Med & Health Dec 2019; 14(2): 219-234 https://doi.org/10.17576/MH.2019.1402.20

ORIGINAL ARTICLE

The Use of Complementary and Alternative Medicine among Malaysian Chronic Kidney Disease Patients

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ABSTRAK

Ramai di kalangan pesakit ginjal kronik yang telah mengambil rawatan sampingan dan juga alternatif. Tujuan kajian ini dijalankan adalah untuk mengkaji kekerapan penggunaan rawatan ini dan hubungannya dengan perkembangan kerosakan penyakit ginjal kronik. Kajian ini dilakukan kepada pesakit-pesakit ginjal kronik di Pusat Perubatan Universiti Kebangsaan Malaysia. Data dikumpul dengan menggunakan kaedah soal-selidik yang mengkaji demografi, jenis dan corak rawatan sampingan dan alternatif. Latar belakang pesakit dan nilai serum kreatinin dikumpul daripada nota pesakit untuk mengkaji hubungkait penggunaan rawatan ini dengan kegagalan ginjal kronik. Ujian- ujian statistik yang digunakan termasuklah Chi-Square, Sampel-T, Mann-Whitney U dan regresi logistik. Sejumlah tiga ratus tujuh puluh dua pesakit telah mengambil bahagian di dalam kajian ini. Kekerapan pengunaan rawatan sampingan dan alternatif adalah 29% untuk tahun sebelumnya. Pesakit muda yang mempunyai tahap pendidikan yang tinggi dan pendapatan yang lebih adalah lebih cenderung untuk menggunakan rawatan sampingan dan alternatif. Produk semulajadi adalah rawatan yang paling kerap digunakan (86.1%). Kepercayaan kepada keberkesanan rawatan sampingan dan alternatif menjadi penyebab utama pengambilan dan kira-kira 57.8% pesakit memberitahu hal ini kepada doktor mereka. Kami dapati bahawa penggunaan rawatan sampingan dan alternatif oleh pesakit kegagalan ginjal kronik di Malaysia tidak mempengaruhi perkembangan penyakit ini.

Kata kunci: alternatif, herba, makanan tambahan, penyakit ginjal kronik, sampingan

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ABSTRACT

Many of our chronic kidney disease (CKD) patients venture into complementary and alternative medicine (CAM) to seek a cure for the disease beyond conventional management. The objective of this study was to determine the prevalence and pattern of CAM usage; and its association with the progression of CKD in our population. This was a cross-sectional survey recruited CKD patients from Universiti Kebangsaan Malaysia Medical Centre (UKMMC). Data was collected via interview using questionnaires which explore the demographics, type and pattern of CAM use. Patients' comorbidities and serum creatinine were extracted from the medical notes to assess the association between progression of CKD and usage of CAM. Chi-square, Independent Samples t-test, Mann-Whitney *U* test and logistic regression were used to evaluate for an association. Three hundred and seventy two eligible patients were recruited. The prevalence of CAM use was 29% in the past year. Younger age, higher education and higher income level were associated with significantly more usage of CAM. Natural products were the commonest type of CAM used (86.1%). The belief in the effectiveness of CAM was the main reason for its uptake and about 57.8% revealed their practice to their physician. We found that the use of CAM in Malaysian CKD patients did not influence the progression of the disease.

Keywords: alternative, complementary, chronic kidney disease, dietary supplements, herbs

INTRODUCTION

Chronic kidney disease (CKD) is defined based on its duration and the estimated glomerular filtration rate (eGFR) (Levin et al. 2013). Worldwide, CKD has a prevalence of around 10.6%, and in Malaysia, the prevalence of CKD was 9.07% (Hill et al. 2016; Hooi et al. 2013). The most common causes of CKD are diabetes mellitus, and hypertension and the treatment strategy is aimed at slowing the progression of the disease through controlling the risk factors associated with the disease.

