments well.

However, the overall finding highlighted that most respondents (43.5%) were considered as a having poor knowledge level about CKD with a mean score of 3.65 (SD = 1.12). Interestingly, when we classified the respondents into clinical and non-clinical courses, the mean knowledge score was slightly higher for the non-clinical course respondents [4.20 (SD = 0.86)] than the clinical course respondents [3.56 (SD = 1.14)]. Perhaps, the non-clinical students might have an experience of handling family members with CKD or they looked for thorough information on CKD via other methods. The current findings are consistent with studies conducted among the general population in Singapore (7), Hong Kong (15), and Iran (16).

In comparison to the undergraduate students' knowledge on CKD, two studies performed in Rwanda revealed a similar pattern (17, 18), whereby the knowledge of the disease and its preventive measures among students in Rwanda were considered low. Somehow, these results contradict a previous study among final year nursing students in Nigeria (12) that found an overall good knowledge on CKD, especially on the anatomical structure functions, along with the signs and symptoms of CKD. Perhaps, if this study is repeated with final year students in IIUM, it might be similar with those from the study in Nigeria (12), especially when the students have completed their overall clinical placement.

In terms of awareness, 99.1% of the students have heard about CKD, especially from medical personnel (48.1%) and the Internet (25.9%). Perhaps having a syllabus being taught by physicians, nurses, pharmacists, dietitians, or other medical personnel has contributed to this result. Furthermore, in IIUM, we encourage students to perform their own self-directed learning (SDL) for extra knowledge in addition to face-to-face interaction during lecture, practical, or tutorial sessions. Internet is commonly utilised by the students during SDL, which is applied throughout this blended learning (14, 19–21). It is common for students to use YouTube, Google Scholar, and other search engines for research such as ScienceDirect or EBSCOHost in completing their assignments and research projects. Therefore, providing adequate facilities to facilitate the students' learning process is very important (22), especially when we are empowering our students to be self-directed learners. As we know, motivation, interest, and memory retention are enhanced using various technologies offered online.

Interestingly, a study performed in Byumba, Rwanda (18) reported that most of the students who attended the university received information about CKD via mass communication such as radio (61.9%) followed by television (58.1%). However, there is a lack of physicians' role in their study to inform the participants about the risk of DM and HTN towards the development of CKD (18). Our study has proven the importance of multidisciplinary healthcare personnel involvement in teaching and learning along with the SDL technique, which have created awareness and improved the dissemination of information regarding CKD.

The univariate findings highlight that the only variable from sociodemographic domain that is significantly associated with knowledge on CKD is courses taken (clinical and non-clinical) by the participants, with a p value of 0.039. Interestingly, participants from non-clinical courses (Marine and Biomedicine) scored higher on knowledge domain about CKD with mean and standard deviation (SD)

of 4.20 (SD = 0.86), compared to their counterparts (Medicine, Nursing, Dentistry, Dietetics, Audiology, and Physiotherapy students) [3.56 (SD = 1.14)]. It is an unexpected result because the curriculum planned for the Marine and Biomedicine students are more geared towards laboratory approach in preparing them to be a good scientist in the future. On the other hand, students in clinical courses such as Medicine, Nursing, Dentistry, Dietetics, Audiology, and Physiotherapy might have more experience in dealing with CKD patients during their clinical attachments. We expected that the students' exposure to CKD from the curriculum might be different between the clinical and non-clinical students.

Thus, we postulated that the use of technology among the non-clinical course students which is the Internet, for example, by reading online information or journals while answering the questionnaire, may have affected the knowledge score. There is also the potential that some of the students from the clinical course may not be prepared while answering the questionnaire and have forgotten what they learned about CKD, which may have affected the choice of answers. Nevertheless, this result has imparted some precautions to the academicians, especially those teaching the clinical courses to ensure that the syllabus on CKD is delivered as interestingly as possible using multiple teaching strategies (e.g. blended learning, e-learning, problem-based learning, reciprocal learning, etc.) and to ensure the quality of the content. However, it is important to measure the students' acceptance and readiness to accept this strategy since each of them have their own learning style (13, 14, 23).

It is well known that learning about the renal system is among the toughest experience as declared by students (24). Students may find the renal system as one of the complicated systems to understand and memorise, especially on the anatomical structure and functions (e.g. tubular absorption, acid-base balance, etc.) along with the development of abnormal conditions, which include CKD. Therefore, it is important to provide a real experience for the students such as bedside interviews with CKD patients, simulations, or bedside teaching to connect the theory and clinical conditions to enhance their understanding. Furthermore, lecturers should prepare a more graphical-based lecture notes such as animations, comics, and videos, along with integrating project-based curriculum such as problem-based learning (PBL), focused group discussion (FGD), or mini research throughout delivering the syllabus as recommended by previous researchers (13, 24).

The other univariate findings show that there is no significant difference between awareness and knowledge levels. The students may be aware and have heard about CKD, but they have inadequate knowledge on the clinical management of CKD. Therefore, our study has provided some baseline information about IIUM students' knowledge and awareness on CKD, especially those from clinical courses. They are our future generation of medical personnel who will serve the community. It is important to mould their interest in the renal system as this syllabus is considered as among the toughest syllabus, particularly on CKD, which affects many Malaysians to date.

The Malaysian Ministry of Health (2011) has noted that the number of patients with CKD is increasing, and this is predicted to continue. More than 5,000 new patients are diagnosed with kidney failure every year, and thus, the number of Malaysians dependent on dialysis was predicted to increase to more than 30,000 by the end of 2015 (4, 25, 26). Thus, students, academicians, and clinicians must play a role in advising, educating, and empowering self-care management of patients, as recommended by the health authority (4, 27).

We would like to highlight the strength of this study, which provides vital implications

for health education on CKD in Malaysia because the awareness and knowledge levels of our university students are still limited. This is a common issue in other nations as well, as mentioned in the discussion previously. On the other hand, we do have some limitations in this study such as lack of generalisability since it was conducted only at a single university. Furthermore, not all potential students were available during recruitment, which may have led to sampling bias. We would like to recommend that the study is replicated at different universities to investigate the whole Malaysian undergraduate students' knowledge and awareness about CKD.

CONCLUSION

We concluded that students may have good theoretical knowledge on CKD but still have lack of understanding on how to manage CKD patients, especially for those taking clinical courses. Thus, nearly half of them were classified as having poor knowledge on CKD in the overall finding. Furthermore, the students of non-clinical courses (Marine and Biomedicine) had a significantly higher total score compared to their counterparts (clinical courses) when univariate analysis was performed. This alarmed us as academicians must equip the undergraduate students, particularly those in clinical courses, about CKD because they will serve the nation as future medical personnel. With the increasing trend of CKD occurrence, more awareness campaigns, health education, and blended learning strategy in curriculum should be emphasised in clinical settings and teachings, which may help to retard the progress of the disease from becoming end stage renal failure.

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