

Prevalence of nocturnal hypertension and associated factors: a cross-sectional study among hypertensive patients attending a public primary care clinic in Singapore

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INTRODUCTION

- Nocturnal hypertension (NH), defined as nighttime blood pressure (BP) ≥120/70 mmHg, is associated with adverse cardiovascular events and organ damage.¹
- The prevalence of NH has been found to vary across countries, populations and lifestyles.²⁻⁵

OBJECTIVE

- This ongoing study aims to determine the prevalence of NH among patients with treated hypertension in a Singapore primary care setting and the factors associated with it.

METHODS

- A cross-sectional study was conducted at a polyclinic (public primary care clinic) in July 2024 – March 2025.
- Adult patients with an established diagnosis of hypertension who are managed in primary care were recruited via convenience sampling.
- Recruitment strategies included invitation via text messaging, poster advertisement, referral by physicians, and snowball sampling.
- Participants underwent standardized 24-hour ambulatory blood pressure monitoring (ABPM) using a clinically-approved oscillometric device (SpaceLabs).
- Multivariable logistic regression analyses were conducted to identify sociodemographic, clinical and lifestyle factors associated with NH.

RESULTS

- Out of 126 participants recruited, 103 (81.7%) had valid ABPM readings (≥70% successful readings; ≥20 waketime and ≥7 sleeptime readings).

Table 1. Participant characteristics

Characteristics	Overall		NH		Isolated NH	
	n	(%)	n	(% of category)	n	(% of category)
Age group						
<60 years	29	(28.2)	26	(89.7)	6	(20.7)
≥60 years	74	(71.8)	48	(64.9)	18	(24.3)
mean±sd	63.9±9.4 years					
Gender						
Male	69	(67.0)	49	(71.0)	17	(24.6)
Female	34	(33.0)	25	(73.5)	7	(20.6)
Ethnicity						
Chinese	84	(81.5)	61	(72.6)	19	(22.6)
Others	19	(18.5)	13	(68.4)	5	(26.3)
Currently working						
Yes	39	(38.6)	33	(84.6)	9	(23.1)
No	62	(61.4)	40	(64.5)	14	(22.6)
Education						
Secondary school and below	24	(23.3)	17	(70.8)	8	(33.3)
Post secondary	79	(76.7)	57	(72.2)	16	(20.3)
Body mass index (BMI)						
Normal/Underweight	29	(28.2)	22	(75.9)	6	(20.7)
Overweight/Obese	74	(71.8)	52	(70.3)	18	(24.3)
Smoking status						
Yes	3	(2.9)	2	(66.7)	0	(0.0)
No	100	(97.1)	72	(72.0)	24	(24.0)
Alcohol risk						
Low risk	88	(85.4)	62	(70.5)	21	(23.9)
Moderate risk and above	15	(14.6)	12	(80.0)	3	(20.0)
Co-morbid conditions						
Diabetes mellitus	30	(29.1)	17	(56.7)	7	(23.3)
Hyperlipidaemia	56	(54.4)	40	(71.4)	14	(25.0)
Chronic kidney disease	1	(1.0)	1	(100.0)	0	(0.0)
Chronotype						
Morning	54	(52.4)	40	(74.1)	17	(31.5)
Evening/Intermediate	49	(47.6)	34	(69.4)	7	(14.3)
Sleep hours						
<7 hours	35	(34.0)	25	(71.4)	9	(25.7)
≥7 hours	68	(66.0)	49	(72.1)	15	(22.1)

Figure 1. Prevalence of nocturnal hypertension (NH)

