

Traditional and Complementary Medicine (TCM) among Study Population with Cardiovascular Risk; use and Substitution for Conventional Medicine in Pahang, Malaysia

Yueting Kew*, Yuik Ling Chia*, Su Meng Lai*, Kim Yeong Chong*, Xin Lun Ho*, Da Wei Liew*, Foong Ming Moy**, Sharmini Selvarajah**

*Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia, **Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, 50603, Kuala Lumpur, Malaysia

SUMMARY

Introduction: Cardiovascular diseases are the main cause of morbidity and mortality in Malaysia. There is evidence of high traditional and complementary medicine (TCM) use among population with cardiovascular risk and there have been anecdotal reports about substitution of conventional medicines with TCM. We investigated the prevalence of TCM use, treatment preference and substitution of conventional medicines in study population with cardiovascular risk factors in Pahang, Malaysia.

Methods: A cross-sectional survey was conducted using an interviewer-administered questionnaire in five districts of Pahang. A total of 1250 households were chosen through proportionate and systematic sampling. Respondents aged 18 years and above were selected.

Results: The study population with cardiovascular risk factors who used TCM was higher than the general population (31.7% versus 25.9%). There were no clear preferences in using TCM by gender, age groups, educational level and income even though other bumiputeras showed a slight inclination towards TCM use. Among the study population with cardiovascular risk factors who consumed TCM, 20-30% of them were using TCM as a substitute for their conventional medications. Respondents from the younger age group (18-40 years) (57.1%), highest educational level (43.2%), other bumiputeras (38.4%) and highest income group (31.4%) preferred the combination of both conventional and traditional medicine.

Conclusion: TCM use among population with cardiovascular risk factors is high. The high preference for combination therapy of TCM and conventional medications among young adults and the use of TCM to substitute conventional medications show that much research is needed to provide proven TCM therapies to avoid self-mismanagement of cardiovascular risk in Malaysia.

KEY WORDS:

Traditional medicine, Complementary medicine, Diabetes Mellitus, Hypertension, Hypercholesterolaemia, Substitution

INTRODUCTION

According to the World Health Organization, "traditional medicine is the sum total of the knowledge, skill and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness" while "complementary medicine refers to a broad set of health care practices that are not part of that country's own tradition or conventional medicine and are not fully integrated into the dominant health-care system".¹ The Ministry of Health Malaysia defines Traditional and Complementary Medicine as a form of health-related practice across all ethnic groups and also includes homeopathy and complementary therapies but excludes registered medical practices.²

In Malaysia, Traditional and Complementary Medicine (TCM) are classified into six major groups² namely traditional Malay medicine, traditional Chinese medicine, traditional Indian medicine, homeopathy, complementary medicine, and Islamic medical practice. Malaysian studies have reported that 69.4% of the Malaysian population used TCM in their lifetime,³ and about 55.6% of people used TCM within a twelve-month period.⁴ Although modern medicine has become the mainstream medicine practice since the twentieth century, there is high usage of TCM worldwide. In developing countries such as Uganda and Ethiopia, the prevalence of TCM used to help meet primary health care needs ranged from 60 to 90% while populations in developed countries such as the United States of America (USA) and Australia, the populations who have used TCM at least once ranged from 40 to 50%.² Cardiovascular risk factors such as diabetes mellitus, hypertension and hypercholesterolaemia are highly prevalent in Malaysia. Based on the 2011

This article was accepted: 15 April 2015

Corresponding Author: Yueting Kew, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia

Email: yue_ting0214@hotmail.com

National Health and Morbidity survey (NHMS), 2.6 million Malaysians suffered from diabetes, 5.8 million Malaysians suffered from hypertension while 6.2 million Malaysians suffered from hypercholesterolaemia.⁵ Besides utilising conventional (Western) medical treatment for chronic illnesses, TCM was identified as one of the most commonly used medical treatment.⁶ Studies done in public primary care clinics in Malaysia showed that there were 56% of diabetic patients and 27% of hypertensive patients who had been on TCM.^{6,7} Among all the different types of TCM, herbal remedies were the most popular choice.⁸ For instance, the commonly used herbs were bitter melon (*Momordica Charantia*) and Misai Kucing (*Orthosiphon Stamineus*, Benth), both used in treatment of diabetes mellitus.⁸

