ORIGINAL ARTICLE

Dietary and Physical Activity Questionnaire for Hypertensive Patients in Malaysia

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ABSTRACT

Introduction: It is crucial to first determine the level of knowledge, attitude, and practices (KAP) among hypertensive patients before developing strategies for the successful intervention. However, the absence of a specific, valid, and reliable KAP questionnaire could hamper the successful treatment modalities. This study aimed to develop and validate a dietary and physical activity questionnaire (DPAQ) with which to measure the KAP of hypertensive patients. **Methods:** This cross-sectional study was divided into two parts: questionnaire development and validation. A total of 23 knowledge items, 20 attitude items, and 15 practices items were tested for content and face validity on a panel of experts and patients. Construct validity and reliability were evaluated by 105 patients. **Results:** Content and face validity were found to be within acceptable limits (>0.70). Item response theory (IRT) analysis of the knowledge domain found that the items tapped at 99.8%. The Kaiser-Meyer-Olkin (KMO) test on the attitude and practise domains were 0.91 and 0.82, respectively. Bartlett's test of sphericity on both domains were found to be significant ($p< 0.001$). An exploratory factor analysis (EFA) showed that there were three factors in the attitude domain while five factors in the practise domain were found to be satisfactory (>0.3). The internal consistency of all the domains was found to be acceptable (>0.70). **Conclusion:** The DPAQ was found to be a valid and reliable instrument with which to assess the KAP of hypertensive patients to better facilitate the development of dietary and physical activity management plans. *Malaysian Journal of Medicine and Health Sciences* (2022) 18(8):16-22. doi:10.47836/mjmhs18.8.3

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INTRODUCTION

Hypertension is one of the leading causes of premature death in the world. As of 2015, an estimated 1.13 billion people; or 1 in 4 men and 1 in 5 women; have hypertension globally with almost two-thirds living in low and middle-income countries (1). The National Health and Morbidity Survey (NHMS) 2019 of Malaysia reported that 3 out of 10; or 6.4 million; people have hypertension and that this number increases with age (2). It is, therefore, essential to overcome hypertension and decrease blood pressure levels. Medical and lifestyle intervention are shown to be effective in controlling blood pressure (3). Recommended lifestyle changes that have been proven to reduce blood pressure include salt restriction, alcohol abstinence, increased consumption of vegetables, fruits, and low-fat food, weight loss and maintenance as well as regular physical activity (4).

Multiple studies have endeavoured to develop and validate a knowledge, attitude, and practice (KAP) questionnaire (5,6). This is because KAP surveys help identify gaps in knowledge, cultural beliefs, or behavioural patterns that may either encourage understanding and action or pose problems and create barriers to controlling hypertension. According to the Integrated Theory of Health Behaviour Change (7), knowledge and beliefs about an issue can help people change their health behaviours, especially when they're combined with an intervention (8). Therefore, it is crucial to first determine the level of KAP in the general population before developing programmes and strategies for the successful dissemination of health education (9). Accurately and validly gathering the relevant data is usually the primary purpose of a study

questionnaire. As such, the accuracy and consistency of a survey or questionnaire form are essential for validity and reliability (10). Therefore, using a valid and reliable questionnaire to determine the level of KAP will provide higher quality data with which to develop a basis for controlling hypertension.

Only a handful of the KAP studies that have been published in Malaysia focus on hypertension. One cross-sectional study used convenience sampling to evaluate the KAP of 110 hypertensive patients above the age of 18 and residing only in Selangor, Malaysia. It found that KAP only correlated with age and not the other socio-demographic characteristics that were studied. However, the instrument used in the study had not been validated (11). Another Malaysian study evaluated the level of KAP on non-communicable diseases (NCDs) among urban adults in Negeri Sembilan. While this study did not solely focus on hypertension, the generalised list of NCDs included hypercholesterolemia, hypertension, diabetes mellitus, chronic obstructive pulmonary disease (COPD), heart attacks, and stroke (12). As the absence of a specific, valid, and reliable survey instrument could impede the ability of healthcare professionals in providing hypertensive patients with successful treatment modalities, this study aims to bridge this gap by developing and determining the psychometric properties of a dietary and physical activity questionnaire (DPAQ) for hypertensive patients.

