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Awareness and perceived barriers in practicing healthy living to prevent hypertension among young adults in Malaysia

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ABSTRACT

Objective: To investigate the knowledge, attitude, and practice levels and perceived barriers towards healthy living to prevent hypertension among young adults in Malaysia.

Methods: Adults aged 18-25 years reside in Malaysia were recruited via convenience sampling. Sociodemographic characteristics, medical knowledge on hypertension (K1), knowledge (K), attitude (A), practice (P) and perceived barriers in practising healthy living to prevent hypertension were assessed. Average scores were categorised into good (80%-100%), upper-moderate (70%-79%), lower-moderate (60%-69%) and poor (<60%). Multivariate analysis was performed to test the difference and relationship of variables. Pearson correlation test was used to test the association of two continuous variables.

Results: A total of 1 218 respondents participated in this survey. The mean score of K1 was 54.1%, while the knowledge, attitude, and practice towards healthy living were 82.7%, 78.2% and 68.5% respectively. The prevalence of high salt intake, high fat intakes, low fibre intake, sedentary lifestyle and lack of annual health screening was 83.2%, 81.4%, 70.3%, and 73.2%, respectively. Abnormal BMI was associated with low P scores, while lower socio-economic status, unawareness of self-blood pressure reading and those without family history of hypertension were associated with lower scores in K1, K, A, and P. K1, K, A, and P are significantly inter-related. The main perceived barriers included self-proclaimed good fit status, frequent consumption of out-of-home food, and addiction to high salt/fat food.

Conclusions: The national strategies for health management should be prioritized in reducing salt and fat, promoting annual health screening, physical activities and fibre intake in this age group.

KEYWORDS: Healthy living; Physical activity; Salt restriction; Dietary; Hypertension; Malaysia; Young adults

1. Introduction

Hypertension is a major public health challenge affecting more than one billion people worldwide; it disproportionately affects populations in low- and middle-income countries, where health systems are generally weak. The increasing prevalence of hypertension is associated with population growth, aging, genetic factors, and behavioural risk factors such as excessive salt and fat consumption, physical inactivity, being overweight and obese, harmful alcohol consumption, and poor management of stress. Over the long term, hypertension leads to risk for cardiovascular diseases, the leading cause of death globally[1].

Non-pharmacological management (healthy living) that modifies lifestyle have been assessed in numerous randomized controlled

Significance

This survey incorporated knowledge, attitude and practice questions that are specific to Malaysian cultural settings. The main perceived barriers in practicing healthy living have been identified and national strategies for health management in reducing salt and fat consumption, promoting annual health screening, physical activities and fibre intake in this age group should be prioritized.

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trials, and pairwise meta-analyses, and it is widely recognized to be an effective strategy in reducing raised blood pressure, delay the progression from pre-hypertensive to hypertensive stage, reduce the antihypertensive medication, and improving overall cardiovascular health[2]. In Malaysia, environmental factors, poor lifestyle and dietary habits have been hypothesized as the contributing factors for low effectiveness of hypertension management[3].

The prevalence of hypertension worldwide including Malaysia population is continuously increasing. The pressing concern is the prevalence of premature-onset hypertension were increasing from 17.7% in 2006 to 18.4% in 2015 in Malaysia. Merely 15% of them were aware of their hypertensive condition and less than 50% were on treatment. While trend analysis discovered a significant increase in young onset prevalence among those resided in urban area, those with no formal and tertiary education and those from middle-income group[4]. Evidence from the Framingham Heart Study showed that early onset hypertension is correlated with remarkable greater risk for cardiovascular events and mortality compared with hypertension that begins later in life. Unhealthy eating habits, sedentary lifestyle, obesity, smoking, and alcohol consumption are well-known as the main modifiable risk factors for development and progression of hypertension. The increasing trend of young-onset hypertension could be due to early exposure to these modifiable risk factors among the young adults[1].

Public health programmes in identifying individuals at increased risk of hypertension, raising their awareness related to hypertension and cardiovascular diseases, and providing recommendation in risk management play crucial roles in reducing the prevalence of hypertension. The Malaysia government is aware of the importance of preventive measures and has launched substantial national plans/strategies in promoting healthy living to prevent non-communicable diseases since decades in the past. Indeed, recognizing the importance of the modifiable risk factors for hypertension, as well as the roles of lifestyle modification at young age play a crucial role in reducing the prevalence of hypertension and cardiovascular diseases. Therefore, this study was designed to investigate the knowledge, attitude, and practice (KAP) levels and perceived barriers towards healthy living to prevent hypertension among the young adulthood (18-25 years old). These findings are certainly helpful in strategizing the awareness campaigns related to prevention of hypertension, as well as to identify the population at increased risk for behaviour change support/lifestyle advise.