From the year 2000 to 2005, the expenditure spent on traditional medicines rose four fold from RM 1 billion to RM4.5 billion in Malaysia.⁹ This increasing utilisation of TCM may lead to a situation in which people are not only using TCM, but substituting conventional medicine with TCM. In the United States, researchers have shown that Complementary and Alternative Medicine was a substitute for conventional medicine.¹⁰ In Malaysia, there have been anecdotal reports suggesting that patients with chronic diseases were substituting conventional medicine with traditional medicine. However, no studies have been carried out to determine the extent of the problem. Hence, this study was conducted to estimate the prevalence of traditional and complementary medicine use in study population with cardiovascular risk factors and to determine if substitution of conventional medicine with TCM occurs.

MATERIALS AND METHODS

This was a community-based cross sectional survey carried out in five districts in Pahang. By using purposive sampling, the districts chosen were Bentong, Jerantut, Raub, Temerloh and Maran. Four villages were selected from each sampling location and further, 250 households were sampled from four villages of each district, proportionate to their respective sizes by random sampling. Therefore, the grand total of houses studied in Pahang was 1250.

A household consisted of people who were living together during the two weeks when the survey was on-going. All permanent residents who were living in each household, aged 18 years and above were eligible for the study. A face-to-face interview was carried out after written informed consent was obtained. The members of the same household were interviewed separately and independently.

The respondents were interviewed by trained interviewers using a pre-tested standardised questionnaire written in both English and Malay. The questionnaire included information on respondents, housing and environment, socio-demographic characteristics, household income, expenditure and utilisation of health care goods and services, modifiable lifestyle factors which included tobacco consumption, assessment of food intake, physical activity, mental health, cardiovascular risk factors, traditional and complementary medicine, injury, women's health and activities of daily living

for the elderly. Within the questionnaire, TCM component was focused in this study. The TCM component was developed and pre-tested by Clinical Research Centre, Ministry of Health, Malaysia and vetted at the Department of Social and Preventive Medicine, University of Malaya. The TCM component in the questionnaire captured information pertaining the prevalence of TCM use within past one year for general health reasons, the preferred treatment options among respondents who were not diagnosed with diabetes mellitus (DM), hypertension and hypercholesterolemia as well as the use of TCM for DM, hypertension or hypercholesterolemia. The types of TCM use and information on substitution of conventional medicine with TCM were also collected. Respondents with cardiovascular risk factors were defined as all those who reported having either DM, hypertension or hypercholesterolaemia as diagnosed by medical doctors. The study protocol was approved by the Ethical Review Board of Faculty of Medicine, University of Malaya.

All analysis was conducted using Statistical Package for Social Sciences (SPSS) v. 22.0. The associations between covariates (sex, age group, ethnicity, highest education level, income group) and TCM use as well as substitution of conventional medicine with TCM were tested using a Chi-square test with a significance level of 0.05.

RESULTS

A total of 2776 respondents aged 18 years and older were recruited in our study. The majority (73.5%) of our respondents were Malay, followed by Chinese (9.6%), Other bumiputeras (8.1%), Indian (7.9%) and others (0.9%). Female (53.4%) was more than male (46.6%) in our study. Those with secondary school level as the highest educational level (40.5%) were slightly more in our study as compared to those without education (10.8%), with primary school level (33.4%), with certificate or skills (6.0%) and those who went to university or college (9.3%). The income groups among the respondents by tertile group were first tertile group (RM0-RM150), second tertile group (RM151-RM1100) and third tertile group (RM1101-RM38000).

Out of the 2776 respondents, 30.8% of the study population presented with cardiovascular risk factors. Among them, the women, elderly and those from a lower educational level were more likely to have cardiovascular risk factors. There was no clear difference between the ethnic groups and prevalence of cardiovascular risk factors, nor were the cardiovascular risk factors determined by income groups (Table I).