MATERIALS AND METHODS

Development of the DPAQ

This process was divided into two parts: 1) questionnaire development and 2) questionnaire validation. The DPAQ was developed in three months (between April and June 2020) and validated over six months (between July and December 2020).

The questionnaire was developed in the English language via literature review and focus group discussions with industry experts. A total of 58 items that were relevant to dietary and physical activity management were obtained from the literature (13-15). The DPAQ consisted of three domains: knowledge (K), attitude (A), and practice (P). The knowledge domain consisted of 23 items with "Yes" and "No" options while the attitude domain comprised 20 items with a 5-point Likert-type scale; where 1 denoted "Strongly Disagree" and 5 denoted "Strongly Agree"; and the practice domain encompassed 15 items with a 5-point frequency-scale ranging from "Every day" to "Never".

Ethics approval was obtained from Universiti Teknologi MARA Research Ethics Committee (reference: 600-IRMI (5/1/6) and all participants provided informed consent before study commencement.

Validation of the DPAQ

Participants and Setting.
The content and face validity involved the participation of industry experts; more specifically six dietitians, one statistician, and one linguist; as well as 20 hypertensive patients. The construct validation involved 105 hypertensive patients. The participants were required to understand English and patients suffering from mental disorders were excluded from participation.

Sample Size
The number of participants was calculated based on the minimum ratio between the sample size and the number of variables; which was 3:1; therefore, three subjects per variable was used in the EFA (16). As there were supposed to be 35 items in the attitude and practice constructs, the sample size was calculated as follows:
3 participants x 35 items = 105 participants + 20% non-response rate = 126 participants.

Procedure
The participants were recruited using convenience sampling on online platforms; such as Facebook, WhatsApp Messenger, Telegram, Twitter, and Instagram; due to the government's Movement Control Order (MCO) in light of the Covid-19 pandemic. During the Covid-19 pandemic, online distribution is a very feasible adaptation and could increase the response rate (17).

Statistical Analyses
The obtained data was entered into Statistical Package for the Social Sciences (SPSS) version 25 (IBM Corporation, USA) and R software version 3.1.1+.

Content and Face Validity. Six dietitians, one statistician, and one linguist were involved in the content validation while 20 hypertensive patients were recruited for face validation. Content and face validity were evaluated using the content and face validity index.

Construct Validity. The knowledge domain was validated using item response theory (2-PL IRT) analysis. A difficulty range of -3 to +3 and a discrimination range of 0.35 to 2.5 are considered acceptable for difficulty level determination. The Chi-square goodness of fit of each item was calculated using item fit while unidimensionality was determined using modified parallel analysis (MPA). The attitude and practice domains were validated using exploratory factor analysis (EFA) due to their ordinary responses while principal component analysis (PCA) was used to construct a scree plot and to calculate the number of factors obtained based on eigenvalues of ≥1. Items with a load factor of > +/-0.3 are deemed acceptable (18).

Reliability. As the knowledge items were dichotomously built, the Kuder-Richardson Formula 20 (KR20) was used to evaluate its internal consistency and to evaluate

the questionnaire's reliability. A score of > 0.75 was considered acceptable. The internal consistency of the attitude and practice domains were assessed using Cronbach's alpha coefficient. A Cronbach's α value of 0.5 to 0.69 is considered acceptable while values of 0.70 to 0.90 indicate strong internal consistency (19).

RESULT

A total of 105 hypertensive patients were involved in the construct validation of this study. The mean (SD) age of the participants was 53.12 (8.57) years. More than half of participants (56.2%) were female, 34.3% possessed a diploma, 33.3% had secondary school educations and 23.8% had degrees. Most of the participants (73.3%) received treatment at government health clinics. (Table I).

Table I. Socio-demographic Characteristics of Hypertensive Patients (n=105).

Variables	Mean (SD)	Frequency(n)	Percentage (%)
Age	53.12 (8.57)		
Gender			
Male		46	43.8
Female		59	56.2
Level of education			
Primary school		3	2.9
Secondary school		35	33.3
Diploma		36	34.3
Degree		25	23.8
Master		6	5.7
Places of getting treatment			
Government clinics		77	73.3
Private clinics		16	15.2
Government hospitals		11	10.5
Private hospitals		1	1.0

Validity

The content validity of most of the items was acceptable, with I-CVI values >0.79. Two items in the knowledge domain, that did not meet this criterion, were later removed from the DPAQ. The S-CVI/Ave and S-CVI/UA of the DPAQ met the acceptable satisfactory level. The face validity index (FVI) of the questionnaire also met the acceptable satisfactory level of >0.80 in all domains. The final DPAQ included 23 knowledge items, 20 attitude items, and 15 practices items.

