THE EFFECTIVENESS OF CHRONIC KIDNEY DISEASE EDUCATION TOWARDS KNOWLEDGE, ATTITUDE, PRACTICE AND HBA1C AMONGST UNCONTROLLED TYPE 2 DIABETIC PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

BY

DR ALIA FAHIZHA BINTI FAHIMI

DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF MEDICINE (FAMILY MEDICINE)

UNIVERSITI SAINS MALAYSIA

2022

ACKNOWLEDGEMENT

I would like to thank my supervisors, Dr Juliawati bt Muhammad, Dr Faridah Mohd Zin and Dr Nur Suhaila binti Idris for guiding and assisting me in completing this thesis. Special thanks for Dr Masoud Mohamednezzad for providing me the questionnaires that had been adapted in this research. Gratitude towards Dr Muhammad Imran Kamarudin from Internal Medicine department HUSM for validating the questionnaire and special thanks to AP Dr Norhayati Mohd Noor for giving statistical input for this study. The Covid 19 pandemic and its Movement Control Order had made this thesis a few set back as restriction was made to curb the pandemic. However, due to support from Hospital Universiti Sains Malaysia (HUSM) and its staff had allow this study to be carried out despite the set-back. I would also like to thank my research assistants, who helped me in collecting the data. Without the correct guidance and supports from them, I would not have this achievement and completing this thesis.

I would also like to say my gratitude to my family and my beloved husband, En Mohd Yusri bin Noordin and my son, Muhammad Iskandar bin Mohd Yusri for their sacrifice in helping me in handling this research amid the Covid 19 pandemic.

This work was supported by Tabung Geran Penelidikan Sarjana Perubatan (GPSP) Universiti Sains Malaysia [grant number 1001/PPSP/8070011]

TABLE OF CONTENT

ABSTRAK (BAHASA MALAYSIA)

Pengenalan: Prevalen menunjukkan kadar penyakit buah pinggang kronik semakin meningkat di kalangan pesakit kencing manis di Malaysia.

Objektif: Kajian ini dilakukan untuk menyiasat tahap pengetahuan, sikap, amalan dan paras HbA1c dalam kalangan pesakit kencing manis tidak terkawal sebelum dan selepas pendidikan penyakit buah pinggang

Metodologi: Kajian ini merupakan percubaan klinikal terkawal yang dilakukan pada bulan Februari hingga bulan Mei 2021. Kedua-dua kumpulan intervensi dan kumpulan kawalan terdiri daripada 68 peserta. Tahap pengetahuan, sikap dan amalan mengenai penyakit buah pinggang telah diuji menggunakan soal selidik tadbir sendiri yang telah disahkan pada pertemuan pertama dan di ulang pada minggu kedua dan kedua belas selepas intervensi diadakan. Ujian HbA1c telah di ambil pada permulaan dan pada minggu kedua belas. Perbezaan antara purata markah pada minggu kedua dan kedua belas setelah intervensi telah dikira untuk menentukan keberkesanan pendidikan penyakit buah pinggang.

Keputusan: Purata dan sisihan piawaian untuk markah pengetahuan, sikap dan amalan mengenai penyakit buah pinggang dalam kumpulan intervensi sebelum intervensi ialah 27.3 ± 4.63, 23.89 ± 3.52, and 9.73 ± 2.18 telah meningkat kepada 28.04 ±2.75, 24.14 ± 3.10 and 10.34 ± 1.70 setelah 2 minggu dan 28.54 ± 3.67, 25.07 ± 3.24 and 10.30 ± 1.89 setelah 12 minggu. Perbeaan antara purata markah pengetahuan, sikap dan amalan ialah 1.18 (95% CI 0.07,2.28, $p<0.05$), 0.10 (95% CI: -0.817,1.025, $p=0.82$) dan 0.76 (95% CI: 0.227,1.289, $p<0.001$). Interaksi antara kumpulan dan masa melalui repeated measures analysis of variance dengan

pembetulan Bonferroni, purata pengetahuan dan sikap menunjukkan peningkatan yang ketara. Namun, tiada peningkatan ketara dijumpai pada markah sikap dan HbA1c antara kumpulan intervensi dan kumpulan kawalan. Kebanyakan peserta tidak kembali ke klinik semula untuk ujian susulan HbA1c kerana Covid-19

Kesimpulan: Pendidikan kesihatan penyakit buah pinggang terbukti dapat meningkatkan pengetahuan dan amalan terhadap penyakit buah pinggang di kalangan pesakit kencing manis yang tidak terkawal.

ABSTRACT (ENGLISH)

Introduction: The prevalence of chronic kidney disease (CKD) is increasing progressively among diabetes patients in Malaysia. Thus, CKD education is important in order to prevent or slow the progression of CKD.