Among the total study population of 2776, the prevalence of TCM use in the past one year was 25.9%. The elderly, those with lower education and higher income groups were more likely to use TCM. Nevertheless, both sexes were equal and there was no clear preference between different ethnicities in using TCM. On the other hand, the study population with cardiovascular risk factors who used TCM was slightly higher than the general population, (31.7% versus 25.9%). However, there were no clear preferences in using TCM by gender, age

Table I. Baseline characteristics of the study population by their cardiovascular

risk factors			
Characteristics	With cardiovascular risk factors (%) n=855 % (n)	Without cardiovascular risk factors (%) n=1921 %(n)	P-value
Sex*			
Male	40.8 (349)	49.0 (942)	<0.001
Female	59.2 (506)	51.0 (979)	
Age*			
Young (18-40)	5.7 (49)	53.3 (1024)	<0.001
Middle (41-60)	47.1 (403)	31.3 (602)	
Elderly (above 61)	47.1 (403)	15.4 (295)	
Ethnic group*			
Malay	74.2 (634)	72.9 (1401)	<0.001
Chinese	12.9 (110)	8.3 (159)	
Indian	9.7 (83)	7.1 (137)	
Other bumiputeras**	2.8 (24)	10.6 (203)	
Others***	0.5 (4)	1.1 (21)	
Highest educational level*			
No education	13.3 (114)	9.7 (187)	<0.001
Primary	47.4 (405)	27.3 (525)	
Secondary	33.2 (284)	43.8 (842)	
Certificate/ skills	2.7 (23)	7.3 (141)	
University/ college	3.4 (29)	11.8 (226)	
Income groups			
First tertile (RM0-RM150)	33.1 (283)	33.8 (650)	0.234
Second tertile (RM151-RM1100)	31.6 (270)	34.0 (653)	
Third tertile (RM1101-RM38000)	35.3 (302)	32.2 (618)	

Data are expressed as percentages (n).

*Chi square test, p<0.05 are for comparison between study population with cardiovascular risk factors and without cardiovascular risk factors

**Other bumiputeras are Orang Asli

***Others are foreigners

**** Cardiovascular risk factors :self-reported doctors' diagnosis of either diabetes mellitus, hypertension or hypercholesterolaemia

Table II: Baseline characteristics of the study population with cardiovascular risk factors by their use of traditional and complementary medicine (TCM)

Characteristics	TCM use (%) n=266 %(n)	No TCM use (%) n=574 %(n)	P-value
Sex			
Male	40.6 (108)	40.9 (235)	0.926
Female	59.4 (158)	59.1 (339)	
Age group			
Young (18-40 years)	4.1 (11)	6.3 (36)	0.366
Middle (41-60 years)	46.2 (123)	47.6 (273)	
Elderly (above 61 years)	49.6 (132)	46.2 (265)	
Ethnic group*			
Malay	74.4 (198)	73.5 (422)	0.001
Chinese	12.0 (32)	13.6 (78)	
Indian	7.5 (20)	10.8 (62)	
Other bumiputeras**	6.0 (16)	1.4 (8)	
Others***	0.0 (0)	0.7 (4)	
Highest educational level			
No education	14.7 (39)	12.5 (72)	0.715
Primary	48.1 (128)	47.2 (271)	
Secondary	32.3 (86)	33.6 (193)	
Certificate/ skills	2.6 (7)	2.8 (16)	
University/ college	2.3 (6)	3.8 (22)	
Income groups			
First tertile (RM0-RM150)	31.6 (84)	33.8 (194)	0.756
Second tertile (RM151-RM1100)	31.2 (83)	31.4 (180)	
Third tertile (RM1101-RM38000)	37.2 (99)	34.8 (200)	

Data are expressed as percentages (n).

*Chi square test, p<0.05 are for comparison between TCM use and no TCM use

**Other bumiputeras are Orang Asli

***Others are foreigners

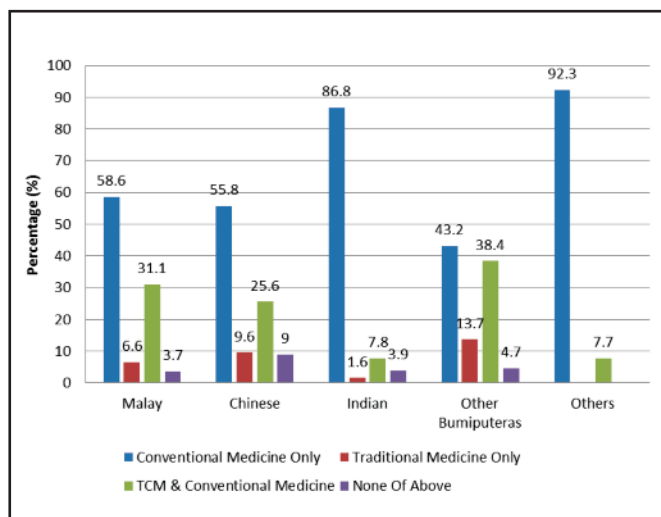


Fig. 1: Preferred treatment options among different ethnicities.