The non-curative nature of the management has pushed patients with CKD to venture into alternative therapies to seek a cure for the disease beyond conventional management. Complementary and alternative medicine (CAM) has been the popular choice among patients with chronic illness as found in multiple studies worldwide (Akyol et al. 2011; Molassiotis et al. 2005). The prevalence of usage of CAM varies between 10% to 40% in European countries and is up to 60% in the USA (Molassiotis et al. 2005; Barnes et al. 2004). In Malaysia, there is a high prevalence of CAM usage in the community based on the study done in 1999, and one study

found about 64% of chronic illness patients were using CAM regularly (Siti et al. 2009; Hasan et al. 2009).

There is no single definition to describe CAM due to its vastness and heterogenicity, but it is best defined as practices that include therapeutic and diagnostic discipline that is outside of the conventional management that is provided to the community (Zollman & Vickers 1999). The utilisation of this practice can be influenced by the health belief system, local culture, tradition and ethnicity. Patients took CAM due to many reasons including to increase the body's ability to fight and prevent diseases, to improve physical and emotional well-being, and to supplement conventional medication (Tangkiatkumjai et al. 2013).

The prevalence of CAM usage in CKD patients ranging from 24% to 64% (Akyol et al. 2011; Tangkiatkumjai et al. 2013; Osman et al. 2015). The use of herbs containing aristochalic acid was found to contribute to the development of end stage renal disease (ESRD) in Balkan nephropathy and a study in Taiwan has shown nearly 10% incidence of end-stage renal disease (ESRD) due to Chinese herb nephropathy (Pavlovi 2013; Wu et al. 2012). CAM use was also thought to adversely affect the compliance to conventional medication and patients' hesitancy to disclose their CAM practice may also affect their overall management of CKD.

As there was no local data, the primary objective of this study was to determine the prevalence of CAM usage in Malaysian CKD patients. We also explored the type of CAM, demographic factors related to CAM usage, reasons why CKD patients use CAM and any association of progression of CKD with CAM usage.

MATERIALS AND METHODS

Study Design and Population

This was a cross-sectional study conducted from June 2018 to October 2018 in the nephrology clinic in Universiti Kebangsaan Malaysia Medical Centre (UKMMC), Kuala Lumpur. Patients older than 18 years with eGFR below 60 ml/min/1.73m^2 (CKD Stage 3-5), who had been under the clinic follow up for at least one year and agreed to participate in this study were recruited. We excluded patients on renal replacement therapy and patients who had difficulty answering questions due to language, comprehension and recalling issue.

Patient were selected using systematic random sampling and based on the study done by Osman et al. where 64% of predialysis patient were using CAM, the calculated sample size required for the study was 355 patients with confidence interval of 95% (Osman et al. 2015).

Instrument

The data was collected using structured questionnaire adapted from a study done by Baharom et al. on prevalence of CAM usage in diabetic population through face to face interview (Baharom et al. 2016). The validated questionnaire was used with permission. A pamphlet with various

examples of different categories of CAM was used to remind the respondents about CAM modalities that they might have used in the past twelve months.

The survey consisted of a total of 18 questions, including demographic questions, the usage of CAM modalities and its purposes, the reason of usage and source of influence, disclosure of CAM practice to doctors and the reason of terminating CAM usage, if the patient has stopped using them during the past twelve months.

CAM usage was recorded if the respondent has used it regularly (more than once) for at least one month over the past twelve months preceding the survey. CAM usage was divided into three groups; CAM use for CKD (CAM-CKD), referred to respondents who used at least one CAM modality which they believed will help with their CKD. CAM use for general health (CAM-G) referred to respondents who used CAM for general health or other illness but not CKD, and non-CAM user referred to respondent who did not use any CAM modalities in the past twelve months from the interview date.

Classification of CAM categories in the study was based on the National Centre for Complementary and Integrative Health (NCCIH) which grouped CAM into the following: (1) natural products (botanical, herbs or dietary supplement (HDS)); (2) mind-body practices (meditation, Yoga, breathing exercise); (3) other complementary health practices (traditional healer, Ayurveda, homeopathy) (NCCIH 2019). Dietary supplements which are prescribed by doctors, i.e. vitamins were excluded from the study definition of CAM.

