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ORIGINAL DATA

Management of Type 2 Diabetes and Chronic Kidney Disease in Fiji in 2018: Knowledge, Attitude, and Practice of Patients

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■ Abstract

OBJECTIVE: The aim was to identify the level of knowledge, attitude, and practice (KAP) in patients with type 2 diabetes (T2D) and chronic kidney disease (CKD) at Sigatoka Subdivisional Hospital (SSH) in 2018 since no studies have been done on this issue so far in Fiji. **METHODS**: A quantitative, cross-sectional study including 225 patients was carried out July 1, 2018, through August 31, 2018, using a validated self-structured questionnaire. Fijians, aged 30 years or above, with confirmed T2D and CKD who were attending the Special Outpatient Department (SOPD) at SSH, were included in the study using a purposive sampling method to identify eligible participants. Data was gathered by a questionnaire that covered questions related to each aspect of KAP. **RESULTS**: The relation of native Fijians (i-Taukei) to Fijians of Indian descent (FID) was approximately 1:1. The majority of participants had high levels of knowledge, attitude, and practice (61.8%, 63.6%, and 88.4%, respectively). However, a few areas of low knowledge were evident, such as the relation between high blood pressure and renal status in people with diabetes and the need for renal transplant in end-stage kidney disease (ESKD) abroad. Low attitude was apparent for the impact and management of diabetic kidney disease (DKD). Low practice was evident regarding clinic attendance, self-monitoring, and opting for non-medical treatment. **CONCLUSIONS**: The majority of T2D patients with CKD had a high level of knowledge, but weaknesses were observed in the self-management of CKD and clinic attendance. This information should be considered by clinicians and policy-makers to improve management and treatment of CKD in T2D.

Keywords: type 2 diabetes · knowledge · attitude · practice · chronic kidney disease · Fiji islands · KAP questionnaire · awareness

1. Introduction

Type 2 diabetes (T2D) is a metabolic disorder in which the body is unable to use insulin, resulting in a state of high blood sugar over a prolonged period of time [1]. This disorder may give rise to multiple complications, including chronic kidney disease (CKD) which is predominantly caused by T2D (44%) and is one of the most feared sequelae [1]. CKD is defined as estimated glomerular filtration rate (eGFR) of less than 60 ml/min/1.73 m^2 for at least 3 months [2]. Globally, 1 in 7 adults suffers from CKD; it is the 9th leading cause of death worldwide causing a huge economic burden on health systems [1]. A systematic review and meta-analysis of 100 observational studies showed that the global prevalence of CKD is 11-13% [3]. The National Kidney Foundation (NKF) [4] and Frellick [5] estimate that 1 in 10 people is affected by CKD worldwide. T2D doubles a person's risk of cardiovascular event such as heart attack or stroke [6], damages eyes (retinopathy) and nerves (neuropathy), and is the leading cause of CKD [7].

In the Western Pacific, 50-60% of people with T2D have CKD, while the annual incidence of CKD is 2-4% [8]. According to the Global Burden of Disease (GBD) for Fiji, in 2016, T2D was the 1st

cause of death, 1st cause of premature death, and 1st cause of death and disability combined, while CKD was the 4th cause of death, 5th cause of premature death, and 4th cause of death and disability combined [9]. The GBD further noted that diabetes was the number one cause of years lived with disability (YLD) in Fiji [9]. In 2013, mortality attributed to CKD in Fiji was 25.6 per 100,000 people, while Fiji was ranked 3rd in Oceania (after Marshall Islands and Kiribati) in terms of overall mortality caused by CKD [10].

Patients' knowledge of disease and therapy options can have a substantial influence on the development of the disease and its treatment [11]. This shows that proper knowledge of a disease is vital for health and survival; it is critical for the entire disease management process [12]. Moreover, patients' attitude towards their disease affects immediate disease status as well as the long-term outcomes, which shows that their attitude is directly linked to their health status and the occurrence of later complications [13]. Finally, the level of practice determines the extent to which patients' clinical conditions are controlled, and is an important indicator for disease management, compliance, and frequency of complications [14, 15].