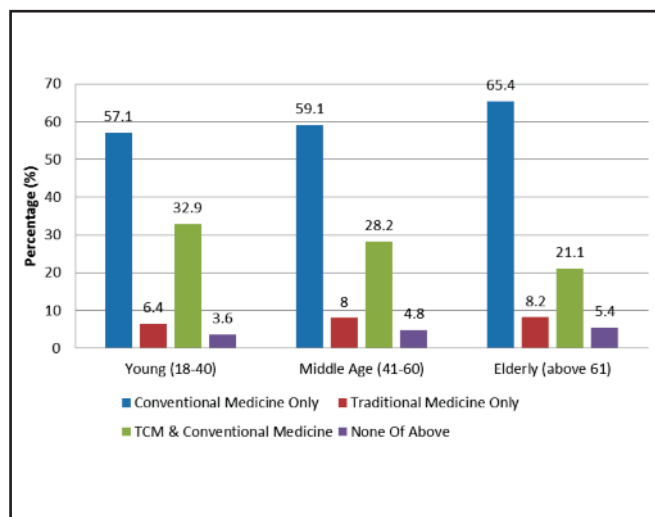


Fig. 2: Preferred treatment options among different age groups.

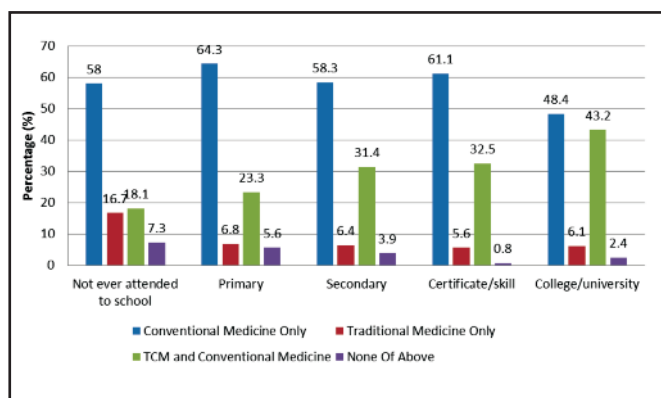


Fig. 3: Preferred treatment options among respondents with different educational level.

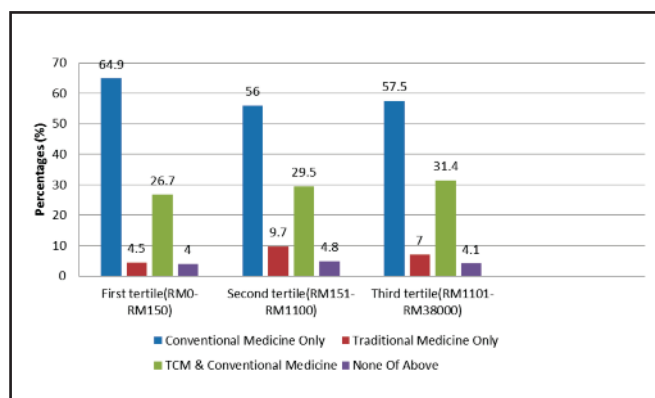


Fig. 4: Preferred treatment options among respondents with different income groups

groups, educational level and income groups among the study population with cardiovascular risk factors (Table II). Only other bumiputeras showed a slight inclination towards TCM use.

The general prevalence of TCM use for health needs among study population with cardiovascular risk factors was 31.7%. Among the diabetic (n=351) and hypertensive (n=607) respondents, 22.2% and 16.8% of them were taking TCM for their conditions respectively. Among those with hypercholesterolaemia (n=345), majority of them (90.4%) did not use any TCM.

Among the diabetic and hypertensive respondents who were taking TCM currently, 21% and 17% of them were substituting their conventional medicine with TCM respectively. Among small proportion of hypercholesterolaemia respondents who were taking TCM currently, 30% of them were substituting their conventional medicine with TCM. About half (49%) of them did not disclose the substitution to their clinicians.