The patient records were also reviewed to register other comorbidities, latest blood pressure, blood and urine investigations. eGFR is calculated using the CKD-epidemiology (CKD-EPI) creatinine equation. The decline of eGFR over the past twelve months was calculated using a slope of the best fit of linear regression between eGFR and the time period, and at least three values of eGFR were calculated. The drop of eGFR of at least 5 mL/min per 1.73 m^2/year was considered as rapid progression (Levin et al. 2013).

Statistics

Data analysis consisted of simple frequencies with percentages which were used to describe the prevalence of CAM usage along with other descriptive results. Chi-square, Independent Samples t-test, Mann-Whitney U test and logsitic regression were performed to evaluate the factors related to CAM use and any associations between CAM use and progression of the disease. Statistical analyses were performed using Statistical Package for Social Science (SPSS) version 23.0; p-value <0.05 was accepted as statistically significant.

RESULTS

Demographic Characteristics of Respondents

A total of 372 eligible respondents with a median age of 68 (Interquartile range

Table 1: Comparison of sociodemographic characteristics between CAM users and CAM non-users

Characteristics	No. of patients (%)	CAM user N (%)	CAM non-user N (%)	p-value
Age (year)				
< 65	134 (36)	50 (37.3)	84 (62.7)	0.011*
≥ 65	238 (64)	59 (24.8)	179 (75.2)	
Gender				
Male	219 (58.9)	72 (32.9)	147 (67.1)	0.070*
Female	153 (41.1)	37 (24.2)	116 (75.8)	
Ethnicity				
Malay	207 (55.6)	67 (32.4)	140 (67.6)	0.407**
Chinese	140 (37.6)	35 (25)	105 (75)	
Indian	24 (6.5)	7 (29.2)	17 (70.8)	
Others	1 (0.3)	0 (0)	1 (100)	
Marital status				
Married	298 (80.1)	91 (30.5)	207 (69.5)	0.726**
Single	22 (5.9)	6 (27.3)	16 (72.7)	
Divorce	5 (1.3)	1 (20)	4 (80)	
Widow	47 (12.6)	11 (23.4)	36 (76.6)	
Education level				
No formal education	27 (7.3)	1 (3.7)	26 (96.3)	0.002*
Primary education	98 (26.3)	26 (26.5)	72 (73.5)	
Secondary education	166 (44.6)	48 (28.9)	118 (71.1)	
Tertiary education	81 (21.8)	34 (42)	47(58)	
Employment status				
Full time	63 (16.9)	20 (31.7)	43 (68.3)	0.286**
Part-time	5 (1.3)	0 (0)	5 (100)	
Not working	121 (32.5)	34 (28.1)	87 (71.9)	
Retired	183 (49.2)	55 (30.1)	128 (69.9)	
Personal monthly income				
< RM1000	206 (55.4)	47 (22.8)	159 (77.2)	0.005*
RM1000-RM3000	92 (24.7)	29 (31.5)	63 (68.5)	
RM3000-RM5000	40 (10.8)	18 (45)	22 (55)	
> RM5000	34 (9.1)	15 (44.1)	19 (55.9)	
Monthly household income,				
Low income group (<RM1000)	227 (61)	55 (24.2)	172 (75.8)	0.002*
Middle income group (RM1000-RM5000)	79 (21.2)	23 (29.1)	56 (70.9)	
High income group (>RM5000)	66(17.7)	31(47)	35(53)	

* Pearson Chi-Square
** Likelihood Ratio

Table 2: Demographic characteristics of study population by CAM usage

Characteristics	CAM user (n=109)	CAM non-user (n=263)	p-value
Creatinine (µmol/L)	196 (147-275)	192 (149-293)	0.898
eGFR (mL/min/1.72m^2)	27 (17-39)	26 (15-35)	0.548
Diabetes (n, %)	68 (62.4)	177 (67.3)	0.363
HbA1c (%) †	7.5 (6.6-8.9)	6.9 (6.2-7.9)	0.002*
Hypertension (n, %) ‡	106 (97.2)	244 (92.8)	0.096
Systolic blood pressure, mmHg	148 ± 23	145 ± 22	0.248
Urine PCI (g/mmol creatinine)	0.13 (0.04-0.29)	0.10 (0.40-0.31)	0.638

‡ Hypertension was defined as either from doctor's diagnosis or receiving antihypertensive agents
† HbA1c level is among the diabetic population (n=245)

(IQR) 60-75 years) were recruited in this study. The sociodemographic and data of the respondents are presented in Table 1. The other characteristics including renal function, blood and urine investigations are presented in Table 2 .