Objective: This study was done to assess the level of knowledge, attitude, reported practice (KAP) and HbA1c level among uncontrolled diabetics before and after the CKD educational.

Methodology: This is a randomized controlled trial in outpatient clinic from February till May 2021. 68 participants were in the intervention and control group respectively. KAP on CKD was assessed using self-administered validated questionnaires at first visit and again at two-, and twelve-weeks post intervention. HbA1c was taken at baseline and 12 weeks. The difference in mean score at 2 weeks and 12 weeks post intervention was calculated to determine the effectiveness of CKD education.

Results: Mean and standard deviation of KAP for intervention group before the CKD educational were 27.3 ± 4.63, 23.89 ± 3.52, and 9.73 ± 2.18 at baseline and had increased to 28.04 ±2.75, 24.14 ± 3.10 and 10.34 ± 1.70 after 2 weeks and 28.54 ± 3.67, 25.07 ± 3.24 and 10.30 ± 1.89 after 12 weeks of the intervention. The mean difference of each KAP score was 1.18 (95% CI 0.07,2.28, $p<0.05$), 0.10 (95% CI: -0.817,1.025, $p=0.82$) and 0.76 (95% CI: 0.227,1.289, $p<0.001$) respectively. The group*time interaction of repeated measures analysis of variance with Bonferroni correction showed the increase mean difference in knowledge and practice score showed significant changes. However, there was no significant difference mean in

attitude score and HbA1c level between intervention and control group. Many participants did not return to clinic for repeat HbA1c due to Covid-19

Conclusion: Chronic kidney education is effective in improving the knowledge and practice of CKD prevention among patients with uncontrolled diabetes

.

CHAPTER 1 : INTRODUCTION

Kidney Disease: Improving Global Outcomes, KDIGO defines chronic kidney disease (CKD) as abnormality of kidney structure or function observed for more than 12 weeks with deterioration of health. CKD is classified by aetiology, estimated glomerular filtration rate, eGFR (G1-G5) and albuminuria (A1-A3) (Milik and Hrynkiewicz 2012). If the patient's eGFR decreases below 15 ml/min per 1.73m2, they are classified with end stage kidney disease (ESKD).

CKD prevalence in Malaysia had increased from 9.07 percent in 2011 (Hooi et al. 2013) to 15.48 percent in 2018. (Saminathan et al. 2020). This prevalence was greater than the worldwide prevalence of CKD (9.1%) in 2017 (Bikbov et al. 2020) and almost equivalent to the prevalence of CKD in the USA (14.5%). (Saran et al. 2018). Dialysis patients in Malaysia had increased from 32,026 in 2013 to 39, 711 in 2016 (24th Report of the Malaysian Dialysis & Transplant 2016) which increased the Malaysian public sector's overall spending on ESKD management by 94%. Malaysian government had invested RM 572 million purchasing power parity, PPP in 2010 and RM 1.2 billion PPP in 2016. (Ismail et al. 2019). The number of dialysis patients in Malaysia is expected to treble by 2040, reaching 106,249, with an estimated cost of USD 796,867,500 (Bujang et al. 2017). It is also anticipated in England that the economic cost of CKD would be over €11.4 billion in 2025. (Nguyen et al. 2018) Thus, it is critical to establish interventions to minimise the number of new CKD and ESKD patients.

Hypertension, diabetes mellitus, DM, high body mass index, aging population were significantly associated with CKD (Saminathan et al. 2020)(Bikbov et al. 2020). In

Malaysia, DM was found as the most cause of CKD ("24th Report of the Malaysian Dialysis & Transplant 2016" 2016)(Salman et al. 2015) and it took 14 years for Malaysian diabetic patient to progress from DM to ESKD (Y. P. Ng et al. 2018). Those who did not receive angiotensin converting enzyme inhibitor, ACEi or angiotensinogen receptor blocker, ARB progressed to ESRD much faster. Non adherence and low prescription of this medication may cause the rapid progression to ESKD in Malaysia (Y. P. Ng et al. 2018). In a meta-analysis, DM had a borderline increase in hazard ratio of 1.16 to 1.24 for progression of late-stage CKD to ESKD (Tsai et al. 2016)

Various study had been done to assess KAP of CKD and various definition was used to described good KAP. Some study use score of or more than 50% KAP score (Chow et al. 2012) (Nyayu, Dini, and Linlin 2021) (Oluyombo et al. 2016) and some use more than 70% of KAP scale (Yusoff, Yusof, and Cheng Kueh 2016) to define good KAP. Meanwhile, others use high mean score to define good KAP (Khalil and Abdalrahim 2014)(Stanifer et al. 2016)(Yann Ng, Shiun Lee, and Seong Goh 2016)(Zibran and Mohammadnezhad 2019).