The construct validity of the knowledge domain was determined using 2-PL IRT analysis. As seen in Table II, most of the items were within the acceptable range except K1, K2, K3, K6, K12, K13, K15, and K19 which exceeded the threshold by a large margin. The goodness-of-fit test indicated that nine items did not fit well (p<0.05). However, the amount of information tapped by these nine items at a -3 to +3 difficulty range was 99.87%. Therefore, all the items remained in the DPAQ. The attitude and practice domains were assessed using EFA. The KMO sampling adequacy of the attitude and practice domains were 0.911 and 0.820, respectively, while the significance of the Bartlett's test of sphericity

Table II. IRT analysis in the knowledge section (n=105).

Items	Difficulty (b)	Discrimination (a)	$\chi 2$ (df = 8)	P-values
K1. Do you know the reading for the normal blood pressure level?	-0.38	57.44	3.33	**<0.001**
K2. Do you know what hypertension means?	-0.66	36.94	0.00	1.000
K3. Do you know increased blood pressure of more than 140/90mmHg is called Hypertension?	-0.38	57.44	3.33	**<0.001**
K4. Do you know that hypertension can be controlled?	-0.54	6.06	2.36	**0.003**
K5. If you have hypertension, have you already met a dietitian or other healthcare provider?	-1.01	4.70	1.07	0.998
K6. Is excessive salt intake one of the risk factors of hypertension?	-1.03	50.91	7.99	**<0.001**
K7. Is physical inactivity a risk factor of hypertension?	-0.54	2.13	8.09	0.425
K8. Do you know that stress is another risk factor that causes hypertension?	-0.86	4.57	4.82	0.777
K9. Do you know what you need to do in order to lower down blood pressure?	-0.43	2.86	1.24	0.133
K10. If medication adherence is able to control blood pressure, is there a need to also change lifestyle?	-0.79	2.35	1.54	0.051
K11. Can an individual with hypertension eat foods high in salt as long as they take their medication regularly?	-1.64	1.04	7.41	0.493
K12. Do you know the recommended amount for salt per person per day?	0.65	37.18	4.34	0.825
K13. Do you know that the Ministry of Health Malaysia recommends reducing salt intake <5 g / day salt (about one teaspoon of salt)?	0.65	37.18	4.34	0.825
K14. Do you know there is hidden salt in foods?	0.44	2.26	5.08	**<0.001**
K15. Do you know how to read a food label?	0.70	23.44	7.12	**<0.001**
K16. Do you know how to differentiate which foods contain high sodium and which foods contain low sodium?	0.74	4.24	1.08	**<0.001**
K17. Do you know that flavours, canned and processed foods have high salt content?	0.08	2.45	1.84	**0.019**
K18. Do you know a diet rich in fresh fruits can substantially lower your blood pressure?	-0.71	4.96	5.20	0.735
K19. Do you know a diet rich in fresh vegetables can substantially lower your blood pressure?	-0.70	34.60	1.73	**<0.001**
K20. Do you know the importance of physical activity in regulating blood pressure?	-0.75	2.81	9.41	0.309
K21. Do you understand what the word exercise means?	-0.06	1.39	1.31	0.108
K22. Is doing household chores as exercise enough for a day?	-1.64	1.19	7.43	0.491
K23. Do you know the recommended duration to exercise in a week to reduce blood pressure?	-0.49	3.14	1.23	0.140

a discrimination, *b* difficulty, df degree of freedom, IRT item response theory, $\chi 2$ chi-square with $P < 0.05$ in the assessment of the item fit are highlighted in bold.

for both the domains was <0.001. This implied that EFA could be applied. A three-factor solution with a total variance explained of 75.12% was obtained in the attitude domain whereas a five-factor solution with a total variance explained of 78.56% was obtained for the 15 items in the practice domain (Table III).

Table III. EFA of the attitude domain (n=105).