Also, 57.9% of the study population with cardiovascular risk factors agreed that they would not substitute conventional medicine with traditional medicine if their medication could be simplified to one tablet (“polypill” concept). Eighteen percent of them disagreed while the remaining 24.1% were unsure about their choice.

There were different types of TCM used as treatment for cardiovascular risk factors. Misai Kucing (Orthosiphon Stamineus, Benth) had the highest prevalence for all three cardiovascular risk factors studied: diabetes mellitus 5.3%, hypertension 1.9% and hypercholesterolaemia 6.6%.

Among the study population without cardiovascular risk factors, 59% of them preferred conventional medicine alone as their choice for treatment of chronic diseases. This was followed by the combination of both conventional and traditional medicine (30%) and traditional medicine alone (7%). Four percent of them preferred none of the treatment options mentioned. There was an association between ethnicity, age groups, educational level and income groups with the preferred treatment option (p<0.05). All ethnicities

preferred conventional medicine as their primary treatment option, ranging from 43.2% to 92.3% (Figure 1). The combination of both conventional and traditional medicine was the second preferred choice and other Bumiputeras showed the highest percentage of 38.4% (Figure 1). Conventional medicine as the preferred treatment gradually rose across the three age groups: young (57.1%) < middle age (59.1%) < elderly (65.4%). Meanwhile, the combination of both conventional and traditional medicine showed a steady decrease across the three age groups: young (32.9%) > middle age (28.2%) > elderly (21.1%) (Figure 2). When compared to respondents from other educational level, those who attended college or university exhibited the lowest preference for conventional medicine (48.4%). Nevertheless, those who attended college or university showed the highest preference for a combination of both conventional and traditional medicine (43.2%) when compared to respondents from other educational level (Figure 3). The preference for traditional medicine alone was more prominent among respondents who had not ever attended school (16.7%). Among respondents with different income groups, conventional medicine as the preferred treatment option showed the highest percentage in all three income groups with the highest proportion in the lowest income group (64.9%) (Figure 4). The preference of combination of both conventional and traditional medicine indicated a steady increase across the income groups: first tertile (26.7%) < second tertile (29.5%) < third tertile (31.4%). There was no significant difference among the genders in terms of treatment preference ($p > 0.05$). Both males and females indicated conventional medicine as their primary choice of treatment (58.4%, 59.6%) followed by the combination of conventional and traditional medicine (28.9%, 30.2%), traditional medicine only (7.7%, 6.7%) and neither conventional nor traditional medicine (5.0%, 3.5%).

DISCUSSION

In our study, the prevalence of study population with cardiovascular risk factors (30.8%) was comparable to the results from National Health and Morbidity Survey (NHMS) 2011 which stated 16.7%, 29.9% and 31.7% of the Pahang population were having diabetes mellitus, hypertension and hypercholesterolaemia respectively.⁵ There were also some comparable characteristics between our study with NMHS 2011 which indicated that population with lower educational level and those middle aged and above had higher prevalence of cardiovascular risk factors.⁵

The prevalence of TCM use of 25.9% among the population in this study was lower than the prevalence of TCM use in Malaysia based on a nationwide survey done by Ministry of Health in 2004 (55.6%).³ There were also studies done in other Asian countries such as Singapore and Japan which indicated approximately three times higher TCM use (76%) than that found in our study.^{11, 12} The prevalence of TCM use among study population with cardiovascular risk factors was similar to that found in other studies. The prevalence of TCM utilisation among respondents with diabetes mellitus (DM) was higher than patients with diabetics in the United Kingdom (17%) and is comparable to a study done in Australia (24%).^{13, 14} This is much lower compared to other

studies done in Malaysia (62.5%), Thailand (47%), Korea (65%), India (68%), and USA (73%).^{8, 15-18} This difference seen was probably because all the other studies were conducted in a clinic setting while our study was a community-based study. The prevalence of utilisation of TCM among respondents with hypertension was lower compared to those with DM. A study in Ghana showed the result with 19.5% of the 400 hypertensive patients used TCM alongside conventional medical treatment, which was comparable with our results.¹⁹ The prevalence of TCM utilisation among respondents with hypercholesterolaemia was the lowest probably due to a lack of evidences recognising the utilisation of TCM among hypercholesterolaemic patients. More research is needed in this area.