Knowledge regarding CKD and its complication was still poor among the population and high-risk patient in Malaysia (Yusoff, Yusof, and Cheng Kueh 2016) (C. Y. Ng, Lee, and Goh 2016). Poor CKD knowledge were also seen in USA, Northern Tanzania, Iran and Australia (Alvis Zibran et al. 2018). Therefore, effort to increase education regarding CKD towards high-risk population is important and had been proposed by many literature (Noorkhairina et al. 2018) (Zimbudzi et al. 2019) (Saminathan et al. 2020)(Bikbov et al. 2020)

Most people did not know risk of CKD (A. U. Tan, Hoffman, and Rosas 2010), sign and symptoms of CKD (Lopez-Vargas et al. 2017) (Yusoff, Yusof, and Cheng Kueh 2016), anatomy of kidney, function of kidney (Khalil and Abdalrahim 2014), laboratory test for CKD and factor which would worsen progression of CKD (Oluyombo et al. 2016). They also did not know that T2DM and hypertension had risk for CKD which make them not aware of this disease (A. U. Tan, Hoffman, and Rosas 2010). There was lack of knowledge that smoking (Lopez-Vargas et al. 2017), NSAID, herbal concoction and high salt intake could worsen kidney function (A. U. Tan, Hoffman, and Rosas 2010).

Study in USA showed that most of patient with CKD stage 3 and 4 did not know that renin-angiotensin system inhibitor as effective in slowing progression of CKD (A. U. Tan, Hoffman, and Rosas 2010). Meanwhile, study in Australia showed that there were also lack of awareness regarding interaction between CKD and development of heart attack or stroke noted (Lopez-Vargas et al. 2017). Therefore, emphasizing on self-management intervention such as blood pressure monitoring, medication adherence, dietary modification, weight management, smoking cessation and education about the risk factors and comorbidities associated with CKD to be included in CKD education (Lopez-Vargas et al. 2017)

Despite poor knowledge of CKD, there is conflicting data on attitude and practice of CKD especially in T2DM population. Poor knowledge and good attitude were found in Malaysia and Northern Tanzania. However, in Jordan, there was good knowledge and good attitude seen. On the contrary, there was poor knowledge and attitude of CKD seen in Iran and Indiana, USA. Good practice of CKD was seen in Malaysia, which defer from study in Northern Tanzania and Jordan which found poor practice.

The usage of traditional healer/medication and self-management was the poor practices seen in Northern Tanzania (Stanifer et al. 2016).

The health belief model (HBM) is a behavioural science hypothesis that states that individuals take action to avert, screen for, or control an illness if they believe they are susceptible to the situation, believe the situation has potentially profound consequences, and believe that a course of action available to them would be beneficial in reducing either their susceptibility or severity (Rosenstock, Strecher, and Becker 1988).

Health education based on HBM had been proven to improving diabetic patient self-care behaviours (Shabibi et al. 2017) (Solhi et al. 2014). For example, MYDEMO, a Malaysian diabetic education model had been constructed using HBM. This education model had been validated in setting of diabetic care in Malaysia (Ahmad et al. 2014). In this pilot project,none-hour didactic lecture followed by another hour of dialogue session had seen an increase in total score in post-test compare to pre-test. However, the intervention program in MYDEMO only uses three constructs of HBM which are perceived susceptibility, perceived barrier and self-efficacy and it was validated using non diabetic participants. The author of this study had suggested for future intervention study to adopt a multi-approach intervention like the use of teaching videos and regular telephone consultation (Ahmad et al. 2014).

In Iran, the HBM had been proven to increase knowledge scores regarding dietary planning, energy intake, number of meals and healthy food for diabetic patients in diabetic patient. During this intervention, 80 minutes of 2 educational session was done in the intervention group. The domain for perceived susceptibility, perceived severity, perceived threated and perceived benefit had increase significantly. From this

study, participant in the intervention group had noted that poor adherence to diet as danger and adherence to diet as benefits to make them follow the diabetic diet.(Sharifirad et al. 2009)

As we know, the HBM was consistently proven to improve knowledge of diabetes patients, however, it had not been tested to improve the knowledge, attitude and practice of diabetic patient towards chronic kidney disease. Using HBM as a guide, CKD education was developed in hoping to improve the diabetic education and their understanding of CKD.