Consequently, patients' KAP impacts their disease outcome, as knowledge about the disease process enables patients to make beneficial decisions regarding their health. Similarly, a positive attitude encourages and empowers these patients to take responsibility for their health, while good practice is reflected in good control of the disease which ideally leads to disease development to be slowed. Fijians have a high disease burden from T2D and CKD, as mentioned above, and thus high KAP regarding these conditions would be expected to cause a decline in the economic and health burdens in Fiji.

Currently, Fiji's healthcare system follows a one-sided health approach, whereby the healthcare provider dictates the entire patient management process without considering the patient's point of view, understanding, and motivation for self-care. Thus, identifying KAP of patients in Fiji may shift the paradigm of disease management towards a greater understanding of the factors that hinder a patient's disease control, and hence will employ innovative ideas to manage patients through health promotion/empowerment, while focusing on the disease process from the patient's perspective.

To the best of our knowledge, there have been no studies to date on the level of KAP conducted in Fiji on this particular population. This study aimed to identify the level of KAP towards the causes, prevention, diagnosis, treatment, and management of T2D patients with CKD at Sigatoka Subdivisional Hospital (SSH) in 2018.

Abbreviations:

CHREC	College Health Research Ethics Committee
CKD	chronic kidney disease
DKD	diabetic kidney disease
eGFR	estimated glomerular filtration rate
ESKD	end-stage kidney disease
FID	Fijians of Indian descent
FNHRERC	Fiji National Health Research Ethics and Review Committee
FOD	Fijians of other descent
GBD	Global Burden of Disease
IBM	International Business Machines
KAP	knowledge, attitude, and practice
NKF	National Kidney Foundation
PH	public health
SOPD	Special Outpatient Department
SPSS	Statistical Package for Social Sciences
SSH	Sigatoka Subdivisional Hospital
T1D	type 1 diabetes
T2D	type 2 diabetes
TPB	theory of planned behavior
WPR	Western Pacific Region
YLD	years lived with disability

2. Methods

2.1 Study design and inclusion/exclusion criteria

We have applied a cross-sectional (quantitative) study design to identify the frequency of KAP in T2D patients with CKD at SSH in 2018 from July 1 to August 31. A brief study period was chosen to comply with the budget and ethical requirements. This procedure could have affected the final study population, but fortunately, this was not the case, as explained below in the subsection "sample size". The inclusion criteria for the study sample were:

1. Patients with confirmed T2D plus CKD as documented in their history
2. Patients attending a Special Outpatient Department (SOPD) at SSH in the period of data collection (1/7/18 to 31/08/18)
3. Citizen of Fiji
4. Age more than or equal to 30 years
5. Agreement to participate in the study

Exclusion criteria were:

1. Patients with CKD, but not T2D
2. Patients with type 1 diabetes

3. Patients with mental/psychiatric conditions or any other illness that jeopardizes their mental ability to participate
4. Patients not interested in participating in the study

2.2 Setting, sampling, and sample size

The study was conducted at SSH's Special SOPD clinic. This particular hospital (SSH) was chosen because of the following advantages:

1. Accessibility of researchers
2. Availability of the population of interest for the study
3. Availability of research approval
4. Almost equal representation of ethnicities
5. The SOPD clinic at SSH is led by the Wellness Unit (of Fiji) guidelines for functional clinics. This ensured that the patients received the best available care as the clinic follows treatment protocols, basic resources are available at all times, staff is competent, and the entire SOPD functions as a multidisciplinary unit to provide holistic patient care.

Inpatients were not considered for this study since SSH does not have an adequate size for an inpatient study. SSH is a sub-divisional, secondary level hospital in the Western division of Fiji, which provides general outpatient services, inpatient services, maternity, child-health, eye-care, laboratory tests, radiological examinations, and pharmacy. It is the only hospital in the Nadroga/ Navosa subdivision that serves a population of approximately 55,000 people (one of the largest subdivisions in the Western division of Fiji), and it accepts primary referrals from its health centers, while also referring cases to its tertiary hospital, i.e. Lautoka Hospital.

The initial sample included all patients who attended SOPD at SSH during the study period and satisfied the inclusion criteria. This non-random sampling basically selected all eligible participants for the study by merely considering their eligibility status. All patients who visited SOPD at SSH during the study period automatically underwent an eligibility check after their informed consent was obtained, and they were included if they satisfied the inclusion criteria.