2. Subjects and methods

2.1. Study design and setting

This cross-sectional survey was conducted between November

2021 and January 2022 *via* convenience sampling. This study was approved by Institutional Scientific and Ethical Review Committee (U/SERC/268/2021) and conducted in accordance with the code of ethics.

2.2. Survey instrument

The questionnaire was prepared in English, Bahasa Malaysia, and Chinese (simplified). The questionnaire was designed in English, forward and backward translation technique was used for the questionnaire preparation in Bahasa Malaysia and Chinese (simplified). A pilot study with 46 respondents was conducted to test the questionnaire's reliability and validity; the alpha Cronbach values were more than 0.8. All the results from the pilot study were excluded from the actual data analysis.

This questionnaire comprises six sections. The first section was related to sociodemographic profile. The second section was related to medical knowledge assessment regarding the definition, risk factors, symptoms and complications of hypertension (K1). The third, fourth and fifth sections assessed knowledge (K), attitude (A) and practice (P) towards healthy living to prevent hypertension respectively. While the last section assessed the perceived barriers faced by the respondents in practicing healthy living to prevent hypertension.

2.3. Outcome measures

For the knowledge measures, each correct answer was given 1 point while an incorrect or "I do not know" was given 0 points. For the attitude measures, five-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree), the poorest attitude was given 0 points, followed by 1, 2, 3, and 4 point(s) for subsequent more favourable attitudes. For the practice measures, a four-point Likert scale was computed (always, sometimes, rarely, never), the poorest practice was given 0 points, followed by 1, 2 and 3 point(s) for the subsequent more favourable practice; while the binary question was given 3 points for the good practice and 0 points for the poor practice. The score was expressed in percentage using the formula: (point obtained/total points) 100%. Modified Bloom's cut-off points were adopted to categorize K1 and KAP scores into good (80%-100%), upper moderate (70%-79%), lower moderate (60%-69%) and poor (less than 60%).

2.4. Participation eligibility

Eligible participants with age of 18 to 25 years old, who reside in Malaysia, and understand English, Bahasa Malaysia or Chinese (simplified) were invited for survey participation.

2.5. Survey invitation and informed consent

Personal invitations comprising the survey poster, and questionnaire hyperlink were sent to personal contacts *via* E-mails, short message text, and mobile messenger Apps. The same invitation was also posted to various social media platforms to call for public participation. All the participants were asked to provide informed consent before proceeding to the questionnaire. The participants can withdraw from the study by stopping answering the questions.

2.6. Data analysis

The statistical analysis was performed using Statistical Package for Social Science version 22.0. Categorical data were expressed as frequency and percentage, while continuous data were checked with the normality test and Levene's test, and then continuous data with confirmed normal distribution were expressed as mean±standard deviation. Multivariate analysis was performed using MANOVA. Pearson Correlation test was used to test the association of two variables. A *P*-value of less than 0.05 was considered statistically significant.

Table 1. Sociodemographic characteristics of the respondents (*n*=1 218).

Variables	<i>n</i> (%)
Age, years, mean±SD	20.6±1.6
Sex	
Male	425 (34.9)
Female	793 (65.1)
BMI	
Underweight	317 (26.0)
Normal	587 (48.2)
Overweight	123 (10.1)
Obese	191 (15.7)
Area of residence	
Urban	952 (78.2)
Rural	266 (21.8)
Monthly household income, RM	
<4 850	607 (49.8)
4 851-10 970	542 (44.5)
>10 971	69 (5.7)
Aware of blood pressure reading	
Aware	507 (41.6)
Not aware	711 (58.4)
Family history of hypertension	
Yes	490 (40.2)
No	728 (59.8)

Table 2. Medical knowledge related to definition, risk factors, symptoms and complications of hypertension (K1).