Among studies from the West, TCM users are usually female, affluent, single, middle aged, well-educated and white. However in our study, the result was quite different in which the TCM users were more likely to be derived from the older age group, had primary education or less, in the higher income group but with no clear predilection in ethnicity and gender. A study conducted in Singapore revealed that the form of TCM used in Asia tended to be more conventional, (example religious practices and herbal medicine) whereas those that were popular in the West tended to be more novel such as yoga, aromatherapy and chiropractor treatments. This may explain the difference in demographic factors associated with the prevalence of TCM found in our study.^{11, 20} Nevertheless, among the study population with cardiovascular risk factors, there were no defining characteristics of which subgroups were more likely to use TCM.

The substitution rates of TCM for conventional medicine among population with cardiovascular risk factors found in our study was high at 20-30%. This literally translates into the proportion of patients who are untreated for their cardiovascular risk factors. Assuming the rates of substitution found in this study are accurate despite the lower prevalence of TCM utilisation, this finding is worrying. With 2.6 million Malaysians suffering from diabetes, 5.8 million Malaysians having hypertension and 6.2 million Malaysians having hypercholesterolaemia,⁵ this translates into at least 120,120 people untreated for diabetes, 226,780 untreated for hypertension and 186,000 untreated for hypercholesterolaemia. If the same rates of substitution apply for higher rates of TCM utilisation (eg. 62.5% TCM use among diabetics in Siew *et al*),⁸ the numbers of people left untreated are staggering and pose a major public health concern.

A study in the United States illustrated that their general population used TCM as complements or add-on's, rather than using it to substitute conventional medicine.²¹ Another study that investigated TCM and conventional medicine utilisation in the United States indicated that only a small group of them substituted their conventional medicine with TCM.¹⁰ In both studies, there were no absolute values for the rates of substitution. Hence, we could not conclude whether the overall 20-30% substitution rate in our study was higher or lower than that found in other countries. Nevertheless, it showed comparable results with a local study done to

determine the use of complementary and alternative medicine among cancer patients in Malaysia. In that particular study, 16.4% of the cancer patients stopped the standard treatment while using complementary and alternative medicine.²² This can be a major health issue as cardiovascular risks and cancers are chronic diseases that require patient's compliance so as to maximise the effectiveness of treatment. Therefore, more studies are needed to address this issue.

In our study, as high as 49% of study population who were substituting conventional medicine with TCM did not disclose their substitution to their physicians and this result was comparable with the research done in Hong Kong which indicated 59.3% of respondents did not disclose their polypharmacy to their physicians.²³ Another study in Malaysia indicated that most patients believed that TCM discussion was not important due to the lack of physicians' knowledge and interest.²⁴ This shows that there is still a gap in the doctor-patient relationship which needs to be bridged. However, in our study, 58% of the respondents agreed that they would not substitute conventional medicine with TCM if their medication were simplified into a single pill. As the "polypill" concept is already undergoing extensive research, perhaps this new strategy will be essential for the treatment of cardiovascular disease in the country.²⁵ Nevertheless, a better knowledge of the evidence base of TCM and conventional (western) medicine is required as it could improve the management of chronic illnesses such as diabetes mellitus, hypertension and hypercholesterolaemia.

Our study findings showed a wide range of TCM being used among respondents with diabetes, hypertension and hypercholesterolaemia. Most of the patients had listed a variety of herbal mixtures and natural forms of TCM. The composition of most of these local remedies was not known as they were passed on from generation to generation and purchased ready made from traditional healers. However, we found that Misai Kucing (*Orthosiphon Stamineus* Benth) was commonly used for the treatment of all the three diseases of diabetes mellitus, hypertension and hypercholesterolaemia. There has been a study which proposed that the use of Misai Kucing (*Orthosiphon Stamineus* Benth) can reduce blood sugar levels.²⁶ More research is needed in this area to ensure the efficacy of these different traditional therapies.

