

## Physical Activity and Body Mass Index Among Hypertensive Patients Attending Outpatient Clinic at a Tertiary Hospital in Kelantan, Malaysia

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### ABSTRACT

**Introduction:** Hypertension is one of the predisposing factors for increased morbidity and mortality rate in Malaysia as it significantly contributes to the risk of non-communicable diseases such as heart disease, stroke, and kidney injuries. Non-pharmacological intervention such as physical activity (PA) helps to reduce the progression of hypertension severity and body mass index (BMI) among hypertensive patients. Limited studies were conducted among hypertensive patients at outpatient clinics in the east-coast region of Malaysia.

**Objective:** To determine the level of PA and BMI of hypertensive patients attending outpatient clinics.

**Methods:** This is a cross-sectional study using purposive sampling. The study was conducted among 73 hypertensive patients who attended the outpatient clinic at a tertiary hospital in Kelantan state, the Northern East of Malaysia. Data was collected using a self-reported questionnaires for BMI and hypertension and the short form of the International Physical Activity Questionnaire (IPAQ) was used to measure the level of PA.

**Results:** The findings show that most of the respondents above 50 years old are moderately active (54.8%, n=40) and nearly half (45.2%, n=33) were overweight. There is no significant association between the level of PA and BMI ( $p=0.854$ ). A significant association was only found between the respondents' marital status and their BMI ( $p=0.034$ ). **Conclusion:** The majority of the respondents in the study were moderately active in performing physical activity and within the category of overweight. PA and BMI are not significantly associated in the study. The non-significance findings could be due to the small sample size in this study and other contributing factors such as comorbidities, lifestyle variables including dietary habits, and sedentary behaviour that were not investigated in the study. Overall, the study underlined the importance of physical activity and body mass index in achieving public health recommendations.

**Conclusion:** Overall, the study underlined the importance of physical activity and body mass index in achieving public health recommendations.

**Keywords:** Physical activity; Body Mass Index; Hypertension

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## INTRODUCTION

Hypertension is known as a silent killer that significantly contributes to the risk of non-communicable diseases (NCDs) such as heart disease, stroke, and kidney injuries. According to the World Health Organization (WHO), approximately 1.13 billion of the population worldwide are experiencing hypertension (1). In Malaysia, hypertension is one of the common predisposing factors contributing to cardiovascular diseases (2-4). The National Health and Morbidity Survey reported that 6.4 million people in Malaysia have hypertension and only 50% of them know about their disease (4). In addition, despite taking medication blood pressure control are low (4).

Non-pharmacological interventions such as exercise, weight control, and healthy diet consumption help reduce the progression of hypertension stages (5-6). Physical activity promotes circulation to the brain and indirectly helps reduce cognitive impairment resulting from hypertension (7-8). Previous studies showed a positive relationship between the level of PA and blood pressure (9) and it was notable the reduction in blood pressure until 24 hours post-exercise (10). Therefore, regular PA is needed as a method to maintain blood pressure.

A high level of body mass index (BMI) is strongly associated with hypertension (11). Maintaining an ideal weight by increasing PA is vital in controlling BMI and obtaining the desired effect on blood pressure measurement (11). Studies conducted in Malaysia show that BMI strongly affects the blood pressure of middle-aged respondents above 40 years old (12) whereby an increase of 10% in BMI would gradually increase the blood pressure readings (10).

A significant correlation was observed between PA, BMI, and hypertension based on a study done in northern Borneo, Malaysia in 2022 (10). Another study also showed that a higher BMI with a lower level of PA was independently associated with a higher risk of hypertension (13).

According to the statistic from the Ministry of Health Malaysia, Kelantan is the third highest rate with a 33.8% prevalence of hypertension in

the year 2015 and the rate is increasing compared to years before (14).

Limited studies were found assessing the relationship between PA and BMI among hypertensive patients in the Kelantan region. This study aimed to determine the level of PA and BMI and their association with sociodemographic characteristics among hypertensive patients attending an outpatient clinic at a tertiary hospital located in Kelantan, the east-cost of Malaysia.

## METHODS

### Study design

A descriptive cross-sectional and preliminary study was done to achieve the study objectives. The study was conducted at the outpatient clinic in Hospital Universiti Sains Malaysia, located in the federal constituency in Kota Bharu district, Kelantan the east cost of Malaysia.

### Study sample/population

The sample size was calculated using a single proportion formula with the population proportion of hypertension in Kelantan of 33.8 (NHMS, 2015), precision ( $\pm 10\%$ ), level of confidence of 90% and level of significance of 0.05. With 80% response rate, the calculated sample size is 73 respondents. The respondents were selected according to their eligibility of being Malaysian nationality, having been diagnosed with hypertension by medical practitioners, and attending the outpatient clinic at the Hospital Universiti Sains Malaysia. A total number of 73 hypertensive patients who attended the outpatient clinic in a tertiary hospital located in the east-cost of Malaysia were recruited through purposive sampling.