Twenty-nine percent of patients (*n*=109) claimed that they used CAM regularly in the past year. A further 13% of respondents admitted to using CAM in their lifetime but have stopped in more than one year preceding the study. About 34% of CAM users reported using multiple types of CAM therapies. The factors that were found to be significantly associated with CAM usage are age, education and income level. Other comparisons found no difference between group (Table 1).

Simple logistic regression analysis shows that younger patients and patients with higher education were more likely to use CAM compared to patients with lower education (Odds ratio (OR) 1.80, 95% confidence interval (CI) 1.09-2.98). Higher income was also associated with higher usage of CAM. Further multivariate logistic regression revealed only education level to be significantly associated with CAM use (Table 3).

Complementary and Alternative Medicine Use

There were 201 different CAM practices found in the study population. The most common type of CAM was natural products (81.6%), followed by mind-body practices (10.9%) and about 7.5% of other complementary health practices. Only 32% of the respondent reported using CAM to improve their CKD (CAM-CKD) and the majority used it for general health and other illness (CAM-G). Among the natural products, more than half (68%) were herbal medicine. Table 4 shows the different types of HDS that have been used in the study population. Cupping (4%) and the use of 'alkaline water' (5%) were the commonest mind-body practice and other complementary health practice used, respectively (Table 5).

The belief in the effectiveness of CAM practice was the main reason

Table 3: Simple and multivariate logistic regression analysis of the sociodemographic factors related to the use of CAM

Variables	Simple logistic regression		Multivariate logistic regression	
	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age (year)				
< 65	1.81 (1.14-2.85)	0.011	1.25 (0.74-2.10)	0.406
≥ 65	1.00		1.00	
Education level				
No formal education	1.00		1.00	
Primary education	9.39 (1.21-72.72)	0.032	8.88 (1.14-69.16)	0.037
Secondary education	10.58 (1.40-80.15)	0.022	8.40 (1.09-64.98)	0.042
Tertiary education	18.81 (2.43-145.44)	0.005	9.69 (1.15-81.40)	0.037
Monthly personal income				
< RM1000	1.00		1.00	
RM1000-RM3000	1.56 (0.90-2.69)	0.113	1.27 (0.70-2.30)	0.428
RM3000-RM5000	2.77 (1.37-5.59)	0.005	1.56 (0.63-3.87)	0.342
> RM5000	2.67 (1.26-5.66)	0.010	0.89 (0.28-2.85)	0.848
Monthly household income				
Low-income group (<RM1000)	1.00		1.00	
Middle income group (RM1000-RM5000)	1.28 (0.73- 2.28)	0.392	1.09 (0.57-2.10)	0.790
High income group (>RM5000)	2.77 (1.57-4.90)	<0.001	2.26 (0.95-5.38)	0.066

for CAM usage and family and friends were the main source of influence (Table 6). A significant number disclosed their CAM practice to their doctors (57.8%), and thirty-four CAM users had discontinued their practices. The commonest reason for stopping the practice was advice from health practitioner (Figure 1).

Comorbidities and Progression of CKD

In this study, 65.9% were diabetics, 94.1% were diagnosed as having hypertension or receiving antihypertensive agent, 81% had dyslipidaemia and 39.8% suffered from cardiovascular disease. We found 28.8% of the respondents had rapid progression of CKD with a reduction of eGFR more than 5 mL/min per 1.73 m^2/year. The median eGFR change was -2.1 (IQR-5.6-1.5 mL/min per 1.73 m^2/year). The median systolic blood pressure (SBP) was 146 (IQR 131-160 mmHg), mean diastolic blood pressure (DBP) was 74.6±13.1 mmHg, median Haemoglobin A1c (HbA1c) in the diabetic population was 7.0 (IQR 6.2-8.1%) and median low-density lipoprotein (LDL) of 2.67 (IQR 2.04-3.35 mmol/L).