Variables	<i>n</i> (%)
1. Which of these is/are risk factor(s) that contribute to hypertension?	
Aging	
Yes [#]	976 (80.1)
No	242 (19.9)
Family history of hypertension	
Yes [#]	1 104 (90.6)
No	114 (9.4)
Diabetes	
Yes [#]	708 (58.1)
No	510 (41.9)
Kidney disease	
Yes [#]	475 (39.0)
No	743 (61.0)
Ethnicity	
Yes [#]	128 (10.5)
No	1 090 (89.5)
2. Which of the following are the complications of hypertension?	
Heart attack	
Yes [#]	1 029 (84.5)
No	189 (15.5)
Heart failure	
Yes [#]	858 (70.4)
No	360 (29.6)
Stroke	
Yes [#]	1 049 (86.1)
No	169 (13.9)
Kidney failure	
Yes [#]	457 (37.5)
No	761 (62.5)
Vision loss	
Yes [#]	361 (29.6)
No	857 (70.4)
Sexual dysfunction	
Yes [#]	164 (13.5)
No	1 054 (86.5)
3. Blood pressure above 140/90 mmHg is considered hypertension.	
True [#]	767 (63.0)
False	67 (5.5)
I do not know	384 (31.5)
4. Most people who have hypertension don't have any symptoms.	
True [#]	495 (40.6)
False	467 (38.4)
I do not know	256 (21.0)

[#]Correct answer.

Table 3. Knowledge towards healthy living to prevent hypertension [*n* (%)].

Knowledge	True	False	I do not know
1. Regular medical body check-up can help in preventing hypertension.	1 147 (94.2) [#]	40 (3.3)	31 (2.5)
2. Being overweight or obese is a risk factor of hypertension.	1 162 (95.4) [#]	11 (0.9)	45 (3.7)
3. High salt intake does not lead to hypertension.	79 (6.5)	1 014 (83.2) [#]	125 (10.3)
4. Alcohol drinking does not lead to hypertension.	72 (5.9)	971 (79.7) [#]	175 (14.4)
5. Physical inactive is a risk factor of hypertension.	960 (78.8) [#]	97 (8.0)	161 (13.2)
6. Diet rich in fruits and vegetables prevents hypertension.	1 038 (85.2) [#]	49 (4.0)	131 (10.8)
7. Diet with low total fat, low saturated fat and low-fat dairy products prevents hypertension.	938 (77.0) [#]	72 (5.9)	208 (17.1)
8. Smoking is a risk factor for hypertension.	831 (68.2) [#]	119 (9.8)	268 (22.0)

[#]Correct answer.

Table 4. Attitudes towards healthy living to prevent hypertension [*n* (%)].

Attitude	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Regular self-monitoring of blood pressure is effective to prevent hypertension.	22 (1.8)	13 (1.1)	119 (9.8)	517 (42.4)	547 (44.9)
2. Regular medical check-up is effective to prevent hypertension.	21 (1.7)	10 (0.8)	109 (8.9)	500 (41.1)	578 (47.5)
3. Body weight reduction is effective to prevent hypertension.	16 (1.3)	62 (5.1)	280 (23.0)	484 (39.7)	376 (30.9)
4. Reduction in salt intake is effective to prevent hypertension.	20 (1.6)	11 (0.9)	159 (13.1)	522 (42.9)	506 (41.5)
5. Reduction in alcohol intake is effective to prevent hypertension.	17 (1.4)	13 (1.1)	214 (17.5)	505 (41.5)	469 (38.5)
6. Regular physical activity is effective to prevent hypertension.	19 (1.6)	9 (0.7)	113 (9.3)	503 (41.3)	574 (47.1)
7. Increasing fruits and vegetables intake is effective to prevent hypertension.	22 (1.8)	9 (0.7)	156 (12.8)	524 (43.0)	507 (41.6)
8. Avoiding high-fat food intake is effective to prevent hypertension (foods with high saturated fats: sausages, bacons, burger, fatty meat, butter, cheese, cream, etc.).	19 (1.6)	10 (0.8)	119 (9.8)	458 (37.6)	612 (50.2)
9. Smoking cessation is effective to prevent hypertension.	32 (2.6)	34 (2.8)	282 (23.2)	444 (36.4)	426 (35.0)
10. Healthy living is essential in controlling blood pressure when on antihypertensive medication.	105 (8.6)	163 (13.4)	272 (22.3)	351 (28.8)	327 (26.9)

3. Results

3.1. Sociodemographic characteristics

A total of 1 218 respondents fulfilled the eligibility and were included in this study. The mean age of the respondents is (20.6±1.6) years old, with 425 (34.9%) and 793 (65.1%) male and female, respectively. 587 (51.8%) of the respondents having an unhealthy BMI (underweight, overweight or obese). 607 (49.8%), 542 (44.5%) and 69 (5.7%) are under low, medium and high monthly household income categories. 711 (58.4%) of the respondents are not aware of their blood pressure readings, and 490 (40.2%) of the respondents are with a family history of hypertension (Table 1).