According to research, there were no trials including patients with mild to moderate renal illness, and all education interventions took place in nephrology practise settings, with just a handful conducted in high-risk populations. (Wright Nunes 2013). Only two studies had been found that addressed CKD in diabetic patients (Li et al. 2011). In these two studies, spending moderate to extensive time on patient education was found to improve self-reported behaviours and objective clinical measurements, as well as delaying or stopping the progression of the disease. Both of these investigations, however, did not include kidney-specific information in their programmes. Routine implementation of such programmes into evidence-based practise is unlikely without strong studies proving advantages of early kidney-specific patient education on clinical outcomes. Currently existing education programmes do not seem to be intended to transcend CKD care across primary care, which may impede patients' ability to get a cohesive education experience. (Wright Nunes 2013)

The CKD educational were developed in accordance with HBM by the investigator. It used narrated power point presentation to maintain the same education were given. The contents were in Malay as Malay language is the national language in

Malaysia. There are six domains in the HBM. The first domain is perceived severity. CKD was initially asymptomatic and the only evidence of CKD are proteinuria, therefore, it is important that patient focus on the disease process during the earlier stages of the disease (Sowtali Siti Noorkhairina et al. 2018). However, CKD can progress to ESKD. An ESKD patient had multiple symptom such as lethargic, nausea, vomiting, shortness of breath and lower limb swelling. They require a more extensive and expensive treatment such as dialysis or kidney transplant (Webster et al. 2017). This information informed the participants regarding the severity of CKD and the disease progression.

The second domain is perceived susceptibility, DM as risk factor for CKD. DM and hypertension can hasten CKD progression. Many high-risk individuals believe they are not at danger for CKD and lead to poor adherence to anti-hypertensive medication (Boulware et al. 2009). Due to this, risk for CKD especially T2DM and proteinuria should be emphasised in the CKD education to ensure that they are aware regarding their susceptibility for this disease. Knowledge in how T2DM progress to CKD, what will happen if kidney function deteriorates and factor affecting progression of CKD will increase their perceived susceptibility to this disease.

The third domain is perceived benefits. In this CKD education, investigator educated regarding early identification of CKD in diabetic patient. The benefits of doing blood and urine investigation to detect CKD. Participant can gain benefit of reducing progression of CKD by maintaining healthy lifestyle in a diabetic patient such as healthy diet, increasing physical activity, stop smoking and following doctor advice in adherence to medication especially ACEi or ARB. The fourth domain is perceived barrier. Whether presence any barrier in coming to hospital and doing yearly

check-up? Were there any barrier in maintaining healthy life style such as eating healthy diet and doing exercise?

The fifth domain is cue to action. When a person is motivated and can perceive a beneficial action to take, actual change often occurs when some external or internal cue triggers action. CKD education is the cue to action for uncontrolled diabetic patient regarding this disease. The final domain is self-efficacy, it is defined as the trust of uncontrolled diabetic patient in maintaining their health to reduce the progression of CKD. Knowledge is one of the factors to make them more confident. This includes knowledge regarding function of kidney and the usage of medication and good glycaemic control to stabilise kidney function

From the world data there is a staggering increase in prevalence of CKD. DM was found to be the most cause of CKD and new dialysis participant in Malaysia. On top of that, progression of DN to ESKD was shorter in Malaysia than other country. However, not many of our diabetic patients were aware regarding these consequences. Patients with early stage of CKD are usually asymptomatic which cause them to have poor attitude and practice regarding this disease. There is a need to educate diabetic patient regarding kidney disease. Based on HBM, if diabetic patient believe that they are susceptible to develop CKD and understand that CKD is a serious consequence, they will believe that course of action available to them would be beneficial in reducing either their susceptibility to or the severity of CKD. Therefore, increase in knowledge regarding the disease may change the attitude and furthermore change the behaviour towards the disease. In conclusion, educating regarding CKD is crucial to high-risk patient especially T2DM patient and can influence the disease progression.

CHAPTER 2 : OBJECTIVES

2.1 OBJECTIVES

2.1.1 General objective

To assess the effectiveness of CKD education on knowledge, attitude and practice in uncontrolled diabetic patients attending an outpatient clinic in Hospital, USM

2.1.2 Specific objectives

1. To compare the mean difference of knowledge score on CKD among uncontrolled diabetic patients at baseline, 2 weeks and 12 weeks post intervention between intervention and control groups
2. To compare the mean difference of attitude score on CKD among uncontrolled diabetic patients at baseline, 2 weeks and 12 weeks post intervention between intervention and control groups
3. To compare the mean difference of practice score on CKD among uncontrolled diabetic patients at baseline, 2 weeks and 12 weeks post intervention between intervention and control groups
4. To compare the mean difference of HbA1c among uncontrolled diabetic patients at baseline and 12 weeks post intervention between intervention and control groups

CHAPTER 3 : MANUSCRIPT

3.1 TITLE: The effectiveness of chronic kidney disease education towards knowledge, attitude, practice and HbA1c amongst uncontrolled type 2 diabetic patients in Hospital Universiti Sains Malaysia

Author: Alia Fahizha binti Fahimi
Department of Family Medicine
School of Medical Science, Universiti Sains Malaysia
16150, Kota Bharu, Kelantan

Corresponding author:

Dr Alia Fahizha binti Fahimi
MD (USM)
Department of Family Medicine
School of Medical Sciences, Universiti Sains Malaysia,
16150, Kubang Kerian, Kelantan, Malaysia
Tel: +06 019 574 0869 (Malaysia)
Email: aliafahimi@student.usm.my
Fax number: +06 09 764 3700

Dr Juliawati binti Muhammad
MBBS (Adelaide), MMed (Family Medicine) USM
Family Medicine Specialist, Department of Family Medicine
School of Medical Sciences, Universiti Sains Malaysia,
16150, Kubang Kerian, Kelantan, Malaysia
Tel: +06 014 806 4530 (Malaysia)
Email: juliawati@usm.my
Fax number: +06 09 764 3700

Dr Nur Suhaila binti Idris
MD (USM), MMed (Family Medicine) USM
Family Medicine Specialist, Department of Family Medicine
School of Medical Sciences, Universiti Sains Malaysia,
16150, Kubang Kerian, Kelantan, Malaysia
Tel: +06 019 9373950(Malaysia)
Email: nursuhaila@usm.my
Fax number: +06 09 764 3700

Biography of author

Dr Alia Fahizha binti Fahimi is a postgraduate student of Family Medicine Department in Universiti Sains Malaysia. Meanwhile, Dr Juliawati binti Muhammad and Dr Nur Suhaila binti Idris are senior lecturers in family medicine department in Universiti Sains Malaysia

Disclosure of funding:

This work was supported by Tabung Geran Penyelidikan Sarjana Perubatan (GPSP) Universiti Sains Malaysia [grant number 1001/PPSP/8070011]

3.2 Abstract

Introduction: The prevalence of chronic kidney disease (CKD) is increasing progressively among diabetes patients in Malaysia. Thus, CKD education is important in order to prevent or slow the progression of CKD.

Objective: This study was done to assess the level of knowledge, attitude, reported practice (KAP) and HbA1c level among uncontrolled diabetics before and after the CKD educational class

Methodology: This is a randomized controlled trial in outpatient clinic from February till May 2021. 68 participants were in the intervention and control group respectively. KAP on CKD was assessed using self-administered validated questionnaires at first visit and again at two-, and twelve-weeks post intervention. HbA1c was taken at baseline and 12 weeks. The difference in mean score at 2 weeks and 12 weeks post intervention was calculated to determine the effectiveness of CKD education.

Results: Mean and standard deviation of KAP for intervention group before the CKD educational were 27.3 ± 4.63, 23.89 ± 3.52, and 9.73 ± 2.18 at baseline and had increased to 28.04 ±2.75, 24.14 ± 3.10 and 10.34 ± 1.70 after 2 weeks and 28.54 ± 3.67, 25.07 ± 3.24 and 10.30 ± 1.89 after 12 weeks of the intervention. The mean difference of each KAP score was 1.18 (95% CI 0.07,2.28, $p<0.05$), 0.10 (95% CI: -0.817,1.025, $p=0.82$) and 0.76 (95% CI: 0.227,1.289, $p<0.001$) respectively. The group*time interaction of repeated measures analysis of variance with Bonferroni correction showed the increase mean difference in knowledge and practice score showed significant changes. However, there was no significant difference mean in

attitude score and HbA1c level between intervention and control group. Many participants did not return to clinic for repeat HbA1c due to Covid-19

Conclusion: Chronic kidney education is effective in improving the knowledge and practice of CKD prevention among patients with uncontrolled diabetes

3.3 Key words

Diabetic, Kidney Disease, End Stage Kidney Disease, Prevention, Health Education, Health Belief Model, Primary Care, Theoretical Based Education

3.4 Introduction

Chronic kidney disease, CKD prevalence in Malaysia was 9.07 percent in 2011 (Hooi et al. 2013) and increased to 15.48 percent in 2018 (Saminathan et al. 2020). It is higher than the worldwide prevalence of CKD (9.1%) in 2017 (Bikbov et al. 2020) and almost equivalent to the prevalence of CKD in the USA (14.5%). (Saran et al. 2018). Dialysis patients in Malaysia had increased from 32,026 in 2013 to 39, 711 in 2016 (24th Report of the Malaysian Dialysis & Transplant 2016) which increased the Malaysian public sector's overall spending on ESKD management by 94%. Malaysian government had invested RM 572 million purchasing power parity, PPP in 2010 and RM 1.2 billion PPP in 2016. (Ismail et al. 2019). The number of dialysis patients in Malaysia is expected to treble by 2040, reaching 106,249, with an estimated cost of USD 796,867,500 (Bujang et al. 2017). It is also anticipated in England that the economic cost of CKD would be over €11.4 billion in 2025. (Nguyen et al. 2018) Thus, it is critical to establish interventions to minimise the number of new CKD and ESKD patients.