Table 7 shows the relationship between the progression of the CKD and the demographic, risk factors and

Table 4: Natural products; herbal therapies and dietary supplements (HDS) (n=164)

Types of herbal therapies	n = 113 (%)
Mixed botanical extract (Jus Pamoga, Jus Viasia, Jus Walit, Jus Sunnah, Jus Nusantara, Vivix)	13 (11.5)
Coffee/Tea with herbal extract (TripleT herbal tea, Min Kaffe, CellMaxx)	9 (8.0)
Traditional Chinese herbs	9 (8.0)
Celery (Apium graveolens)	7 (6.2)
Honey	7 (6.2)
Commercialised mixed herbal supplement (Alfa-Max, Stem cell)	6 (5.3)
Ginger	6 (5.3)
Habbatus Sauda (Nigella Sativa)	6 (5.3)
Garlic	5 (4.4)
Unknown herbal medicine	4 (3.5)
Deer Placenta	3 (2.7)
Ginseng	3 (2.7)
Peria (Momordicacharantia)	3 (2.7)
Bird's nest	2 (1.8)
Lemon (with other herbal preparation)	2 (1.8)
Okra (A. esculentus)	2 (1.8)
Pineapple (in mixture with herbal ingredients)	2 (1.8)
Pomegranate	2 (1.8)
Sky fruit (Swietenia macrophylla)	2 (1.8)
Apple cider	1 (0.9)
Candlenut (Aleurites moluccana)	1 (0.9)
Chinese dates	1 (0.9)
Chinese tuja (Platycladus orientalis)	1 (0.9)
Curry leaves (Muraya koenigii)	1 (0.9)
Seashore Lily (Crinum asiaticum L.)	1 (0.9)
Evening primrose (Oenothera biennis)	1 (0.9)
Fig vinegar	1 (0.9)
Agarwood (Aquilara malaccensis)	1 (0.9)
Green apple (in mixture with Chinese celery)	1 (0.9)
Green tea	1 (0.9)
Indian herbs	1 (0.9)
Gum Arab	1 (0.9)
Jamu (Traditional Indonesian herbal preparation)	1 (0.9)
God's crown/Mahkota Dewa (Phaleria macocarpa)	1 (0.9)
Mulberry	1 (0.9)
Papaya leaf	1 (0.9)
Pennywort/Pegaga (Centella asiatica)	1 (0.9)
Radish	1 (0.9)
Spirulina	1 (0.9)

Types of dietary supplements	n = 51 (%)
Fish Oil	19 (37.3)
Vitamin and mineral supplement	19 (37.3)
Milk supplement	4 (7.8)
Olive oil	3 (5.9)
Collagen supplement	2 (3.9)
Essence of chicken	2 (3.9)
Oats BG25	1 (2.0)
Propolis	1 (2.0)

Table 5: Three most popular mind-body practice and other CAM practices

No	Mind-body practices	n = 22 (%)
1	Cupping (Bekam)	8 (36.4)
2	Acupuncture	5 (22.7)
3	Tai Chi	2 (9.1)
No	**Other CAM practices**	**n = 15 (%)**
1	Alkaline water	5 (33.3)
2	Ayurveda	2 (13.3)
3	Ceragem	2 (13.3)

Table 6: Reasons for CAM use and source of information (n=109)

	Frequency	Percentage
Reasons (n=167) †		
I believe in the effectiveness of CAM products/practices	47	28.1
Someone I know also uses/ practice this CAM	41	24.6
I need additional treatment to help manage my CKD/ other ailment / general health	33	19.8
CAM products/practice are easily available	19	11.4
This practice is according to my culture and tradition	13	7.8
CAM products/practice are affordable	7	4.2
Medication from the clinic are not as effective as I hoped far	4	2.4
I get harmful side effect from the medication prescribed from clinic	3	1.8
Source of information (n=162) †		
Family members (including extended family)	48	29.6
Friends	43	26.5
Internet	21	13
Healthcare professional (Doctors/Medical Assistant /Nurses)	15	9.3
CAM practitioners and product seller	14	8.6
Newspaper and magazine advertisement	11	6.8
Radio and television advertisement	10	6.2

† Responded reported more than one reason and more than one source of information, so these total more than 109

Table 7: CKD progression relationship with demographics, risk factors and CAM usage.