3.2. KI, KAP scores and perceived barriers

The level in medical knowledge related to the definition, risk factors, symptoms and complications of hypertension (K1) is poor 54.1%±19.8%. While the knowledge (K) and attitude (A) towards healthy living to prevent hypertension of the respondents are at good 82.7%±19.9% and upper-moderate 78.2%±15.3% levels. Nevertheless, the practice (P) score is lower than K and A scores, which is in the lower-moderate category 68.5%±13.5%.

A total of 976 (80.1%) and 1 104 (90.6%) of the respondents aware that aging and family history of hypertension are the risk factors for hypertension, while merely 708 (58.1%) and 475 (39.0%) of the respondents aware that diabetes and kidney disease are the risk factors for hypertension. The majority of the respondents recognized heart attack, heart failure, and stroke are the complications of hypertension, while merely 457 (37%), 361 (29.6%) and 164 (13.5%) of the respondents recognized that kidney failure, vision loss and sexual dysfunction are the complications of hypertension. 723 (59.4%) of the respondents are not aware that most people with hypertension have no symptoms at all (Table 2). Half (55.7%) of the respondents recognized that healthy living is essential in controlling blood pressure when on antihypertensive medication (Table 3).

Table 5. Practices towards healthy living to prevent hypertension (P).

Practice	<i>n</i> (%)
1. When was your last measurement of blood pressure by a healthcare practitioner?	
<1 year ago	554 (45.5)
1-2 years ago	275 (22.6)
2-3 years ago	86 (7.0)
>3 years ago or never	303 (24.9)
2. When was your last medical check-up?	
<1 year ago	380 (31.2)
1-2 years ago	291 (23.9)
2-3 years ago	151 (12.4)
>3 years ago or never	396 (32.5)
3. Do you control your body weight within the normal BMI (18.5-24.9 kg/m ²)?	
Always	604 (49.6)
Sometimes	268 (22.0)
Rarely	186 (15.3)
Never	160 (13.1)
4. Do you limit your salt consumption? (<5 g or 1 teaspoonful of salt per day)	
Always	204 (16.8)
Sometimes	473 (38.8)
Rarely	323 (26.5)
Never	218 (17.9)
5. Do you limit your alcohol consumption? (<14 standard drink per week for female, 21 standard drink per week for male)	
Always	1 029 (84.5)
Sometimes	108 (8.9)
Rarely	51 (4.2)
Never	30 (2.4)
6. Do you carry out physical activity at least 2.5 hours per week? (Physical activity defined as any bodily movement such as walking, cycling or housework whether during sports, leisure time or working for at least 2.5 hours per week)	
Always	326 (26.8)
Sometimes	436 (35.8)
Rarely	387 (31.8)
Never	69 (5.6)
7. Do you consume fiber-rich diet? (4 to 5 servings a day. One serving is 1/2 cup cut-up raw or cooked vegetables, one medium-size fruit (e.g. apple, orange) or 1/2 cup fruit juice)	
Always	361 (29.7)
Sometimes	586 (48.1)
Rarely	227 (18.6)
Never	44 (3.6)
8. Do you avoid consuming high-fat food? (food with high saturated fats: sausages, bacons, burger, fatty meat, butter, cheese, cream, etc.)	
Always	227 (18.6)
Sometimes	673 (55.3)
Rarely	248 (20.4)
Never	70 (5.7)
9. Are you a habitual smoker? (at least one cigarette per day)	
Yes	21 (1.7)
No	1 197 (98.3)

Table 6. Perceived barriers in practicing healthy living to prevent hypertension.