Our study had similarities with a study done in Uganda which revealed that the use of conventional medicine was the most preferred treatment option while traditional medicine was not used alone but as an adjunct to conventional medicine.²⁷ In our study, the most preferred option of treatment was conventional medicine, and this was consistent for all socio-demographic characteristics. However, even though preference for conventional medicine was high (59%), the remaining 41% of respondents are of concern because they preferred treatments other than conventional medicine alone. Among them, 30% of the respondents chose combined treatment of conventional medicine and TCM as their preferred choice for treatment of cardiovascular risk. Since these respondents were mainly from the younger age group, of higher educational level, and higher income group, it would seem that the trend towards TCM treatment complementing conventional medicine will increase in future

among our population. As most TCM can be easily obtained over the counter, the most practical way is to provide standardised guideline in using every types of TCM to the population. Since some forms of TCM were proven to have inherent value and efficacy for health promotion, prevention and treatment, such as traditional Malay medicine, massage, acupuncture, herbal oncology and postnatal massage practised in some government hospitals, the publication of more standardised guidelines should be prompted.²⁸ Moreover, in order to maximise the benefits of TCM, Ministry of Health of Malaysia should set up a strict regulation and regular monitoring of TCM practitioners nationally to prevent them from treating patients inappropriately with their misconceptions towards disease.²⁹

LIMITATIONS AND STRENGTHS

The experience of using TCM was obtained based on self-reported behaviours and some degree of under-reporting or recall bias cannot be completely excluded. Therefore, this may explains the lower prevalence of TCM use found in our study compared to the other studies.

Although majority of the members of the same household were interviewed separately and independently, there were some household members preferred to be interviewed together with several reasons like time constraint and unable to understand certain questions. Hence, this may cause the awareness of study resulting in some degrees of inaccurate information given.

However, this community-based study shows its strength especially in viewing the prevalence of TCM use and substitution for conventional medicine. For example, in a study done in clinical setting, most of the population especially those with chronic diseases are those who already have regular medication. In this scenario, a higher substitution rate of TCM can be obtained.

CONCLUSION

TCM use among population with cardiovascular risk factors is common, TCM substitution rates are high and disclosure rates on substitution are low. There is also a growing preference for combined conventional and TCM therapies for cardiovascular risk factor treatment among the younger age groups and those with higher educational levels. It is imperative that with the increasing burden of cardiovascular risk factors in the country, more efforts are put into the identification of safe, viable TCM therapies and on improvement of cardiovascular risk communication to prevent conventional medication substitution.

ACKNOWLEDGEMENT

We would like to acknowledge the Department of Social and Preventive Medicine, University of Malaya for supporting this study. We wish to express our token of appreciation towards the District Health Officers and Medical Officers of Health of the relevant districts whom had given permission to conduct the study in the districts. Not forgetting also our respondents, the staff of the District Health Office, our lecturers who guided us and our colleagues who assisted in data collection.