### Study instrument

Data was collected using a set of self-administered questionnaires which consist of Part A on sociodemographic characteristics including body weight based on self-reporting. BMI levels were categorized as underweight, normal, overweight, and obese following the range recommended by the Centers for Disease Control and Prevention. Part B consists of the level of PA using the International Physical Activity Questionnaire (IPAQ) short form with

seven structured items designed by assessing specific types of activities including vigorous-intensity activities, moderate activities, walking, and sitting (15). Data were collected within three months from February to April 2018.

**Ethical Approval**

Approval to conduct the study was obtained from the USM Human Research Ethics Committee (ref no: USM/ JEPeM/17110626) and the hospital director. Written consent was obtained from each of the patients prior to participating in the study.

**Data analysis**

Data from the questionnaires were analyzed using the Statistical Package for Social Science (SPSS) version 22.0. Descriptive statistics tests were used to analyze the level of PA and BMI meanwhile, the Pearson Chi-Square and Fisher’s Exact Test were used to analyze the association of PA and BMI with sociodemographic characteristics. The significance level was set at  $p \leq 0.05$  for all statistical analyses.

**RESULTS**

**Sociodemographic characteristics of the respondents**

A total of 73 eligible hypertensive patients participated in the study. Most of the respondents were aged above 50 years old (94.5%). The total of male respondents was 50.7% and the female respondents were 49.3% respectively. Most of the respondents were married (93.2%), obtained tertiary level education (68.5%), unemployed (68.5%), and non-smokers (84.9%). The results are presented in **Table 1**.

**Level of PA among the respondents**

The level of PA was categorized based on the IPAQ scoring protocol (9). There were three categorical scores low PA (category 1), moderate PA (category 2), and high PA (category 3).

A total of 21.9% of respondents have a low level of PA (category 1), followed by 54.8% of respondents with a moderate level of PA

(category 2) and 23.3% of respondents with a high level of PA (category 3) respectively. The results are presented in **Table 2**.

**Table 1:** Sociodemographic characteristics of the respondents (N= 73)

Variables	Frequency (n)	Percentage (%)
Age		
18 - 50	4	5.5
> 50	69	94.5
Gender		
Male	37	50.7
Female	36	49.3
Marital Status		
Single	3	3.1
Married	68	93.2
Divorced/ Widowed	2	2.7
Educational level		
No formal	10	13.7
Primary	0	0
Secondary	13	17.8
Tertiary	50	68.5
Employment Status		
Employed	10	13.7
Self-employed	13	17.8
Not employed	50	68.5
Smoking status		
Yes	11	5.1
No	62	84.9

**Table 2:** Level of PA among the respondents (N= 73)

Variables	Frequency (n)	Percentage (%)
Level of PA		
Category 1: Low	16	21.9
Category 2: Moderate	40	54.8
Category 3: High	17	23.3

**Category of BMI among the respondents**

The result revealed that 4.1% of respondents are underweight, followed by 20.5% of respondents with normal weight, 45.2% were overweight, and 30.1% were obese. The results are presented in **Table 3**.

**Table 3:** Category of BMI among the respondents (N= 73)

Variables	Frequency (n)	Percentage (%)
Category of BMI		
Underweight	3	4.1
Normal	15	20.5
Overweight	33	45.2
Obese	22	30.1

**Association between the PA and BMI among the respondents**

The result revealed the majority of the participants regardless of their category of BMI were practicing a moderate level intensity of PA. There is no significant association between the level of PA and BMI of the respondents in the study ( $p = 0.854$ ). The results are presented in **Table 4**.

**Association between sociodemographic characteristics and level of PA among the respondents**

This study finding shows that there is no significant association between sociodemographic characteristics with PA; age ( $p = 0.322$ ), gender ( $p = 0.735$ ), marital status ( $p = 0.445$ ), educational level ( $p = 0.693$ ), employment status ( $p = 0.417$  and, smoking status ( $p = 0.179$ ). The results are presented in **Table 5**.