In Malaysia, DM was found as the most cause of CKD ("24th Report of the Malaysian Dialysis & Transplant 2016" 2016)(Salman et al. 2015) and it took 14 years for Malaysian diabetic patient to progress from DM to ESKD (Y. P. Ng et al. 2018). Unfortunately, the knowledge regarding CKD and its complication was still poor among the population and high-risk patient in Malaysia (Yusoff, Yusof, and Cheng Kueh 2016) (C. Y. Ng, Lee, and Goh 2016). Poor CKD knowledge were also seen in USA, Northern Tanzania, Iran and Australia (Alvis Zibran et al. 2018).

Despite poor knowledge of CKD, there is conflicting data on attitude and practice of CKD. Poor knowledge and good attitude found in Malaysia and Northern Tanzania. However, there was good knowledge and good attitude seen in Jordan. On the contrary, there was poor knowledge and attitude of CKD seen in Iran and Indiana, USA. Good practice of CKD was seen in Malaysia, which defer from study in Northern Tanzania and Jordan which found poor practice. (Zibran Mohammed Alvis et al. 2018)

Therefore, effort to increase education regarding CKD towards high-risk population is important and had been proposed by many literature (Noorkhairina et al. 2018) (Zimbudzi et al. 2019) (Saminathan et al. 2020)(Bikbov et al. 2020).

The health belief model (HBM) is a behavioural science hypothesis that states that individuals take action to avert, screen for, or control an illness if they believe they are susceptible to the situation, believe the situation has potentially profound consequences, and believe that a course of action available to them would be beneficial in reducing either their susceptibility or severity (Rosenstock, Strecher, and Becker 1988). Health education based on HBM had been proven repetitively in improving diabetic patient self-care behaviours (Sharifirad et al. 2009) (Solhi et al. 2014)(Ahmad et al. 2014) (Shabibi et al. 2017). However, it had not been tested to improve the knowledge, attitude and practice of diabetic patient towards CKD. Using HBM as a guide, CKD education was developed in hoping to improve the diabetic education and their understanding of CKD.

Based on HBM, if diabetic patient belief that they are susceptible to develop CKD and understand that CKD is a serious consequence, they will believe that a course of action available to them would be beneficial in reducing either their susceptibility to, or the severity of CKD. Therefore, a better knowledge regarding the disease will

change the attitude and furthermore change the behaviour towards the disease. Educating regarding CKD is crucial to high-risk patient especially T2DM patient and can influence the disease progression. Thus, this study was done to assess the effectiveness of CKD education based on HBM towards KAP and HbA1c amongst uncontrolled diabetic patient.

3.5 Objectives

3.5.1 General objective

To assess the effectiveness of CKD education on knowledge, attitude and practice among uncontrolled diabetic patients attending outpatient clinic in Hospital, USM

3.5.2 Specific objectives

1. To compare the mean difference of knowledge score on CKD among uncontrolled diabetic patients at baseline, 2 weeks and 12 weeks post intervention between intervention and control groups
2. To compare the mean difference of attitude score on CKD among uncontrolled diabetic patients at baseline, 2 weeks and 12 weeks post intervention between intervention and control groups
3. To compare the mean difference of practice score on CKD among uncontrolled diabetic patients at baseline, 2 weeks and 12 weeks post intervention between intervention and control groups

4. To compare the mean difference of HbA1c among uncontrolled diabetic patients at baseline and 12 weeks post intervention between intervention and control groups

3.6 Methodology

This was a randomised control trial conducted among uncontrolled diabetic patient in outpatient clinic, HUSM. The clinic acts as a tertiary referral center from the surrounding health centers, district hospitals, private hospital and general practitioners. 136 patients were recruited. The study was approved by the research and ethics committee of USM/JEPeM/19080484.

Data was collected using a self-administered validated questionnaires for those who fulfilled the inclusion and exclusion criteria. The KAP of CKD questionnaire was adapted from a questionnaire from research: Management of Type 2 Diabetes and CKD in Fiji in 2018: KAP of Patients (Alvis Zibran and Mohammadnezhad 2019) which had high reliability scores (Cronbach's alphas for knowledge, attitude, and practice were 0.87, 0.73, and 0.78, respectively)

The questionnaire was translated to Malay language by the researcher and content validity was done by 3 expert which is 2 investigator's supervisor and 1 medical specialist in CKD unit to decide whether the content met the objectives of the study or not. Face validity was done to 30 subjects (15 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 reliability of the questionnaire, internal consistency was assessed using Cronbach's alpha. Cronbach's alpha for factor KAP were 0.833, 0.722, and 0.728 respectively.