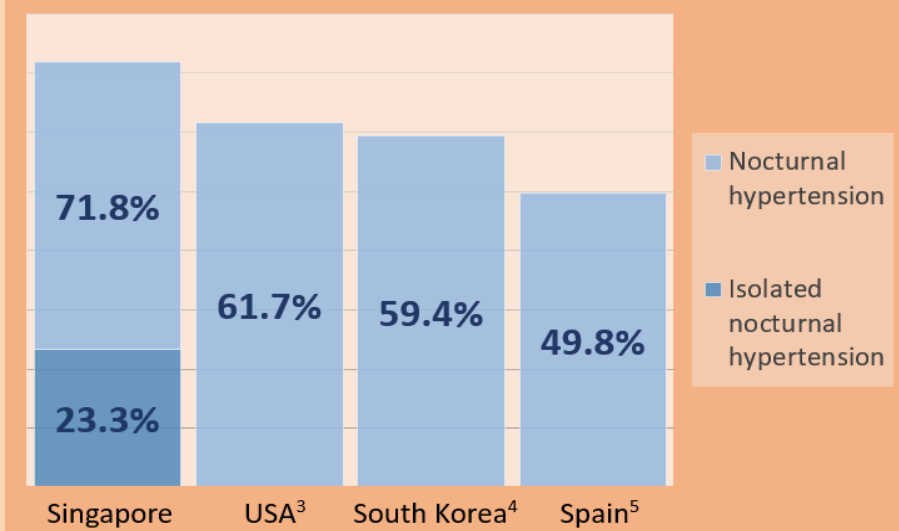


Figure 2. Nocturnal blood pressure dipping patterns

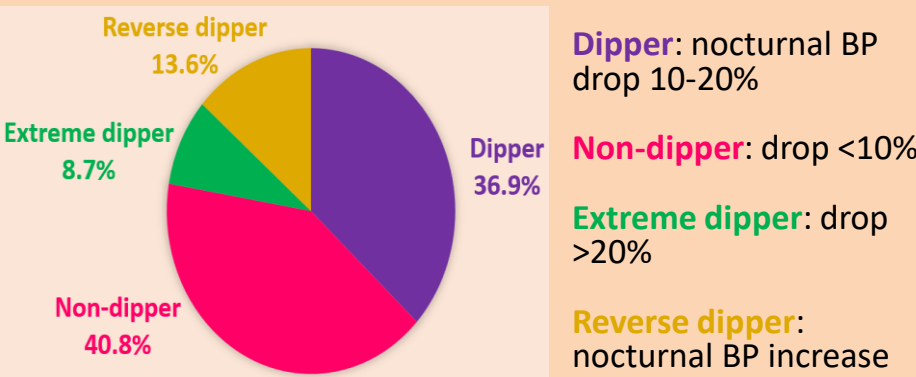
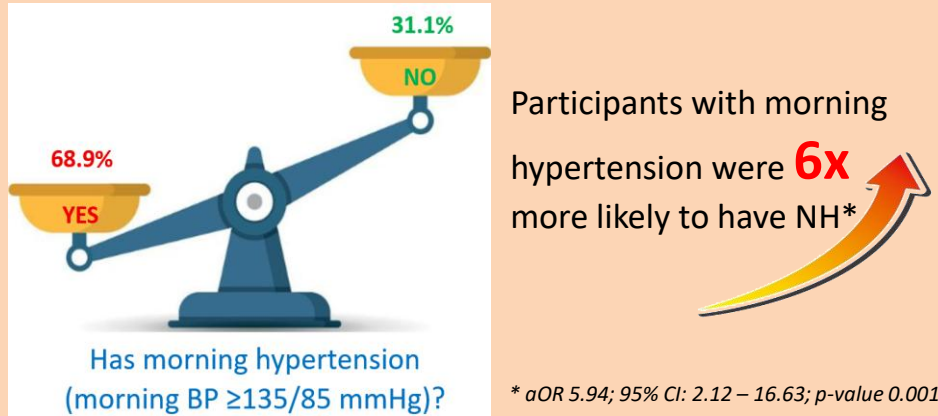


Figure 3. Association between NH and morning hypertension



DISCUSSION & CONCLUSION

- There is a high prevalence of NH in the Singapore primary care setting as compared to other countries.
- Those with morning hypertension were more likely to have NH.
- A potential clinical strategy may include morning home BP-guided titration of antihypertensive medications.
- There was no association with other sociodemographic, clinical and lifestyle factors.
- Findings should, however, be interpreted with caution due to small sample size.
- Convenience sampling may also limit generalizability, however, participant characteristics appear to be similar to polyclinic’s patient profiles apart from overrepresentation of male gender.

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