Challenge	n (%)
1. What is the most challenging factor that you faced while trying to have blood pressure check-up at once a year?	
Hectic schedule/busy	351 (28.8)
Financial constraints	110 (9.0)
Fear in visiting clinic	53 (4.4)
I think my blood pressure is normal and no checking is required	664 (54.5)
Others	40 (3.3)
2. What is the most challenging factor that you faced while trying to undergo medical check-up at least once a year?	
Hectic schedule/busy	380 (31.2)
Financial constraints	218 (17.9)
Fear in visiting clinic	74 (6.1)
I think I am healthy and no medical check-up is required	511 (42.0)
Others	35 (2.8)
3. What is the most challenging factor that you faced while trying to control your body weight within normal BMI?	
Failed to increase physical activity/exercise	402 (33.0)
Lack of motivation in controlling body weight	308 (25.3)
Failed to control or modify dietary pattern	278 (22.8)
Not able to lose weight regardless of all the efforts in diet modification and increased physical activity	98 (8.1)
Weight loss/gained due to medical conditions or medications	32 (2.6)
Others	100 (8.2)
4. What is the most challenging factor that you faced while trying to limit your daily salt intake within the recommended amount?	
Not able to modify the salt content from out-of-home foods (take-away, restaurants and street foods)/food that prepared by others	716 (58.8)
Personal preference/ too much of cravings/addiction for salted food	171 (14.0)
Lack of knowledge in consequence of high salt intake	70 (5.7)
Lack of planning on meals	226 (18.6)
Others	35 (2.9)
5. What is the most challenging factor that you faced while trying to limit your alcohol consumption within the recommended amount?	
I do not take alcohol	895 (73.5)
Social influence/peer pressure	142 (11.7)
Stress	75 (6.1)
Addiction	26 (2.1)
Lack of encouragement, support from family and friends	19 (1.6)
Others	61 (5.0)
6. What is the most challenging factor that you faced while trying to carry out physical activity within the recommended level?	
Obsessed with sedentary lifestyle i.e. watching movies, playing video games, using smartphones/computers	402 (33.0)
Insufficient time to exercise	387 (31.8)
No-enjoyment of exercise	147 (12.0)
Lack of encouragement, support, or companionship from family and friends	112 (9.2)
Lack of access to facilities like sidewalks, gyms, parks, safe walking/ bike trails etc.	117 (9.6)
Others	53 (4.4)
7. What is the most challenging factor that you faced while trying to consume a fiber-rich diet at a recommended amount?	
Lack of planning on meals	421 (34.6)
The recommended servings (4-5 servings) are too much	128 (10.5)
Lack of time in acquiring/prepare fiber-rich diet	122 (10.0)
Lack of access to fruits and vegetables i.e from the market/shops/grocers	112 (9.2)
Dislike of taste of fruits/vegetables	109 (9.0)
Lack of budget for fruits/vegetables	91 (7.5)
Lack of cooking skills to prepare fiber-rich dishes	87 (7.1)
Limited storage space e.g. space in refrigerator	60 (4.9)
Dental problems/difficulty in chewing	15 (1.2)
Others	73 (6.0)
8. What is the most challenging factor that you faced while trying to reduce high fat food in meals?	
Not able to modify the fat-content from out-of-home foods (take-away, restaurants and street foods)/food that prepared by others	727 (59.7)
Personal preference/ too much of cravings/addiction for high-fat food	244 (20.0)
Lack of planning on meals	198 (16.3)
Lack of knowledge in consequence of high fat intake	17 (1.4)
Others	32 (2.6)
9. What is the most challenging factor that you faced while trying to stop smoking?	
I do not smoke	1 165 (95.7)
Stress	22 (1.8)
Social influence/peer	17 (1.4)
Lack of encouragement, support from family and friends	9 (0.7)
Others	5 (0.4)

Table 7. Association between sociodemographic characteristics and K1, KAP.