Demographics, risk factors, CAM usage	CKD Progression		p-value	Odds ratio (95% Confidence interval)
	Rapid progression	Slow progression		
Age (years), n (%)				
< 65	42 (31.3)	92 (68.7)	0.409**	
≥ 65	65 (27.3)	173 (72.7)		
Sex, n (%)				
Male	57 (26)	162 (74)	0.163**	
Female	50 (32.7)	103 (67.3)		
Systolic Blood Pressure, mmHg, median (IQR)	146 (130-161)	147 (131-160)	0.821*	
Blood pressure, n (%) †				
Controlled	31 (30.4)	71 (69.6)	0.670**	
Uncontrolled	76 (28.1)	194 (71.9)		
HbA1c level, %, median (IQR)§	7.2 (6.2-8.6)	7.0 (6.3-8.0)	0.512*	
HbA1c (n = 245) §				
HbA1c ≤ 7 %	34 (27.2)	91 (72.8)	0.365**	
HbA1c > 7 %	39 (32.5)	81 (67.5)		
Urine Protein Creatinine Index (PCI), g/mmol creatinine, median (IQR)	0.24 (0.05-0.58)	0.09 (0.03-0.23)	<0.001*	
Heavy proteinuria, n (%) ‡				
No	31 (18.2)	139 (81.8)	<0.001**	1.00
Yes	76 (37.6)	126(62.4)		2.71 (1.67-4.38)
CAM Usage, n (%)				
CAM User				1.18 (0.73-1.92)
HDS	31 (31.6)	67 (68.4)	0.765**	
Other CAM	3 (27.3)	8 (72.7)		
Non-CAM User	73 (27.8)	190 (72.2)		1.00

† Controlled blood pressure is defined as SBP >130mmHg in patient with diabetes, SBP>140mmHg in patient without diabetes with urine protein <1g/day, SBP>130mmHg in patient without diabetes with urine protein of >1g/day.
§ HbA1c level is among the diabetic population (n = 245)
‡ Heavy proteinuria is defined as Urine PCI of ≥ 0.10 g/mmol creatinine
* Mann-Whitney U test
** Pearson Chi-Square test

CAM usage. Only gross proteinuria showed an association with progression of CKD (X^2 = 16.94 p=<0.001). The difference between the percentage of rapid progressor in CAM user group compared to the non-CAM user was not significantly different (X^2 = 0.44 p=0.505) suggesting no association between CAM usage and progression of CKD. Although there was a

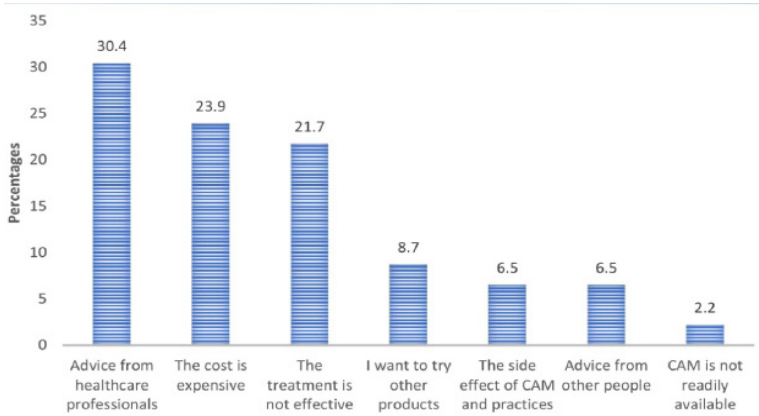

Figure 1: Reasons for CAM discontinuation

significant difference between HbA1c level between CAM user and non-CAM user, there was no association found between CAM usage and progression of CKD in the diabetic population ($X^2 = 0.294$ p=0.588).