Since prevalence rates of CKD are not available for Fiji, not even for the western pacific region, we used the global prevalence of 11-13%. After calculating the 95% confidence interval and 5% margin error, the estimated sample size was 173. However, taking non-responders and unwilling patients into consideration, a further 10% was added to the estimate to reach 193, which was rounded up to 200 participants as the minimal number required for the research. Each week, approximately 35 T2D patients with CKD attended SOPD at SSH. Thus, for the purpose of this study, two months (July 1, 2018 to August 31, 2018) were considered to collect the data and to achieve the minimum sample number. Every participant who satisfied the inclusion criteria was regarded as eligible for the study. As a result, from a total of 265 patients who satisfied the inclusion criteria, a sample size of 225 finally participated in this study. With a response rate of almost 85%, the sample size was considered as appropriate for this study.

2.3 Data collection tool

A KAP questionnaire was developed by reviewing the literature and using other similar questionnaires that have been used earlier such as the CKD Screening Index [16] and the KAP questionnaire developed by Stanifer *et al*. [17]. This self-administrated questionnaire included questions on demographic characteristics of the participants and questions on KAP of T2D patients with CKD. The participants were asked to answer:

- The knowledge-related questions by 3 possible answers: "yes", "no", or "don't know"
- The attitude-related questions by 3 possible answers: "agree", "disagree", or "neutral"
- The practice-related questions by 2 possible answers: "yes" or "no"

For the knowledge component, each item was given a score of "2" for a correct answer, "1" for "don't know" and "0" for an incorrect response. The total scoring range for this section of 15 questions was 0-30 for each participant. Those with a score of 0-15 were considered to have a "low level of knowledge", those with 16-22 a "medium level of knowledge", and those scoring 23 and more a "high level of knowledge" [18]. For the attitude component, each item was given a score of "2" for a positive attitude, "1" for "neutral" and "0" for a negative attitude. Thus, the total scoring range for this section of 15 questions was 0-30 for each participant. Those with a score of 0-15 were considered to have a "low level of attitude", those with 16 - 22 a "medium level of attitude", and those scoring 23 and more a "high level of attitude" [19]. For the

practice component, each item was given a score of "1" for a positive practice and "0" for negative practice. Thus, the total scoring range for this section of 10 questions was 0-10 for each participant. Those with a score of less than 5 were considered to have a "low level of practice" and those scoring 5 or over a "high level of practice" [18].

2.4 Validation of questionnaire

To do face validity, 10 participants (5 randomly selected males and females each) who met the inclusion criteria were given the questionnaire to assess whether it was legible, clear, simple, easy, and understandable (layman terms used instead of medical jargon). These people were not included in the final analysis, and they were not further classified as per their demographic characteristics apart from gender. For content validity, three experts (a research supervisor, a co-supervisor, and a medical registrar from Lautoka Hospital) were given the questionnaire to decide whether the content met the objectives of the study or not. No reliability test was performed since this questionnaire was derived from 2 existing questionnaires which had high reliability scores (Cronbach's alphas for knowledge, attitude, and practice were 0.87, 0.73, and 0.78, respectively) [16, 17].

2.5 Study procedure, data management, and analysis

The questionnaire was filled by the participants, but a service was provided for illiterate patients involving verbal communication by a researcher or an assistant as help to complete the questionnaire, which was provided in 3 languages. All information from the questionnaires was inserted in a Microsoft Excel data sheet for cleaning and coding and a data dictionary was designed. Afterwards, data were analyzed by SPSS, version 25.

Descriptive statistics were used initially to demonstrate the baseline sociodemographic characteristics from section A of the questionnaire. The continuous variables were analyzed and expressed as means and standard deviation; the categorical variables were indicated as numbers and percentages in a frequency distribution table. The frequency of responses to the KAP questions was expressed in total and percentages.

Ethical approval for this study was obtained from the Fiji National University College Health Research Ethics Committee (CHREC) and the Fiji National Health Research Ethics and Review Committee (FNHRERC).