Variables	K1		K		A		P	
	Mean±SD	P-value	Mean±SD	P-value	Mean±SD	P-value	Mean±SD	P-value
Sex								
Male	53.7±20.7	0.564	81.6±21.8	0.162	77.2±16.0	0.117	67.7±13.7	0.121
Female	54.4±19.3		83.3±18.8		78.7±14.9		68.9±13.3	
BMI								
Underweight (<18.5)	54.2±19.0	0.944	81.9±20.0	0.653	77.3±14.8	0.428	65.1±14.3	<0.001*
Normal (18.5-24.9)	54.3±19.9		83.0±19.5		78.9±14.4		70.6±13.0	
Overweight (25-29.9)	53.2±21.1		81.8±21.7		77.6±17.5		70.7±13.5	
Obese (>30)	54.0±20.0		84.0±19.7		77.7±17.4		66.3±12.2	
Monthly household income, RM								
<4 850	52.3±18.5	0.003*	81.5±20.2	0.044*	76.6±16.0	0.001*	66.9±13.7	<0.001*
4 851-10 970	55.3±20.4		83.7±19.1		79.7±14.4		69.9±13.2	
>10 971	60.8±23.8		86.1±22.3		80.6±14.8		71.3±12.4	
Aware of blood pressure reading								
Aware	59.49±20.8	<0.001*	87.0±17.7	<0.001*	80.1±16.9	<0.001*	73.0±12.0	<0.001*
Not aware	50.30±18.0		79.7±20.8		76.8±13.9		65.3±13.6	
Family history of hypertension								
Yes	57.2±20.8	<0.001*	84.79±18.39	0.002*	79.8±16.4	0.002*	69.5±14.2	0.043*
No	52.1±18.8		81.33±20.74		77.1±14.5		67.8±12.9	

K1: Knowledge level related to definition, risk factors, symptoms and complications of hypertension; K: Knowledge level towards healthy living to prevent hypertension; A: Attitude level towards healthy living to prevent hypertension; P: Practice level towards healthy living to prevent hypertension. * $P<0.05$.

More than 80% of the respondents agreed that regular self-monitoring of blood pressure, regular self-check-up, reduction in salt, alcohol, and high-fat food intakes and regular physical activity are effective to prevent hypertension. While approximately 70% of the respondents agreed that body weight reduction and caseation in smoking are effective to prevent hypertension (Table 4).

A total of 664 (54.5%) and 838 (68.8%) of the respondents missed their recent annual blood pressure screening and medical check-up. A total of 614 (50.4%) did not always control their body weight within the normal BMI. However, 1 029 (84.5%) of the respondents always limit the alcohol consumption and 1 197 (98.3%) of the respondents do not smoke habitually. As low as 204 (16.8%) and 227 (18.6%) of the respondents always control their salt and high-fat food intakes. Only 326 (26.8%) and 361 (29.7%) always carry out physical activity at least 2.5 hours a week and consume a fiber-rich diet of 4-5 servings a day (Table 5).

A total of 664 (54.5%) of the respondents believe that their blood pressure is normal, and blood pressure test is not required. While about one-third of the respondents reflected that hectic schedule is the most challenging factor in having annual blood pressure and medical check-ups. Seven hundred and sixteen (58.5%) and 727 (59.7%) of the respondents reflected that they cannot limit the salt and fat intakes due to frequent consumption of out-of-home food or food that prepared by others. While 727 (59.7%) of the respondents revealed they faced the same challenge while trying to limit high-

fat food in meals. One hundred and seventy-one (14.0%) and 244 (20.0%) of the respondents admitted that they were addicted to high-salted and high-fat food, respectively (Table 6).

3.3. Sociodemographic characteristics and its association with K1, K, A and P

Abnormal BMI (underweight/obese) is associated with lower P scores; while lower socio-economic status, unawareness of self-blood pressure reading and those without family history of hypertension are associated with lower scores in all K1, K, A and P (Table 7). K1 is significantly associated with K, A, and P with $r=0.378$, 0.276 , and 0.226 , respectively ($P<0.001$). K is significantly associated with A, and P with $r=0.356$, 0.190 , respectively ($P<0.001$); while A is significantly associated with P with $r=0.139$ ($P<0.001$) (Table 8).

Table 8. Correlation between K1, K, A, and P.

Variables	K1	K	A	P
K1	-	0.378	0.276	0.226
K	0.378	-	0.356	0.190
A	0.276	0.356	-	0.139
P	0.226	0.190	0.139	-

K1: Knowledge level related to definition, risk factors, symptoms and complications of hypertension; K: Knowledge level towards healthy living to prevent hypertension; A: Attitude level towards healthy living to prevent hypertension; P: Practice level towards healthy living to prevent hypertension.

