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Prevalence of white coat hypertension in adult primary care attenders

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RESEARCH

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ABSTRACT

Background

White coat hypertension (WCH) is common but such data is lacking in Malaysia.

Aims

To determine the prevalence of WCH and its associated factors among healthy adults in the Malaysian primary care setting.

Methods

This was a cross-sectional study conducted from January to June 2014 in 5 primary care clinics in Negeri Sembilan, Malaysia. Previously healthy adult who found to have persistently elevated BP fulfilling all the inclusion and exclusion criteria of our study at clinic were recruited. The validated BP set Omron HEM7200 was used for home BP monitoring in making the diagnosis of WCH. Patients were guided to do home BP monitoring.

Results

A total of 105 subjects completed the study, with a response rate of 92.1 per cent. The prevalence of WCH among Malaysian primary care attenders was 52.4 per cent. There was no correlation found between WCH and socio-demographic variables.

Conclusion

More WCH studies using ambulatory blood pressure monitoring with larger sample size are needed for Malaysian primary care setting. Accurate diagnosis of hypertension could have saved money on the unnecessary anti-hypertensive agents.

Key Words

White coat hypertension, prevalence, primary care, Malaysia

What this study adds:

1. What is known about this subject?

White coat hypertension is common. Many international guidelines recommend its exclusion by using either home or ambulatory BP monitoring.

2. What new information is offered in this study?

Malaysian primary care attenders have higher prevalence of white coat hypertension as compared with other countries.

3. What are the implications for research, policy, or practice?

There is a need to repeat the similar study using ambulatory blood pressure monitoring with larger sample size for Malaysian setting.

Introduction

White coat hypertension (WCH) or isolated office hypertension is a condition whereby the blood pressure (BP) is elevated repeatedly in a medical setting, but normal BP outside medical setting, detected either on home BP monitoring (HBPM) or ambulatory BP monitoring (ABPM). On the other hand, sustained hypertension is the presence of an elevated BP regardless of setting.

WCH is increasingly recognised as a significant entity and NICE guidelines[1] recommends its exclusion by offering ABPM or HBPM to those with clinic BP ≥140/90mmHg. These new methods of BP monitoring have been increasingly used in medical practice as it provides additional information compared with the traditional method of BP measurement. ABPM or HBPM are not just useful tools to eliminate errors related to measuring BP but also useful in wider-reaching diagnosis.

It is unknown whether WCH represents a transient state in the development of hypertension, whether risk for cardiovascular morbidity is increased and whether drug therapy is needed.[2] There are no treatment recommendations for WCH so far. It has been shown that demographic factors may affect WCH.[3-5] the pathophysiology of BP increase in white coat hypertension is also yet to be known.[6]

Numerous European, American and Asian studies[7-9] has underlined the importance of WCH. One of the more well-known Asian studies is the Ohasama study[10] in Japan whereby WCH was investigated as a risk factor for developing home hypertension. Prevalence of WCH from the published studies ranged from 20-40 per cent.[11-14] None of these Asian studies were done in primary care setting. There is currently no published data on the prevalence of WCH among healthy adults in Malaysia. The objective of our study is to identify the prevalence of WCH among healthy adults in Malaysian primary care setting.

Method

This was a cross-sectional study conducted from January till June 2014. Previously healthy adults who fit our inclusion and exclusion criteria were recruited from five primary care clinics in Negeri Sembilan, three of which are public clinics. These were consecutive patients visited the clinics during the research period. 116 patients were approached and 114 patients agreed to participate. The research was carried out after being approved by the IMU joint-committee of Research and Ethics Committee (IMU 248/2012). The study was also registered with the National Medical Research Register (NMRR-12-697-13208).

The inclusion and exclusion criteria of the study are listed in Table 1.

The office and home BP were measured using the same validated BP monitoring device (Omron HEM 7200)[15] which records brachial BP using the oscillometric method with a pressure range of 0–299mmHg and pulse rate range of 40–180 beats/minute. Inflation is performed using a fuzzy-logic electric pumping system and deflation by an automatic pressure release valve. At the end of each measurement, systolic BP, diastolic BP, and pulse rate are displayed on a LCD screen.

Two readings were taken two minutes apart at the clinic and those with two BP readings of 140/90mmHg and above were recruited. The recruited patients were asked to measure their BP at home according to the guidance given by the European Society of Hypertension in 2007.[16] A total of 28 BP recordings (2 readings before breakfast and 2 readings before dinner for 7 days) were required. A BP recoding chart was also provided. The second clinic BP was measured using the same device when the subjects came back for the second visit. We only analysed the data of the patients with persistently elevated clinic BP.