Table 1. Demographic characteristics of participants (n = 225)

Variables	Categories	n	%
Age (yr)	30-45	18	8.0
	46-60	118	52.4
	61-75	75	33.3
	>76	14	6.3
Gender	Male	110	48.9
	Female	115	51.1
Ethnicity	Native Fijian (i-Taukei)	110	48.9
	Fijians of Indian descent	109	48.4
	Fijians of others descent	6	2.7
Employment status	Unemployed	72	32.0
	Employed	86	38.2
	Domestic duties	67	29.8
Marital status	Single	16	7.1
	Married	181	80.4
	Divorced	6	2.7
	Widowed	22	9.8

3. Results

3.1 Participants

All the tables in the Results section show complete data for all participants, but not their relative frequencies. The study sample for this research comprised of 225 participants aged 38-92 years (58.6 ± 9.99). Despite the broad age-range, KAP rates were not assessed based on the time since diagnosis or CKD stage, even though it is expected that KAP would markedly differ between age groups and CKD stages. This is because there were no proper records of time of diagnosis due to missing records, paper records rather than electronic copies, and late diagnosis by clinicians among other reasons.

The majority of participants were aged 46-60 years (52.4%), with almost an equal number of male (48.9%) and female (51.1%) participants in this study (**Table 1**). Ethnicity was also balanced in this study, with almost an equal number of native Fijians (i-Taukei, 48.9%) and FID (48.4%). Thirty-eight percent of the participants were employed, while 29.8% were engaged in domestic duties. The majority of the participants were married (80.4%); only a few were divorced (2.7%).

3.2 Evaluation of answers to knowledge-based questions

The following percentages of study participants answered correctly on questions regarding their knowledge on kidney disease and diabetes (see **Table 2**):

- 92.4% knew that unhealthy diet and physical inactivity increased the risk of T2D.
- 74.2% knew that T2D can lead to kidney disease.
- 70.7% reported correctly that high blood pressure may worsen kidney disease in people with diabetes.
- 77.8% knew that kidney disease in people with diabetes is diagnosed by blood tests at the hospital.
- 77.3% reported correctly that a person with kidney disease has certain symptoms that should alert patients to seek medical treatment.
- 66.2% reported correctly that the kidney removes waste from the human body.
- 66% reported correctly that people with chronic kidney disease in the final stage need kidney transplant/surgery overseas.
- 51.6% knew that the kidney is involved in maintaining normal blood pressure and blood formation
- 32.8% knew that dialysis does not completely treat kidney disease in people with diabetes.

3.3 Evaluation of answers on attitude-related question

The following percentages of study participants responded to statements regarding the attitude of patients with kidney disease and diabetes (see **Table 3**):

- 92.9% agreed that kidney disease is a big problem in Fiji.
- 94.7% were interested in knowing their kidney status.
- 80.9% reported that knowledge about their kidney condition would worry them.
- 66.2% disagreed that they would be able to bear the financial costs linked to CKD.
- 92.4% agreed that their family deserved to know about their kidney status.
- 35.6% had considered a plan if their kidney disease progressed to the final stage.
- 85.8% considered kidney disease as potentially life-threatening and restricting in terms of daily life activities.
- 55.6% disagreed that CKD would not affect their health in any way.
- 92.9% agreed that their family members need to be checked for diabetes and CKD if they were more than 40 years old.

Table 2. Frequency of response on knowledge-related questions (n = 225)

Question	Response	n	%
Do unhealthy diet and lack of physical activity increase the risk of diabetes?	Yes	208	92.4
	No	6	2.7
	Don't know	11	4.9
Can diabetes lead to kidney disease?	Yes	167	74.2
	No	13	5.8
	Don't know	45	20.0
Does high blood pressure worsen kidney disease in people with diabetes?	Yes	159	70.7
	No	10	4.4
	Don't know	56	24.9
Is kidney disease in people with diabetes diagnosed at hospital by doing blood tests?	Yes	175	77.8
	No	10	4.4
	Don't know	40	17.8
Does a person with kidney problems have certain symptoms that can alert him/her to seek medical attention?	Yes	174	77.3
	No	9	4.0
	Don't know	42	18.7
Does the kidney remove waste from the human body?	Yes	149	66.2
	No	14	6.2
	Don't know	62	27.6
Is the kidney involved in maintaining normal blood pressure and other functions like blood formation?	Yes	116	51.6
	No	11	4.8
	Don't know	98	43.6
Does dialysis completely treat kidney disease in people with diabetes?	Yes	53	23.6
	No	74	32.8
	Don't know	98	43.6
Do people with chronic kidney disease in the final stage need kidney transplant/surgery overseas?	Yes	148	65.8
	No	21	9.3
	Don't know	56	24.9