4. Discussion

This study revealed that majority of the young adults are lack of medical knowledge regarding the health risk, complications of hypertension. They also (i) did not undergo body medical check-up and blood pressure test for at least once a year (ii) did not always control the salt and fat intakes (iii) did not always have physical activities at a recommended level (iv) did not always consume fibres at a recommended amount (v) are non-smokers or alcohol consumers. Perhaps due to the religion and cultural influence in this country, majority of the young respondents are non-drinker and non-smoker, and these findings are consistent with the findings in a nationwide survey which showing approximately 17% and 4% of 18-24 years old young adults are habitual smokers and alcohol-drinkers[5]. Therefore, the verdicts of this study suggest that alcohol and smoking prevalence are comparatively low, and the strategies in reducing salt and fat, promoting annual health screening, physical activities and fibre intake among the young adults should be prioritized in the near future.

Hypertension is well-known to be a silent killer as most of the hypertensive people are usually asymptomatic until some severe complications develop in target organs such as stroke, heart attack, heart failure, kidney failure, *etc.* It is certainly that early detection of raised blood pressure and associated risk factors can help identify high-risk groups for timely treatment and management of risk factors and undoubtedly it plays a crucial role in limiting microvascular and macrovascular damage, and associated hospital admission and comorbidities[6]. Nevertheless, majority of the respondents of this present study did not aware that hypertension could be symptomless and the importance of annual blood pressure screening. About one-third of respondents have conveyed that hectic lifestyle is the main reason in hindering them from having annual health/blood pressure screening, while majority of these young respondents think that their blood pressure/health is normal, and no health checking is required. Unawareness of the health conditions/ blood pressures is alarming as undiagnosed and untreated hypertensive patients have 1.77 times higher risk to develop future cardiovascular events[7]. Based on data from the Malaysia Non-Communicable Disease Surveillance-1, Yen *et al.* has also concluded those younger age, without family history of illness, no obese and not adhering to healthy diet had low awareness of hypertension[8]. This present study proposes that arranging mobile health screening campaigns in workplace/college/universities could be a realistic strategy in increasing the rate of annual health screening exercise among the young adults. In addition, health insurance companies may consider providing incentives/rewards to those perform annual

health screening for interest of both parties.

Poor participation in physical activity is always believed to be influenced by environmental factors include lack of access to facilities (sidewalks, gyms, parks, walking trails, sports/leisure facilities), air pollution, traffic congestion *etc.* While uses of gadgets, television/movie viewings, video games are positively correlated with an increasing sedentary lifestyle. In this study, 88.4% of the respondents aware that regular physical activity is effective to prevent hypertension, nevertheless, 73.2% did not always carry out physical activity at the recommended level; 33% and 32% of them expressed that physical inactivity are mainly due to obsession with sedentary lifestyle, and insufficient time for exercise, rather than lack of individual support or access to facilities. These findings suggest that physical inactivity is primarily due to lack of individual motivation rather than environmental barriers or lack of knowledge about the benefits of physical activity. Many national intervention programs target to increase the awareness of the importance of physical activity, and provision of facilities and opportunities, however, these do not achieve sustained behaviour change[4]. Undoubtedly, self-regulatory in setting and achieving realistic goal and appropriate reward system are the essential techniques to evoke sustained motivation and health-promoting behaviour[9]. This present study propose to emphasize on (i) integration of physical activity into daily life routines based on personalized interest and goal (ii) incorporation of uses of fitness trackers/wearable devices which can further encourage physical activity engagement[10].

Modification in dietary pattern is an effective strategy in reducing blood pressure, and diet-related non-communicable diseases. The most well-known DASH (Dietary Approaches to Stop Hypertension) emphasizes on diet that rich in fruits/vegetables, and with low saturated fat, low sodium/high potassium content; while Mediterranean dietary pattern is very similar to DASH dietary pattern in addition to high intake of monounsaturated fat (olive oil, nuts and seeds)[11]. Majority of the respondents of this survey agreeable on these recommended dietary approaches in preventing hypertension. Nevertheless, they are not keen in modifying their current dietary pattern. The majority of them claimed that they did not always concern the consumption amount of salt, high-saturated fat and fibre intakes despite having great knowledge about the beneficial effects of this dietary regimen. These findings could be associated with the very common eat-out culture in Malaysia. The locals usually choose inexpensive food from street stalls, kopitiam, mamak stalls that usually serve processed/greasy/unhealthy food. Studies revealed that adults in Malaysia preferred fast-food due to its high palatability, affordability and easy accessibility, and many of them opted for foods at cheaper prices over nutritious foods[12].