In addition to the BP readings, we also collected variables such as biochemical metabolic variables (blood glucose, urine glucose and urine protein) and anthropometric variables (body mass index and waist circumference). The medical history specifically cardiovascular risk factors, family history of hypertension and drug therapy were also obtained.

The diagnosis of WCH was made based on the criteria determined by the European Society of Hypertension 2013[17] and NICE guideline 2011[1], where clinic BP persistently ≥140/90, with non-elevated average home BP (average of several readings <135/85 mmHg).

Standard descriptive and comparative statistical analyses were made. The Student *t*-test was used to test for significant differences between means for continuous variables and the chi-squared test to test for significant differences for categorical variables. *P*-value <0.05 was considered significant.

Results

114 walk-in patients were recruited for the study. However, the data of nine subjects were excluded due to incomplete home BP readings. Thus we only analysed the data on the remaining 105 subjects. The respondents were mainly from

the public clinics (78.1 per cent). Majority of them were married (98.1 per cent). Females were about 68.6 per cent. Malay (71.4 per cent) was the largest ethnic group. Most have at least a secondary education (87.7 per cent). The employed group (47.6 per cent) was the majority. See Table 2 for the detail of the socio-demographic profile of the research subjects.

Table 3 shows the clinical profile of the respondents. Majority of the respondents were non-smokers (91.4 per cent) and did not have any comorbid conditions like hyperlipidemia (87.6 per cent). Most of them were not monitoring their blood pressure at home regularly before enrolling into the study (79 per cent). Fifty-eight respondents (55.2 per cent) did not have any family history of hypertension.

The respondents had a mean age of 49.1 years 9.3, mean BMI of 26.9 kg/m^2 ± 4.1 and mean waist circumference of 87.9 cm ± 10.4. The means of both systolic and diastolic BP as well as the heart rate were higher in the office than at home. See Table 4 for more details.

The prevalence rate of WCH was 52.4 per cent (95 per cent CI:42.8 to 61.9 per cent). Respondents from the public clinics have a higher prevalence of WCH, 56.1 per cent, compared with private clinics with prevalence of 39.1 per cent (p=0.15). Different variables were compared between patients with WCH and patient without WCH. There was no statistical significance noted. See Table 5 for details.

Discussion

55 out of 105 primary care attenders had WCH. The prevalence rate among primary care attenders of our study was 52.4 per cent which is higher than those of previous studies (Scandinavian,[18] Mediterranean[19,20] and South American[21] studies had prevalence rate of 20–40 per cent). HBPM was used in our study instead of ABPM. Despite the sensitivity and specificity in making the diagnosis of WCH between these two methods are comparable,[22] HBPM subjects to potential measurement or recording error. Moreover, Kang et al.[23] found that HBPM overestimated WCH by 52 per cent. Our study needs to be repeated using ABPM to verify the use of HBPM in making the diagnosis of WCH in Malaysian setting.

All socio-demographic factors were not associated with WCH. No independent risk factor contributed to the prevalence of white coat hypertension. Fasting blood glucose, urine protein and urine glucose had no significant associations with WCH. Previous studies had demonstrated the association between WCH and variables like female gender, older age group and non-smoker status. The sample size of our study was not powered to assess the association between WCH and socio-demographic variables. Thus a study with a larger sample size in Malaysia is needed to verify the findings.

This study was limited by its small sample size and geographical location. The clinics participated in the study are located only in Negeri Sembilan, one of the fourteen states of Malaysia. Therefore the result of our study could not be generalized to the whole Malaysian population. A study with larger sample size involves all states is needed.

Conclusion

We found that more than half of the patients with hypertension in the clinic setting actually have WCH and probably do not need any treatment. Accurate diagnosis of hypertension could potentially help to save money and reduce patients' anxiety. Although no conclusive evidence that WCH needs to be treated, a cohort study by Mancia et al.[24] showed adults with WCH were more likely to develop sustained hypertension later. Therefore, regular follow-ups of WCH patients are necessary.

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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

IMU joint-committee of Research and Ethics Committee (IMU 248/2012).