3.4 Evaluation of answers on practice-related question

The following percentages of study participants responded to statements regarding practice in patients with kidney disease and diabetes (see **Table 4**):

- 68.4% had attended all their booked clinics at the hospital.
- 59.6% of the subjects had undergone routine blood tests to check their kidney function every year.
- 75.6% had changed their diet after knowing their disease status.
- 57% of the subjects had checked their sugar on non-clinic days.
- 86.2% made efforts to reduce their risk factors as advised by their doctor.
- 58.7% of the subjects reported they would not seek traditional medicine if they found out they had CKD.
- All participants said that they would consult a doctor for their CKD.

3.5 Distribution of responses by level of knowledge, attitude, and practice

Almost 62% of the participants had a high level of knowledge regarding the function of the kidney and the causes, prevention, diagnosis, and treatment of T2D/CKD (score of 23-30). Similarly, 63.6% of the study subjects had a high level of attitude regarding prevention, burden, impact, effect, awareness and future implications of T2D/CKD (score of 23-30). Most of the participants (88.4%) had a high level of practice towards prevention, self-management, behavior modification, medical-consultation and health-seeking behavior (score of 5-10), as shown in **Table 5**.

Table 3. Frequency of response on attitude-related questions (n = 225)

Question/statement	Response	n	%
Do you belief that kidney disease in people with diabetes is a big problem in Fiji?	Agree	209	92.9
	Disagree	2	0.9
	Neutral	14	6.2
Are you interested in knowing whether your kidney status is normal or not?	Agree	213	94.7
	Disagree	3	1.3
	Neutral	9	4.0
Will knowledge about your kidney condition make you worry about yourself?	Agree	182	80.9
	Disagree	26	11.5
	Neutral	17	7.6
Will you be able to bear the financial costs linked to kidney disease?	Agree	47	20.9
	Disagree	149	66.2
	Neutral	29	12.9
Do you think your family deserves to know about your kidney status/function?	Agree	208	92.4
	Disagree	8	3.6
	Neutral	9	4.0
Have you considered a plan if your kidney disease progresses to the final stage?	Agree	80	35.6
	Disagree	76	33.7
	Neutral	69	30.7
Do you consider kidney disease as a potential threat to your current life in terms of daily life activities such as working, socializing, and community status?	Agree	193	85.8
	Disagree	10	4.4
	Neutral	22	9.8
Kidney disease will not affect my health and lifestyle in any way.	Agree	79	35.1
	Disagree	125	55.6
	Neutral	21	9.3
I belief people with diabetes and kidney disease should follow all the medical advice given to them to prevent worsening of their kidneys.	Agree	211	93.8
	Disagree	10	4.4
	Neutral	4	1.8
I think my family members need to be checked for diabetes and kidney damage if they are more than 40 years old.	Agree	209	92.9
	Disagree	6	2.7
	Neutral	10	4.4

4. Discussion

In this study, the majority of participants had high levels of knowledge, attitude, and practice (61.8%, 63.6%, and 88.4%, respectively). Despite these high rates, there were certain areas of concern where patients attained only low scores. A low level of knowledge was seen regarding the patients' understanding of the relationship between high blood pressure and renal status in diabetes and the need for renal transplant abroad in end-stage kidney disease (ESKD) as eventual treatment. A low attitude was apparent regarding impact and management of diabetic kidney disease in the personal situation. Similarly, low practice was evident regarding clinic attendance, self-monitoring, and opting for non-medical treatment. High knowledge was evident regarding awareness of DKD, high attitude was seen regarding prevention, burden, and effect of DKD, and high practice was noted for prevention, behavior, modification and medical consultation for T2D and CKD.

While our study showed high level of knowledge, Yusoff *et al*. found that only 69.9% of T2D patients with CKD in Malaysia had poor knowledge regarding T2D/CKD [20]. A possible explanation for this difference could be that the majority of participants in our study had a higher level of education than in the other trials. The multi-disciplinary approach to patient care at SSH may have enabled the T2D patients to extend their understanding of the disease, which may have led to the high level of knowledge. Multi-disciplinary approaches to patient care have been shown to improve patient outcomes and increase patient knowledge [21].