No.	Attitude Items	Loading on 3 factors		
		F1	F2	F3
	F1: Attitudes towards the importance of dietary and physical activity function			
A17	I think exercise is important to help to lower the blood pressure	0.851		
A2	I think I have to control my current blood pressure reading	0.844		
A11	I think I should increase fresh vegetable intake to control hypertension	0.840		
A16	I think I should exercise regularly for a healthy life	0.804		
A9	I need to control salt intake to reduce blood pressure	0.783		
A8	I think diet control will improve the condition of hypertension	0.781		
A1	I think it is important to monitor my blood pressure reading regularly	0.779		
A13	I think I should take less oily food for a healthy heart	0.772		
A12	I think I should increase fresh fruit intake to control hypertension	0.770		
A14	I think controlling high-fat food consumption is essential to control blood pressure	0.760		
A3	I think I should visit a doctor or other healthcare provider regularly	0.756		
A10	I think eating a low salt diet will keep my heart healthy	0.718		
A15	I think I should make healthy choices when eating outside	0.669		
A5	I think I should start making changes in my lifestyle	0.657		
	F2: Attitudes towards food label reading function			
A7	I prefer to see a clear warning label if foods are a low-salt selection on the package		0.796	
A6	I think food label reading is important in choosing a low-sodium diet		0.770	
	F3: Attitude towards physical activity choices			
A19	I would rather rest at home than doing exercise			0.717
A4	I think medications alone can control hypertension			0.686
A18	I think I do not have time for exercising			0.686
A20	I should exercise at least 3 times a week 30 minutes each time			0.548

F: Factor; Items with factor loading ≥ 0.30 are shown. The three factors that are probably present among the items together explain 75.12% of the total variance in the results.

CONTINUE

Table III. EFA of domain the attitude (n=105) (cont.)

No	Practice Items	Loading on 5 factors				
		F1	F2	F3	F4	F5
	F1: Physical activity practices					
P14	How often do you perform walking as a physical activity?	0.898				
P11	How often do you perform the exercise?	0.889				
P15	How often do you jog as a physical activity?	0.887				
P12	How often do you exercise for at least 30 minutes per session?	0.864				
P13	How often do you try to limit your sedentary lifestyle such as sitting, watching television, reading, using a mobile phone?	0.800				
	F2: Sodium intake					
P7	How often do you avoid taking extra added salt during cooking?		0.892			
P8	How often do you control your salt intake?		0.844			
P4	How often do you read the food label for sodium content?		0.704			
	F3: Fruits and vegetables intake					
P10	How often do you take fresh vegetables in your diet?			0.898		
P9	How often do you take fresh fruits in your diet?			0.857		
	F4: Eating outside and fast-food frequency					
P5	How often do you eat fast food?				0.876	
P6	How often do you eat outside?				0.820	
	F5: Blood pressure management					
P2	How often do you take medication prescribed by a doctor to control your blood pressure?					0.876
P1	How often do you have your blood pressure measurement?					0.737
P3	How often do you get a consultation from your healthcare provider?					0.505

F: Factor; Items with factor loading ≥ 0.30 are shown. The five factors that are probably present among the items together explain 78.56% of the total variance in the results.

Reliability

The overall score of the DPAQ questionnaire was >0.70 indicating good internal consistency. The KR20 of the knowledge domain was 0.923 while the Cronbach's α value of the attitude and practice domains were 0.916 and 0.848, respectively (Table IV).

Table IV. Internal consistency result for knowledge, attitude and practice domains (n=105)

Domain and items	Kuder-Richardson Formula 20 (KR20)	Cronbach's Alpha coefficient
Knowledge	0.923	
Attitude		0.916
Practices		0.848

DISCUSSION

Eight experts and 20 hypertensive patients rated the DPAQ as satisfactory (>0.70) and acceptable (>0.80) during content and face validity, respectively. A focus group was conducted with eight industry experts; six dietitians, a statistician, and a linguist; to establish the content validity of the questionnaire. Feedback from these experts was then included in the questionnaire. The panel of experts agreed that, while most of the items successfully assessed a respondent's current level of KAP, two items did not measure knowledge. As such, these two items were later excluded from the questionnaire. A few questions were also reframed for better understanding. For instance, "Have you already met the dietitian?" was changed to "If you were diagnosed with hypertension, have you consult the dietitian?". The face validity index (FVI) showed that participants found the items in the DPAQ to be 90% easily understandable and clear. These results, in combination with the face validity and the content validity of the expert focus group, addressed all the aspects of the KAP on the dietary and physical activity management of hypertensive patients.