Table 1: Inclusion and exclusion criteria of the study

Inclusion criteria:
i. Age ≥30 years
ii. BP on first clinic visit ≥140/90mmHg, <180/110mmHg
iii. Respondent willing to visit clinic twice
iv. Able to answer simple questionnaire and follow instructions to do self-measurement of BP
Exclusion criteria:
i. Existing hypertension
ii. Taking anti-hypertensive drugs
iii. Chronic medical illness such as diabetes, stroke, heart/kidney/liver/thyroid/prostate disease, cancer, COPD, Cushing etc.
iv. Physical handicap severe enough to limit measurement

Table 2: Socio-demographic profile of the respondents (n=105)

Variables	Values
Clinic setting	
Public clinic	82 (78.1%)
Private clinic	23 (21.9%)
Age	
31-40 years	22 (20.9%)
41-50 years	34 (32.3%)
51-60 years	36 (34.3%)
61 years and above	13 (12.3%)
Gender	
Male	33 (31.4%)
Female	72 (68.6%)
Ethnicity	
Malay	75 (71.4%)
Chinese	20 (19.0%)
Indian	10 (9.5%)
Marital status	
Single	2 (1.9%)
Married	103 (98.1%)
Education level	
No formal education	3 (2.9%)
Primary	10 (9.5%)
Secondary	66 (62.9%)
College/University	26 (24.8%)
Occupation	
Employed	50 (47.6%)
Self employed	13 (12.4%)
Unemployed	25 (23.8%)
Retired	9 (8.6%)
Others	8 (7.6%)

Table 3: Clinical profile of respondents (n=105)

Variables	Values
Smoke, n (%)	
Yes	9 (8.6%)
No	96 (91.4%)
Hyperlipidemia, n (%)	
Yes	13 (12.4%)
No	92 (87.6%)
Home BP monitoring, n (%)	
Yes	22 (21%)
No	83 (79%)
Family history of hypertension, n (%)	
Yes	47 (44.8%)
No	58 (55.2%)

Table 4: Means and standard deviation (SD) of the respondents

Variables	Mean (SD)
Age (years)	49.1 (9.3)
BMI (kg/m^2)	26.9 (4.1)
Waist circumference (cm)	87.9 (10.4)
Fasting blood glucose (mmol/l)	5.3 (0.9)
OMSBP (Office measured systolic BP, mmHg)	150.9 (9.7)
OMDBP (Office measured diastolic BP, mmHg)	91.0 (5.6)
OMHR (Office measured heart rate, bpm)	80.0 (8.9)
HMSBP (Home measured systolic BP, mmHg)	133.5 (12.9)
HMDBP (Home measured diastolic BP, mmHg)	79.3 (7.4)
HMHR (Home measured heart rate, bpm)	76.2 (8.2)
* bpm = Beats per minute	

Table 5: Association of socio-economic and clinical data in WCH (n=105)

Variables	WCH	No WCH	P-value
Clinical setting, n (%)			
Public	46 (56.1)	36 (43.9)	0.15
Private	9 (39.1)	14 (60.9)	
Age, n (%)			
31-40	14 (63.6)	8 (36.4)	0.635
41-50	18 (52.9)	16 (47.1)	
51-60	17 (47.2)	19 (52.8)	
>61	6 (46.2)	7 (53.8)	
Gender, n (%)			
Male	17(51.5)	16(48.5)	0.904
Female	38(52.8)	34(47.2)	

Ethnicity, n (%)			
Malay	38 (50.7)	37 (49.3)	0.75
Chinese	12 (60.0)	8 (40.0)	
Indian	5 (50.0)	5 (50.0)	
Marital status, n (%)			
Single	1 (50.0)	1 (50.0)	0.946
Married	54 (52.4)	49 (47.6)	
Education level, n (%)			
None	2 (66.7%)	1 (33.3%)	0.672
Primary	5 (50.0%)	5 (50%)	
Secondary	32 (48.5%)	34 (51.5%)	
College/University	16 (61.5%)	10 (38.5%)	
Occupation, n (%)			
Employed	25 (50.0)	25 (50.0)	0.835
Self employed	6 (46.2)	7 (53.8)	
Unemployed	15 (60.0)	10 (40.0)	
Retired	4 (44.4)	5 (55.6)	
Others	5 (62.5)	3 (37.5)	
Smoking, n (%)			
Smokers	4 (44.4)	5 (55.6)	0.618
Non-smokers	51(53.1)	45(46.9)	
Family history of hypertension, n (%)			
Present	20 (42.6)	27 (57.4)	0.07
Absent	35 (60.3)	23 (39.7)	
Home BP monitoring, n (%)			
Done	8 (36.4%)	14 (63.6%)	0.091
Not done	47 (56.6%)	36 (43.4%)	
Body mass index (BMI) kg/m^2, mean (SD)	27.48 (4.53)	26.33 (3.66)	0.157