Although the overall knowledge score was high, there are some areas of concern. Nearly one third of the participants did not know that ESKD patients need renal transplant abroad and two third of the patients did not know that CKD is not curable with dialysis. Similarly, Stanifer *et al*. found low knowledge scores (mean 3.28/10) regarding the causes, symptoms, and treatments for DKD in Northern Tanzania [22]. Khalil and Abdalrahim recognized that the participants in Jordan were unaware of the symptoms of T2D/CKD [14], while Waterman *et al*. reported low knowledge regarding definition, diagnosis, and risk factors for kidney disease in African Americans [23]. Thus, there are various low-rate parameters of knowledge for DKD that need to be evaluated for improvement. The identified areas of low knowledge should be the target of future awareness in the clinic and possible public health programs.

A good level of attitude was found by Stanifer *et al*. who found a high rate of attitude regarding

Table 4. Frequency of response on practice-related questions (n = 225)

Question	Response	n	%
Have you attended most or all of your booked clinics at the hospital?	Yes	154	68.4
	No	71	31.6
Have you undergone routine blood tests to check your kidney function every year?	Yes	134	59.6
	No	91	40.4
Have you changed your diet after knowing about your current disease?	Yes	170	75.6
	No	55	24.4
Have you attempted to check your sugar level on non-clinic days at your own expense?	Yes	129	57.3
	No	96	42.7
Have you made any efforts to reduce your risk factors, if you have any as advised by your doctor?	Yes	194	86.2
	No	31	13.8
If you find out you have kidney disease, would you seek traditional healing/medicine?	Yes	93	41.3
	No	132	58.7
If you find out you have kidney disease, would you consult a doctor?	Yes	225	100
	No	0	0

Table 5. Distribution of responses by level of KAP

Variables	N	%
Knowledge		
Low level of knowledge (0-15)	2	0.9
Medium level of knowledge (16-22)	84	37.3
High level of knowledge (23-30)	139	61.8
Attitude		
Low level of attitude (0-15)	2	0.9
Medium level of attitude (16-22)	80	35.6
High level of attitude (23-30)	143	63.6
Practice		
Low level of practice (0-4)	26	11.6
High level of practice (5-10)	199	88.4

health concerns and economic and social impacts of renal disease in 97% of DKD patients [22]. In contrast, Roomizadeh *et al*. reported a poor attitude in 60% of the Iranian participants [24]. The possible reason for the conflicting finding may be the large population size used by the latter study and the sampling method used (convenience sampling), which could probably account for the discrepancy seen in the level of attitude between the Iranian study and the current one.

According to the theory of planned behavior (TPB), the combination of a person's attitude with perceived behavioral control and subjective norms predicts his intentions or deliberate behavior [25]. Thus, if patients have a high level of attitude, as they had in this study, then this may result in good behavioral outcomes in terms of DKD.

The overall attitude regarding prevention, burden, effects, and awareness of T2D/CKD was high in our study. The future aim is to maintain and reenforce this level of attitude, while improving the few areas of low attitude. In the model of TPB, attitude is one of the main categories of behavior. Therefore, careful deliberation on this category may result in considerably improved behavior in patients with DKD and thus improved health [25].

However, high levels of knowledge and attitude are not sufficient to achieve improved health if they are not translated into good practice [26]. The majority of the T2D patients with CKD at SSH in 2018 (88%) had a high level of practice (score range 5-10) regarding prevention, self-management, behavioral modifications, medical consultation and health-seeking behavior.

In contrast to our study, Stanifer *et al*. reported poor practice, in that 80% of the Tanzanian subjects were found to have poor practice towards DKD, mainly because they went to traditional healers and used traditional medicine for the treatment of kidney disease [22]. This is an alarming drawback as these patients may be subject to high rates of mortality. The poor practice rates among patients from Tanzania may be explained by a lack of knowledge about the disease and effective medical treatment.