The questionnaires were divided into two sections. The first section was on subjects' socio-demographics data and the second section was KAP questionnaires. Categorical responses (yes, no and don't know) was applied for the knowledge items. For attitude items, three likert scale (agree/disagree/neutral) was used and categorical (yes/no) was applied for the practice items. There were 17 questions for the knowledge items, 16 questions for the attitude items and 14 questions for the practice items

The patient was screened using the computer-based hospital record to review their results for HbA1c and eGFR result. 147 patients were screened initially for eligibility to study and 136 patients agreed to participate. Randomisation was done by using computer generated sequence, 136 patients were randomised to either intervention or control group. After randomisation, participant from both intervention and control group were asked to respond to a set of questionnaires asking about their demographic characteristic and KAP regarding CKD. 15 minutes was used to complete this self-administered questionnaire. The records were kept confidential and secured.

For intervention group, they were given, 20 minutes of narrated power point CKD education based on HBM after one week of randomization. The intervention was done in a group seminar consist of 3 subjects per session. As this research was done during the Movement Control Order during Covid 19 pandemic, only 3 participants were used per session to abide the gathering restriction. 3 participants were used to increase their concentration and understanding during the intervention. During the intervention, investigator was presence during the CKD education.

CKD education was developed by the researcher and was validated by two family medicine specialist who supervised the research. According to HBM, knowledge regarding CKD was divided into perceived severity, perceived susceptibility, perceived benefit, perceived barrier and cue to action.

In perceived severity: participants were educated regarding function of kidney, sign and symptom of CKD, sign and symptom of ESKD and management of CKD including renal replacement therapy such as haemodialysis and peritoneal dialysis. Perceived susceptibility: Risk factor of CKD such as diabetes, hypertension and methods to detect CKD were taught to participants. Perceived benefit: Treatment of CKD in diabetic patient such as used of ACEi and general measures in management of CKD such as adherence to medication and healthy life style was taught. Perceived barrier: What is the barrier that patient could be facing to stop CKD progression such as inability to adhere to medication, monitoring blood glucose and attending clinic for blood monitoring. Cue to action: the CKD education is the patient cue to action to change their diabetes management

After the intervention, 10 minutes of question-and-answer session was done to enhance their knowledge.

Meanwhile, for the control group, after participant fill the CKD KAP questionnaire, participant will see their respective physician without given CKD education. Participants were given a phone call interview for posttest and 12 weeks follow up after the intervention to reassess their KAP regarding CKD using similar questionnaire. Pamphlet regarding CKD and CKD educational were given to the control group at the 12 weeks follow up to increase their understanding regarding the

disease. Blood for HbA1c were collected after 12 weeks of intervention. The flow of study was included in Figure 1

Data was entered and analyzed by using SPSS version 26.0. Categorical variables were expressed by the frequencies and percentage. The outcome (dependent) variable is in numerical. All of the questions were analysed and assessed individually using a scoring system. Each of the appropriate answer was given a point and was totalled for each section of KAP. Total mean of each component KAP was calculated at the end. Repeated measure ANOVA was used to compare changes in outcomes across time. The time-by-group interaction effect (between-subject factor) and pair wise comparison was used to assessed differences in outcome changes. Post hoc test (Bonferroni) was used to evaluate between the group's differences in outcome measures. All analysis used a 95% confidence interval (CI), and p-value of less than 0.05 was judged to be statistically significant.

3.7 Results

136 participants were randomly allocated equally to 68 participants for both the intervention and control group. During the intervention, only 64 participants in intervention group and 59 participants in control group had completed the KAP intervention. The response rate for this research were 94.1% for intervention group and 86.6% for control group. 4 participants from the intervention and 9 participants from the control group were unable to analysed as they were unable to be contacted during the post intervention phone called interview follow up.

Baseline characteristic were similar between study arms. Most participants in both the group are those age more than 60 years old and they were equally same in

man and woman. Most of the participant were Malay (90%) and married (81%) for both groups. There were no differences in age, sex and gender comparing patients who enrolled in the intervention versus those in the control group. Most of the participant are either unemployed (42%) or pensioner (35%) and had completed secondary school (60%). More than 50% of the participant are in the Malaysia B40 group who earned less than RM2500 per months. More than (30%) of them had HbA1c more than 10.0% and were at stage 2 of CKD with eGFR of 60 – 90 (ml/min/1.73m^2). Other demographic data are documented in Table 1

Mean and standard deviation of CKD knowledge, attitude and practice for intervention group before the CKD educational were 27.3 ± 4.63, 23.89 ± 3.52, and 9.73 ± 2.18 had increased to 28.04 ±2.75, 24.14 ± 3.10 and 10.34 ± 1.70 after 2 weeks and 28.54 ± 3.67, 25.07 ± 3.24 and 10.30 ± 1.89 after 12 weeks of the intervention. The mean difference of each knowledge, attitude and practice score between intervention and control group was 1.18 (95% CI 0.07,2.28, $p<0.05$), 0.10 (95% CI: -0.817,1.025, $p=0.82$) and 0.76 (95% CI: 0.227,1.289, $p<0.001$) respectively. The interaction between group and time of mean difference in knowledge and practice score was found significant. However, there was no significant difference mean in attitude score. Refer to Table 2.