The construct validity of the knowledge domain was measured using 2-PL IRT analysis due to the dichotomous scale of the items while the attitude and practice domains were evaluated using EFA as the items used the Likert and frequency scales, respectively. The IRT analysis found that the items in the knowledge domain had good difficulty within the acceptable difficulty range of -3 and +3. Item discrimination (ai) determines the rate at which the probability of endorsing a correct item changes given the ability levels (20). The theoretical parameter range for discrimination values range from -∞ to +∞. Items with negative ai values are considered problematic because respondents with increasing latent trait levels are less likely to endorse more severe traits response options (21). In our DPAQ, only items K7, K10, K11, K14, K17, K21, and K22 were within the acceptable range of 0.35 to 2.5 while the remaining items exceeded the 2.5 threshold. However, as items with higher ai values increase precision(20), these items were retained in our DPAQ. Due to the significance of their content in assessing participant knowledge, several other studies on questionnaire development also retained these items despite their high ai values (22,23). More importantly, all the items in our DPAQ were within the acceptable difficulty range of -3 and +3.

EFA revealed that three factors in the attitude domain accounted for 75.12% of the total observed variance (Table III). Factor 1 accounted for 63.01% of the total variance explained. As the 14 items under this factor evaluated patient attitudes on the importance of controlling hypertension by leading a healthier lifestyle through diet and physical activity, Factor 1 was named "attitudes towad the importance of dietary and physical activity function". Factor 2 accounted for 6.83% of the total variance explained. As the two items under this factor assessed patient attitudes on reading food labels to select low salt or low sodium options, Factor 2 was referred to as "attitudes toward food label reading function". Factor 3 accounted for 5.28% of the total variance explained. As the four items under this factor investigated patient willingness and confidence in practising the recommended physical activity, Factor 3 was labelled "attitudes toward physical activity choices". The five factors obtained in the practice domain explained 78.56% of the total variance and were named according to the items grouped in each factor. As the first factor included five items targeted towards the practice of physical activities, Factor 1 was named "physical activity practices". Factor 2 identified three items that accounted for 13.39% of the total variance explained. As these factors assessed the practice of controlling sodium intake, Factor 2 was labelled "sodium intake". As the two items in Factor 3 that analysed the practice of consuming fruits and vegetables accounted for 9.18% of the total variance explained, it was accordingly referred to as "fruits and vegetable intake". Factor 4 had a total variance explained of 7.29%. As the two items grouped in this factor assessed the frequency of eating outside and consuming fast foods, Factor 4 was named "eating outside and fast-food frequency". Factor 5 accounted for 6.68% of the total variance explained with its three items evaluating the control of hypertension via blood pressure management. As such, Factor 5 was named "blood pressure management".

Based on the results of the EFA, both the attitude and practice sections of the questionnaire had good construct validity. All attitude and practice items were fairly good and retained in the questionnaire with a loading factor of ≥ 0.30. As all items in the attitude and practice sections were above the requirements, none of the items were excluded from the DPAQ.

The KR20 was used to analyse the internal consistency of the knowledge domain as it was scored dichotomously (24) while the Cronbach's alpha coefficient was used to examine the internal consistency of the attitude and

practice domains as they were scored using Likert and frequency scales, respectively. The internal consistency reliability of the KAP sections of the DPAQ were more than 0.7. As such, the items of the questionnaire were considered to represent a measure of good internal consistency (25).

One of the limitations of this study was that participants were recruited via convenient sampling in Malaysia. Therefore, our findings are not general as they are only representative of a small local population. However, the DPAQ can be used in other settings as the instrument had good psychometric properties. Furthermore, this study was conducted online thereby limiting contact between researchers and participants. Finally, the DPAQ could only be administered to English-literate patients as it was developed in the English language.

CONCLUSION

To the best of our knowledge, there are no published studies on similar questionnaires on validity and reliability that can compare to our findings. As the psychometric properties were within an acceptable range, the DPAQ was a valid and reliable instrument for measuring the knowledge (K), attitude (A), and practices (P) on diet and physical activity on managing hypertension. Clinicians and other healthcare providers could use the DPAQ to determine the current level of KAP among hypertensive patients which would help develop effective initiatives or programmes for controlling hypertension in the Malaysian populace. Furthermore, we recommend translating the DPAQ into local languages so as to access patients who are not English literate.

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