Multiple logistic regression analysis performed to determine the strongest predictors of rapid progression of CKD showed that only heavy proteinuria was significantly related to progression of CKD (OR 2.77 95% CI 1.70-4.53) (Table 8).

DISCUSSION

The prevalence of CAM usage in this study (29.3%) was lower than similar pre-dialysis CKD population in Thailand (45%) and Egypt (64%) but higher compared to the prevalence found in Turkey (25%) (Akyol et al.

Table 8: Multiple logistic regression analysis of CKD risk factors in relation to rapid progression of disease

Risk factors (including CAM usage)	Wald	Adjusted Odds Ratio	95% Confidence Interval	p-value
Blood pressure				
Controlled		1.00		
Uncontrolled	1.335	0.736	0.44-1.24	0.250
HbA1c				
HbA1c ≤ 7%		1.00		
HbA1c > 7%	0.616	1.22	0.75-1.99	0.433
Heavy proteinuria				
No		1.00		
Yes	16.502	2.77	1.70-4.53	<0.001
CAM User				
No		1.00		
Yes	0.124	1.09	0.66-1.81	0.725

2011; Tangkiatkumjai et al. 2013; Osman et al. 2015). This prevalence was also considerably low compared to the general population usage of CAM (55.6%) in Malaysia and the usage of CAM in Malaysian patients with other chronic diseases (Siti et al. 2009; Hasan et al. 2009; Baharom et al. 2016; Remli & Chan 2003). However, a comparable prevalence (25.9%) was noted in the population with cardiovascular risk factor in Pahang (Kew et al. 2015). This difference could be explained by the different definition of CAM usage and different geographical area hence socioeconomic status between these studies. It may also be due to current public awareness as there has been much advice on media regarding the risk of kidney problem with CAM use.

In our study, there were significant differences, which were found between CAM usage and age, educational background and income level. Educational background and income level were also found to be the main factors contributing to CAM usage in other similar studies (Akyol et al. 2011; Osman et al. 2015; Kleshinski et al. 2003). Our study revealed that patients with higher education were more likely to use CAM, and a similar trend was found in studies done in Turkey and the USA (Akyol et al. 2011; Kleshinski et al. 2003). Higher income was also associated with higher usage of CAM in general Malaysian population (Aziz & Tey 2009). Patients with higher education may have secured better employment which may provide extra financial means to spend on alternative therapies. Although our study showed that age was associated with usage of CAM, such association was not consistently found in all studies involving patients with CKD except in a study of CAM usage in patients with cardiovascular risk factors, where elderly patients were more likely to use CAM compared to their younger counterparts (Kleshinski et al. 2003).

The usage of CAM to treat kidney disease (CAM-CKD) was found to be low in our study (32%), and this finding was also found in a study done in Thailand (Tangkiatkumjai et al. 2013), Majority of the patients (68%) use CAM to improve general health and other diseases (CAM-G).

Further analysis of the type of CAM usage in our study reveals that natural products are the most frequent type of CAM utilised (81.6%). This finding was similar with previous studies on CAM usage in patient with chronic illness in Malaysia and other South-East Asian countries (Siti et al. 2009; Peltzer et al. 2016). In the West, however, many studies found that mind-body practice was the commonest type of CAM used (Akyol et al. 2011; Barnes et al. 2004; Ni et al. 2002). This could be explained by the culture, and geographical location as the use of herbal remedies are more common in Asia, and such practice is an integral part of their culture (Lee et al. 2004). The commonest type of herbal medication use in the study was the commercialised mixed herbal and botanical extract in the form of liquid. These herbal and botanical extract commonly combine multiple extracts of fruits and herbs such as pomegranate, *Eurycoma longifolia* (Tongkat Ali), *Morinda citrifolia* (Noni) which has been claimed as

having numerous health benefits. The availability of such remedies along with its attractive combination of herbs and fruits might have caused high uptake of such treatment. This trend was not found in Thailand, where it only constituted 6% of total HDS usage (Tangkiatkumjai et al. 2013). Such tendency was also not found in studies in the West suggesting it to be unique to our population. The commonest natural plant-based product used to treat CKD in our study was celery (*Apium graveolens*). Although celery has excellent antioxidant property, there is no substantial evidence to support the claim that it improves CKD (Vamenta-Morris et al. 2014)