In view of Movement Control Order during the intervention, only 18 participants from intervention and 18 participants from control group came for the second HbA1c, 12 weeks post intervention with only 26.4% response rate. The baseline HbA1c for intervention group and control group was 9.21 and 10.03 respectively. Meanwhile HbA1c 12 weeks post intervention for each group was 9.32

and 9.16. There was no significance interaction between group and time of HbA1c between intervention and control group. Refer to Table 3.

3.8 Discussion

In this study for patient with uncontrolled T2DM, a 20 minutes CKD education using narrated power point was developed and examined for its effects of increasing KAP regarding CKD. Levels of KAP and HbA1c were evaluated as outcomes variables. Level of knowledge and practice about CKD was significantly improved in the intervention group compared to the control group. The intervention group reported continuous increases of knowledge and practice from pre-test to 2 weeks post-test and to the 2nd post-test, 12 weeks after the intervention.

A 20 minutes PowerPoint presentation education was almost similarly done by research in Australia which focus on culturally and linguistically diverse group. In this study, 20 minutes of PowerPoint presentation with a fortnightly telephone motivational interviewing for 12 weeks was used to increase medication self-management based on HBM (Williams, Allison, et al. 2012). Even though in this pilot research had shown that it is not feasible to do research in culturally and linguistically diverse group, the intervention group considered the intervention to be enjoyable, satisfying, and useful in maintaining their health. Furthermore, this method also was proven to increase medication adherence and blood pressure reduction of patients with T2DM who had CKD and hypertension.(Williams, Manias, et al. 2012). A small group of three participants was used in this study to improve participant understanding. Using a small group of 2 to 3 participant in an individualized and face to face self-management program was proven to increase the level of knowledge in CKD patient

(Choi and Lee 2012). This method was found to be more efficient and cost effectives compare for lengthy health education.

This study was done mainly in elderly who age more than 60 years old. This findings reflects on the mean age of patient with T2DM found in Malaysia which was 63 years old. 30 % of diabetic patients recorded in the Malaysia Diabetic Registry in 2013-2017 consist of patients who aged more than 60 years old (Ministry of Health Malaysia (MOH) 2020). These percentage of age group in Malaysia was more compare to world estimated prevalence of T2DM patients who aged more than 60 years old which estimated at 18 to 20% (International Diabetes Federation 2019).

In this study, the participant mean knowledge score was 27 out of 34 total knowledge score point. Based on research by Alvis Zibran et al, scoring of 15 out of 30 was said to have good knowledge (Alvis Zibran and Mohammadnezhad 2019). This show that participant in this study have good knowledge regarding CKD. In the current study, participant was chosen from those who attended outpatient clinic in a public university hospital. Patients that attend outpatient clinic in a public university may have more exposure regarding CKD compare to others which might explained the good knowledge among participant in this study.

Despite there is significant increase in mean of knowledge in this study, however the mean difference was only 1.18. Results from this study must be interpreted with cautious. Study in older adult aged 60 years and above in Malaysia had shown that increasing metabolic risk factors was associated with reduced cognitive function (Foong et al. 2018). Since, most of the participant in this study was elderly with comorbidity, this explains the small increment in mean of knowledge in this study. Cognitive function was not tested in this study which may impacted the study

result. In future study, research could made among elderly should include testing regarding their cognitive status.

HBM had been proven to increase knowledge and practice by this study. Since there is limited research that used HBM in improving KAP in CKD, comparison between study cannot be done. Result from this study supports the study by Khorsandi et al that educational based on HBM had improve in health belief, awareness and practice regarding hypertension among elderly population in Iran (Khorsandi, Fekrizadeh, and Roozbahani 2017). In this quasi-experimental study of 100 hypertensive elderly showed that HBM had been recommended to enhance health belief regarding hypertension and self-care behaviours in the elderly. The current study also supported that diabetic education based on theory can improved KAP towards oral health in elderly diabetes patient (Saengtipbovorn and Taneepanichskul 2015). In the beforementioned study, a collaboration of dentist and doctor in health education in promoting oral health and its complication in diabetic patient had improved the overall KAP towards diabetes and oral health. Furthermore, according to a systematic review of HBM in diabetic patient shown the HBM-based interventions have been found to be successful in treating and preventing diabetes (Sadeghi, Hesary, and Khanjani 2020). In the nutshell, HBM could be also used to improve CKD care in diabetic patients.

However, this study had a non-significant increase in attitude score between intervention and control group. The mean attitude score was high in both intervention and control group. Therefore, it could be concluded that participant in this study already had a good attitude in CKD. This supports the earlier research that noted