REFERENCES

- World Health Organization. WHO traditional medicine strategy 2014-2023. Geneva: World Health Organization, 2013.
- Traditional and Complementary Medicine Division, Ministry of Health Malaysia. A handbook of traditional and complementary medicine programme in Malaysia. Malaysia: Ministry of Health Malaysia, 2011.
- Siti ZM, Tahir A, Ida Farah A, *et al.* Use of traditional and complementary medicine in Malaysia: a baseline study. *Complementary Therapies in Medicine* 2009; 17(5-6): 292-9.
- Tahir A, Azman AH, Sondi S, *et al.* The utilisation of traditional & complementary medicine in Malaysian population – a community based survey. *Journal of Health Management* 2006; 76.
- National Health and Morbidity Survey 2011. Institute for Public Health, Ministry of Health, Malaysia.
- Remli R, Chan SC. Use of complementary medicine amongst diabetic patients in a public primary care clinic in Ipoh. *Med J Malaysia* 2003; 58(5): 688-93.
- Mahfudz AS, Chan SC. Use of complementary medicine amongst hypertensive patients in a public primary care in Ipoh. *Med J Malaysia* 2005; 60(4): 454-9.
- Siew MC, Zakaria ZA, Paimin F, Jalalian M. Complementary alternative medicine use among patients with type 2 diabetes mellitus in the primary care setting: a cross-sectional study in Malaysia. *BMC Complementary and Alternative Medicine* 2013; 13: 148.
- Bernama local herbal industry registers annual sales of RM4.5 Bln. Available at: <http://www.bernama.com.my/bernama/v3/news/business.php?id=150892> (retrieved on February 7, 2014).
- Tom Xu K, Farrell TW. The complementary and substitution between unconventional and mainstream medicine among racial and ethnic groups in The United States. *Health Serv Res* 2007; 42(2): 811-26.
- Lim MK, Sadarangani P, Chan HL, Heng JY. Complementary and alternative medicine use in multiracial Singapore. *Complementary Therapies in Medicine* 2005; 13: 16-24.
- Yamashita H, Tsukayama H, Sugishita C. Popularity of complementary and alternative medicine in Japan: a telephone survey. *Complement Ther Med* 2002; 10: 84-93.
- Leese GP, Gill GV, Houghton GM. Prevalence of complementary medicine usage within a diabetes clinic. *Practical Diabetes* 1997; 14: 207-8.
- Clifford RM, Davis TM, Batty KT, Davis W. Prevalence and predictors of complementary medicine usage in diabetes: fremantle diabetes study. *J Pharm Pract Res* 2003; 33: 260-4.
- Moolasarn S, Sripa S, Kuessirikiet V, *et al.* Usage of and cost of complementary/ alternative medicine in diabetes patients. *J Med Assoc Thai* 2005; 88: 1630-7.
- Lee MS, Lim HJ, Moon SR. Survey of the use of complementary and alternative medicine among Korean diabetes mellitus patients. *Pharmacoepidemiol Drug Saf* 2004; 13: 167-71.
- Kumar D, Bajaj S, Mehrota R. Knowledge, attitude and practice of complementary and alternative medicines for diabetes. *Public Health* 2006; 120: 705-11.
- Bell RA, Suerken CK, Grzywacz JG, Lang W, Quandt SA, Arcury TA. Complementary and alternative medicine use among adults with diabetes in United States. *Altern Ther Health Med* 2006; 12: 16-22.
- Kretchy IA, Owusu-Daaku F, Danquah S. Patterns and determinants of the use of complementary and alternative medicine: a cross-sectional study of hypertensive patients in Ghana. *BMC Complementary and Alternative Medicine* 2014; 14: 44.
- Michelle Tan GE, Win MT, Khan SA. The use of complementary and alternative medicine in chronic pain patients in Singapore: a single-centre study. *Ann Acad Med Singapore* 2013; 42: 133-7.
- Druss BG, Rosenheck RA. Association between use of unconventional therapies and conventional medical services. *Journal of the American Medical Association* 1999; 282(7): 651-6.
- Al-Naggar RA, Yuri VB, Mahfoudh A, Subramariam R, Osman MT, Samiah Yasmin AK. Complementary/alternative medicine use among cancer patients in Malaysia. *World Journal of Medical Sciences* 2013; 8 (2): 157-64.
- Vincent Chung CH, Polly Ma HX, Tiffany Tang SK, Lau CH, Jean Kim H, Griffiths Siam M. Do patients tell their clinicians they are using both prescribed and over the counter allopathic and traditional medicines? *European Journal of Integrative Medicine* 2011; 3: 289-298.
- Farooqui M, Hassali A, Knight A, Akmal A, Tan BS, Farooqui MA. Disclosing traditional and complementary medicines (T&CM) use to the health care providers: a qualitative study among cancer patients at a local hospital in Malaysia. *Value in Health* 2011; 14: 233-510.
- Lonn E, Bosch J, Teo KK, Pais P, Xavier D, Yusuf D. The polypill in the prevention of cardiovascular diseases. *Circulation* 2010; 122: 2078-88.
- Mohamed EA, Mohamed AJ, Asmawi MZ, Sadikun A, Ebrika OS, Yam MF. Antihyperglycemic effect of *Orthosiphon stamineus* benth leaves extract and its bioassay-guided fractions. *Molecules* 2011; 16: 3787-3801.
- Nuwaha F, Musinguzi G. Use of alternative medicine for hypertension in Buikwe and Mukono districts of Uganda: a cross sectional study. *BMC Complementary and Alternative Medicine* 2013; 13:301.
- Maihebureti A, Sharifa Ezat WP, Syed AJ. Role of traditional and complementary medicine in universal coverage. *Malaysian Journal of Public Health Medicine* 2011; 11(2): 1-5.
- Al-Naggar RA, Yuri VB, Mahfoudh MA, Subramanian R, Al-Jashamy K. Knowledge and perceptions of cancer and cancer prevention among Malaysian traditional healers: a qualitative study. *Asian Pacific Journal of Cancer Prevention* 2012; 13: 3841-50.