Cupping (*Bekam*) was the top mind-body practice use in our population. This ancient treatment involves applying cups to selected skin points and creating subatmospheric pressure, either by heat or suction (Aboushanab et al. 2018). Many randomised control trials showed promising results with regards to cupping effect on chronic pain problem, but there is no evidence of any beneficial effect on CKD patients (Aboushanab et al. 2018). The use of 'alkaline water' was found to be the commonest other complementary practice in our population. Although many pre-clinical laboratory studies were done on mice with regards to alkaline ionized water effect, there is still no substantial study done on human to assess its general effectiveness on health (Magro et al. 2016). The belief in the effectiveness of CAM was the main reason for CAM usage in our study. Such positive attitude towards the therapy is more likely to influence patient to use it as found in a survey done in determining the factors of CAM uptake (Aziz & Tey 2009). However, we were unable to determine whether the belief stems from patients' own experience or the experience of others, but we noted that the study population are also more likely to practices CAM if they knew someone else who is practising it too. This observation was further strengthened by the top two influencers of CAM usage in the study, which were immediate family and friends.

We also found that more than half of our study population disclose their CAM usage to their physician (57.8%). Although this percentage was much higher compared to the study done in patients with other chronic diseases than CKD in Malaysia (45.5%), CKD patients in the US were found to be more likely to inform their CAM usage to their doctors (Hasan et al. 2009; Grabe & Garrison 2004). Our study also showed that advice from healthcare professional was the main reason that led to the discontinuation of CAM use. This emphasises the crucial role of healthcare professionals in successfully advocating discontinuation of such treatment when it has harmed the patient.

Our study did not find any statistically significant association between the usage of CAM in general or specifically HDS with progression of kidney disease. Other similar studies done in other countries had mixed result. Although no association was found in a study in Thailand, a study in Taiwan did show a reduced risk of ESRD in the study population who

took HDS (Tangkiatkumjai et al 2015; Lin et al. 2015). Our study includes different types of CAM in our analysis, and the number of patients who are on possible nephrotoxic CAM therapy might be small to show any significant difference.

There was no association between progression of CKD with CAM usage in the diabetic population despite the significant difference between the HBA1c level between CAM user and non-CAM user. The difference of the HBA1c level could be explained by the possible non-compliance to their conventional diabetic medication and possible high sugar content in their CAM preparation. However, no significant association was found as the study was not powered to look at effect of diabetic control on progression of CKD.

The review of our patients' record showed that three patients had rapid progression of renal function which was attributed to the uptake of HDS. This acute event caused by herbal treatment was also found in many other studies involving the use of HDS (Gabardi et al. 2007). Although no significant association was found in our study, the findings of such event related to CAM use should be evaluated in future prospective studies to determine the causal relationship between such treatment and progression of CKD.

The main limitation of the study was its cross-sectional design which may only suggest association but not causation from the conclusion drawn. The patient was also asked to recall their CAM usage in the past twelve months, and this could have led to recall bias. The respondents may also have altered their behaviour and hidden their usage of CAM (Hawthorne effect), as the interview was done during clinic setting.

CONCLUSION

In conclusion, our study revealed a much lower prevalence of CAM usage in our population compared to the usage in general population in Malaysia. CKD patients who are younger than 65 years with higher education and higher income were noted to be more likely to use CAM. Most patients used natural products as the main CAM modality, and more than half of them disclose their CAM usage to their physicians. The study did not find any association of the usage of CAM with the progression of CKD.

ACKNOWLEDGEMENT

This study received ethical approval from Universiti Kebangsaan Malaysia Research Ethics Committee (Reference number: FF-2017-494). The authors would like to thank all members of the nephrology unit, UKMMC for their assistance during the study.

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Received: 23 Sept 2019
Accepted: 5 Dec 2019