**Table 4:** Association between the PA and BMI among the respondents

Variables	Level of physical activity, n (%)			X <sup>2</sup> (df)	p-value
	Category 1: Low	Category 2: Moderate	Category 3: High		
Category of BMI				2.690 (6)	0.854
Underweight	1 (33.3)	2 (66.7)	0 (0)		
Normal	4 (26.7)	6 (40.0)	5 (33.3)		
Overweight	7 (21.2)	19 (57.6)	7 (21.2)		
Obese	4 (18.2)	13 (59.1)	5 (22.7)		

**Table 5:** Association between sociodemographic characteristics and level of PA among the respondents (N = 73)

Variables	Level of physical activity, n (%)			p-value
	Category 1: Low	Category 2: Moderate	Category 3: High	
Age				0.322 <sup>a</sup>
< 50	0 (0)	4 (100.0)	0 (0)	
≥ 50	16 (23.2)	36 (52.2)	17 (23.3)	
Gender				0.735 <sup>a</sup>
Male	8 (21.6)	19 (51.4)	10 (27.0)	
Female	8 (22.6)	21 (58.3)	7 (19.4)	
Marital Status				0.445 <sup>b</sup>
Single	0 (0)	3 (100.0)	0 (0)	
Married	15 (22.1)	26 (52.9)	17 (25.0)	
Divorce/Widowed	1 (50.0)	1 (50.0)	0 (0)	
Educational level				0.693 <sup>a</sup>
High	6 (4.6)	11 (11.5)	4 (4.9)	
Low	10(11.4)	29 (28.5)	13 (12.1)	
Employment Status				0.417 <sup>a</sup>
Employed	3 (5.0)	15 (12.6)	5 (5.4)	
Not employed	13 (11.0)	25 (27.4)	12 (11.6)	
Smoking status				0.179 <sup>a</sup>
Yes	5 (45.5)	4 (36.4)	2 (18.2)	
No	11 (17.7)	36 (58.1)	15 (24.2)	

<sup>a</sup>Chi-Square, <sup>b</sup>Fishers Exact test

**Table 6:** Association between sociodemographic characteristics and BMI among the respondents (N=73)

Variables	Level of physical activity, n (%)				p-value
	Underweight	Normal	Overweight	Obese	
Age					0.618 <sup>a</sup>
< 50	0 (0)	1 (25.0)	1 (25.0)	2 (50.0)	
≥ 50	3 (4.3)	14 (20.3)	32 (46.4)	20 (29.0)	
Gender					0.309 <sup>a</sup>
Male	2 (5.4)	10 (27.0)	17 (45.9)	8 (21.6)	
Female	1 (2.8)	5 (13.9)	16 (44.4)	14 (38.9)	
Marital Status					0.034 <sup>b</sup>
Single	0 (0)	1 (33.3)	0 (0)	2 (66.7)	
Married	2 (2.9)	14 (20.6)	33 (48.5)	19 (27.)	
Divorce/Widowed	1 (50.0)	0 (0)	0 (0)	1 (50.0)	
Educational level					0.096 <sup>a</sup>
High	1 (0.9)	8 (4.3)	6 (9.5)	6 (6.3)	
Low	2 (2.1)	7 (10.7)	27 (23.5)	16 (15.7)	
Employment Status					0.102 <sup>a</sup>
Employed	2 (0.9)	2 (4.7)	9 (10.4)	10 (6.9)	
Not employed	1 (2.1)	13 (10.3)	24 (22.6)	12 (33.9)	
Smoking status					0.257 <sup>a</sup>
Yes	1 (9.1)	3 (27.3)	6 (54.5)	1 (9.1)	
No	2 (3.2)	12 (19.4)	27 (43.5)	21 (33.9)	

<sup>a</sup>Chi-Square, <sup>b</sup>Fishers Exact test

## DISCUSSION

In this study, the total number of male and female hypertensive respondents was similar proportion. Most of the respondents are above 50 years old, married and unemployed due to age. A previous study found that hypertension is not associated with gender and rises with older age (4, 16-17). As part of the aging process, the arteries would be getting stiff and contribute to increased blood pressure (18).

According to the Malaysia National Health and Morbidity Survey (2015), married people are prone to experience higher psychological disturbance compared to unmarried people thus this causes a rise in blood pressure (14). Higher family responsibilities and limited income could be the factor associated with stress and hypertension. Job insecurity could add more stress that contributes to rising blood pressure and this depends on the length of unemployment as well (19). In this study, unemployment was due to the age factor and a previous study showed that employment due to retirement does not impact blood pressure (20).

The study findings revealed that most of the respondents are highly educated and non-smokers. It is notable that most respondents understood the importance of PA and health since they practice moderate to high-intensity exercise. A few studies conducted in Malaysia showed that the knowledge prevalence of hypertension is greater in highly educated individuals (17&21). Meanwhile, people who are smoking or recently stop from smoking do not influence blood pressure (22).