The government of Malaysia has set up a series of The National Plan of Action for Nutrition Malaysia since 1996. The outcome of the previous strategies was not at a satisfactory level and substantial new challenges surfaced mainly due to rapid urbanization and globalization[13].

Malaysian Community Salt Study reveals that 79% of Malaysians aged 18 years old and above ($n=1\ 032$) are consuming 3.17 g sodium per day, and this amount is approximately 60% higher than the daily sodium intake recommended by the WHO (2 g/day)[14]. While this present study shows that as high as 83.2% of the respondents aged 18-25 years old did not always limit salt consumption to less than 5 g (equivalent to 2 g of sodium) a day. Excessive salt intakes among the local community in Malaysia has been a serious concern for decades and continuous effort has been made to reduce salt intakes. Recently, the government of Malaysia has set a five-year Salt Reduction Strategy to Prevent and Control Non-Communicable Disease for Malaysia (2015-2020) which aimed to reduce population salt intake by 15% by 2020. This implementation consisted of three core interventions: (i) monitoring population salt intake, (ii) generate awareness on the benefits of salt restriction, (iii) lowering sodium content of food products. Nevertheless, the progress was low and the outcome was unsatisfactory[15]. In this present study, majority of the respondents claimed that the main obstacle in salt intake restriction is not able to modify the salt content from street/restaurant dishes or food that prepared by others. It has been reported that food manufacturers were reluctant to lower the salt content in their food products as they believed that Malaysians prefer salty food[15]. In addition, the report revealed that the food manufacturers did not have budget for food research and technology in re-formulation of the highly-salted traditional food *e.g.* soy sauce and preserved food. The same report has concluded that food culture in Malaysia, limited budget for sodium content analysis and awareness campaign, highly accessible unhealthy food, limited nutrition information of restaurant meals *etc* are the main barriers in salt restriction efforts in Malaysia[15].

This present survey reveals that majority of the respondents did not always adhere to fibre-rich and low-fat food diet, despite of good knowledge and good attitude towards beneficial effect this dietary style in preventing hypertension. This survey reveals that the most contributing factor in hindering the respondents from consuming fibre-rich diet is lack of planning on meals, and some respondents think that the recommended servings are too much. One-fifth of the respondents reflected that personal preference/cravings for high-fat food is the most challenging factor, while easy access to high-fat food is the second most challenging factor in reducing high-fat food. Other than to further strengthen public awareness programmes on healthy eating, the current National Plan of Action for Nutrition

of Malaysia III 2016-2025 has re-emphasized the importance in reaching out the hawkers, food operators/providers to promote offering of healthier meals. This plan also aims to engage food and beverage industries to reduce the level of fat, salt and sugar in processed foods and ready-to-eat meals[13].

In conclusion, the medical knowledge related to hypertension risk and complications is poor. The practice degree towards healthy living to prevent hypertension among the 18-25 years old young adults comparatively lower than the degrees of knowledge and attitude. The prime risk factors in this cohort are sedentary lifestyle, reluctant in having annual health screening, restricting salt and fat intake, and unwillingness to increase fibre intake. While, smoking and alcohol consumption are relatively at a less worrisome stage. National strategies for health management in targeting these prime risk factors should be prioritized and tailored to this cohort.

This survey incorporated knowledge, attitude and practice questions that are specific to Malaysian cultural settings. The main hesitancy in practicing healthy living have been identified and national strategies for health management in reducing salt and fat, promoting annual health screening, physical activities and fibre intake in this age group should be prioritized.

Online dissemination of the survey *via* social media allows us to reach a large number of Malaysia in cost-and time-effectively. Nevertheless, it may generate potential sampling bias and possesses the possibility of under- or over-representation of the population. While the use of online self-administered questionnaire for data collection may discourage those with poor internet connection, inactive in using social media/messenger apps from participating this survey.

Conflict of interest statement

The authors declare that there is no conflict of interest.

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Authors' contributions

LSK, KWH, SKH, LRE, LBC, MMSC, TZK, CAL developed the theoretical formalism, performed the analytic calculations and performed the numerical simulations. LSK drafter the manuscript. LSK and CAL contributed to the final version of the manuscript.

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