Despite the fact that the overall practice was high in SSH in 2018, there are a few aspects that need to be improved. A large proportion (one third) of the participants missed clinic visits; patients who repeatedly missed clinic visits have worse metabolic control and more complications than those who attended most of their appointments [27]. In this regard, 40% of the participants did not have regular blood tests to monitor their renal status. It is recommended that DKD patients should have their renal profiles done at least once every 6 months to identify acute deterioration in renal function so that patients can be managed accordingly, if resources permit [28].

The participants in this study had a high level of practice regarding prevention, behavioral modifications, and medical consultation for DKD, but they had poor practice values regarding self-management and health-seeking behavior. They need to learn the importance of self-management. However, it is not only the medical personnel who is responsible for managing the medical conditions. The patients themselves need to take responsibility for their own health so that a collaborative treatment is enabled, which is planned by the physicians and accepted by the patients [26].

Health-seeking behavior impacts health outcome as patients with positive behavior tend to seek medical care earlier, and thus reduce or delay the onset of complications via early medical intervention [26]. Therefore, self-management and health-seeking behavior are two important parameters which have been identified and which should be the focus of future public health interventions in order to improve these practices and consequently delay or reduce the complications of DKD.

The findings of this study have identified some gaps in knowledge that may be further explored by future studies. Firstly, the general awareness of DKD was high, but patients lacked understanding on specific aspects such as risk factors for renal disease, treatment, and management, even though these factors are usually explained to patients by their doctors. It is noticeable that patients have a good knowledge about one aspect, while knowledge on another aspect of the disease is poor.

Other studies revealed problems with different knowledge components compared to our study. A detailed future study may help to identify the reasons for these differences. Another approach could be to test the KAP of doctors who attend to these patients to analyze whether their understanding, behavior, and practice is affecting those of DKD patients.

Similarly, the aspects of attitude, although interrelated, did not show consistent scores as patients had different attitudes towards these components. Practice scores were generally consistent, though patients opted for non-medical treatments as well. It may be worthwhile analyzing the contrasting findings by employing a qualitative study method to understand the patients' perspectives in detail.

The present study had several strengths. It is probably the first study done in Fiji (and or even in the South Pacific region) that focuses on KAP of T2D patients with CKD. The inclusion of all eligible patients who satisfied the inclusion criteria ensured that a large sample was available for this study. Baseline demographic information showed a balanced representation of gender, ethnicity, and employment status, which reduced population bias. The availability of the survey tool (questionnaire) in 3 languages enabled the collection of data from all ethnic groups (FID, i-Taukei, and FOD).

The limitations of this study include the short study period, the small sample, and the restricted scope. The study was performed within a 2-month period only, which was relatively short to collect sufficient data. This could have reduced the statistical power of the test, despite the fact that the study had already surpassed the minimal sample size required. The scope of the study was perhaps too narrow. It may have benefitted from the inclusion of hypertensive patients with CKD since hypertension is the second major cause of CKD after T2D [1]. Narrowing the scope reduced the eligible participants for this study and hence reduced the sample size, which may have affected the test's generalizability. Finally, the questionnaire was self-answered by the participants, so that there may be inaccuracies in the data gathered through this questionnaire.

5. Conclusion

The analysis showed that the majority of the T2D patients with CKD at SSH had an overall high level of knowledge regarding kidney function, diagnosis of T2D/CKD, and prevention, but they have low levels of knowledge regarding causes and treatment of T2D/CKD. Similarly, the patients had an overall high level of attitude regarding prevention of DKD, burden, effects, and awareness of T2D/CKD, but a low level of attitude regarding impact and future implications of T2D/CKD. Finally, the subjects of the present study had a high level of practice regarding prevention, behavioral modifications, and medical consultation for DKD, but they had a poor practice in terms of self-management and health-seeking behavior.

The results of this study may enable clinicians and public-health policies to target those aspects of health promotion which show low levels of KAP in the clinic and through public programs. Eventually, this may lead to an increase in the overall KAP of all the T2D patients with CKD and improve health.

Increasing accessibility of materials to raise knowledge regarding patient's medical conditions, educating patients on the importance of self-monitoring, strengthening multi-disciplinary teams to ensure management of various aspects of the disease are necessary. Moreover, large-scale future studies and experimental/intervention studies may be helpful in identifying the efficacy and effectiveness of various programs (currently used in Fiji) to increase KAP and improve healthcare.

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