Most of the respondents in the study were moderately active in practicing PA. According to the IPAQ categorical score, moderately active indicate the respondents performing PA 3 to 5 or more days lasting between 20 minutes to 30 minutes of activities each day. The activities could be either vigorous-intensity activity, moderate-intensity activity, walking, or any combination of them in achieving a minimum of 600 metabolic equivalents of task (MET) per week (15). A previous study reported that recreational PAs such as running, jogging, and other types of enjoyable exercise also helps to reduce the risk of hypertension (23).

Moderate PA by hypertensive patients would possibly prevent the morbidity of cardiovascular diseases together with the aid of pharmacological treatment (24). According to the Clinical Practice Guidelines on managing hypertension in Malaysia, regular PA will reduce blood pressure and cumulative moderate-intensity exercise of minimally 150 minutes per week would benefit hypertensive patients (25-27).

Is it notable that most of the respondents were classified under the category of overweight and followed by obese according to the BMI guidelines by the Centers for Disease Control and Prevention (28). An effective weight reduction strategy is essential in preventing hypertension and other serious complications due to high BMI even though the process to reduce weight is challenging (29). The previous study shows that performing PA based on a person's available time in a day is sufficient to maintain a normal weight and the initiative reduces the risk of hypertension (23).

The study revealed that most of the respondents were moderately active in performing PA regardless of their BMI categories therefore, no significant associations were found between the level of PA and BMI. The enjoyment of performing interesting PA or recreational exercises is not influenced by their body weight. In this study context, it could be due to the availability of free time following unemployment. Another study was done in China also reported a moderate and high level of PA was negatively correlated with BMI and its outcome on hypertension (30).

The study shows that there is no significant association between sociodemographic characteristics of age, gender, marital status, educational level, employment status, and other comorbidities with the level of PA. According to NHMS, 28% of females and 59% of people above 75 years old in Malaysia were reported to be physically inactive (4). Therefore, Malaysian adults are encouraged to perform a combination of moderate to various activities throughout the week (4). In contrast, studies conducted in Brazil and Bangladesh showed that younger age and married respondents demonstrated a higher level of PA while women, uneducated, and employed

respondents showed a lower level of PA respectively (31-32).

Notably, a significant association was found between the respondents' marital status and BMI. Most of the respondents in the study are married and under the category of overweight and obese. According to a previous study, married respondents gain weight much more easily as they minimally prioritize an ideal weight and show less interest in physical appearance (33). Moreover, another factor to consider is those married with children as they may neglect the importance of PAs while focusing on household responsibilities. In this study, most of the respondents are retired and a previous study shows that people who are overweight prior to retirement may continually increase their body weight once stop working (34).

## CONCLUSION

In conclusion, most of the respondents in the study were above 50 years old and married. The level of PA among the respondents was moderately active although their BMIs were within the category of overweight and obese. There is no significant association between the level of PA and BMI. A significant association was only found between the respondents' marital status and their BMI.

Despite the smaller sample size, this study has determined several pieces of information about the relationship between the level of PA, BMI and its association with sociodemographic characteristics among patients who attended a teaching hospital in Kelantan. The study findings have provided base data to the hospital personnel on the methods patients are coping with their PA and BMI towards managing hypertension.

The NHMS highlighted the key points to overcome NCDs including blood pressure control, maintaining a healthy weight, and regular exercise (4). Patient education is essential in primary health care settings as this will create self-awareness among the patients in managing their blood pressure and BMI. The usage of technology applications such as smart watch tracker monitoring or interactive kiosk in smartphones to monitor the level of PA and blood pressure would be a beneficial tool for

self-assessment among patients in developing life-long learning (35).

However, there are a few limitations of the study, including the smaller sample and conducted in a short duration. It was also subjected to social desirability bias and recall bias due to respondents' self-reported BMI. Since this is a cross-sectional study design, it prevents the establishment of a causal-effect relationship. Additionally, the duration of unemployment, BMI prior to and after unemployment as well as the number of children available by married respondents needs to be reported to discuss the study findings precisely.

Co-morbidities experienced by the respondents and other lifestyle variables such as dietary habits and sedentary behaviours that may contribute to hypertension could be further explored.

Future studies could be conducted on a larger number of hypertensive respondents attending outpatient clinics in the same hospital and include other tertiary hospitals in a few states in Kelantan to compare the study findings extensively for the east-coast region of Malaysia.

#### CONFLICT OF INTEREST

The authors declare that they have no competing interests regarding the publication of this paper.

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#### AUTHOR CONTRIBUTIONS

All authors have made substantial contributions to the submission of the article. NSA & AY: Involved in the conception framework and design of the study, acquisition of data, analysis and interpretation of data.

PLS: has drafted the article and revised it critically.

All the authors have checked the drafted article and proceeded with the final approval of the version to be submitted.

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