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Prevalence and Determinants of Left Ventricular Hypertrophy amongst Elderly hypertensive in an Asia Multi-Ethnic population

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INTRODUCTION

- Prevalence of hypertension is increasing tremendously from 33->43%(NHMS in 2006).¹
- Left Ventricular Hypertrophy (LVH) is one of the most common end organ damage.
- The significant of LVH are ²⁻³
 - 5-10x higher risk to get Cardiovascular event
 - 3x higher risk to get heart failure
 - Higher chance of sudden death

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1. NHMS 2006.
 2. European society of Hypertension 2003
 3. Verdecchia P et al J Am Coll Cardiol 1998

PREVALENCE AND ASSOCIATED FACTORS

- Daniel et al reported prevalence of LVH among hypertensive patients ranged from 15% to 73%.⁴
- The prevalence varied due to difference in
 - sample size
 - The Criteria used to detect LVH
- However ,little is known about its prevalence in Malaysia.

OBJECTIVE

- **General objective**

- To determine the prevalence of LVH amongst elderly hypertensive patient by using Electrocardiogram (ECG) and confirmed by Echocardiogram (ECHO).

- **Specific objectives**

- To determine social-demographic factors among studied population.
- To determine associated factors of LVH.
- To determine sensitivity and specificity of ECG criteria

- **Sub-analysis of a cross sectional study**
- **conducted after Ethic committee approval (1st June -> 15th Oct 2009)**
- **Among treated hypertensive patients registered under a hospital based primary care clinic.**
- **Data on hypertensive patients aged ≥ 60 were recruited in the analysis**

METHODOLOGY(2)

- All patients underwent 12-lead ECG and ECHO to detect LVH.
- ECG LVH was defined according
 - Sokolow criteria
 - » sum of SV1 + RV5 or V6 \geq 3.5mV
- Echocardiographic LVH was defined when both the left ventricular posterior wall thickness and the interventricular septal thickness \geq 11mm.

METHODOLOGY(3)

- Target BP was defined as $<140/90$ mmHg among hypertensive patients and $<130/80$ mmHg among diabetes patient. ⁵
- Metabolic syndrome was defined based on NCEP(2004) ⁶
- Multiple logistic regression was used to analyse the associated factors of LVH.

5. Malaysia CPG on management of Hypertension 2008

6. Malaysia CPG on management of Obesity 2004

Table 1 : Characteristic of treated hypertensive patients

	LVH (N=47)	No LVH (N=152)	Total (N=199)	P-value
Age (mean, SD)	64.4 (3.0)	64.9(2.9)	64.8(2.9)	0.501
Gender (N, % male)	24 (51.1)	63(41.4)	87 (43.7)	0.573
Ethnicity (% Malay :Chinese :Indian)	17:62:19	16:64:20	16:63:20	0.793
SBP	137 (15)	137 (14) /	137(14)	0.901
DBP	82 (8)	79(7)	80 (8)	0.001
Duration of BP, years (mean, SD)	9.8 (5.7)	10.6(8.3)	10.4 (7.7)	0.643
BMI, mean \pm SD	27.7 \pm 5.0	25.2 \pm 4.2	25.7 \pm 4.5	0.001

Table 1 : Characteristic of treated hypertensive patients ...

	LVH (N=47)	WITHOUT LVH (N=152)	Total (N=199)	P-value
Obese ,BMI \geq 27.5 (N,%)	19 (40.4)	36(23.7)	55 (27.6)	0.001
Metabolic syndrome(N,%)	24 (51.1)	55(36.2)	79 (39.7)	0.018
Hypertension only (N,%)	8 (17.0)	20(13.2)	28 (14.1)	0.449
Diabetes hypertensvie (N,%)	26 (55.3)	55(36.2)	81 (40.7)	0.029
Home BP monitoring (N,%)	25 (53.2)	77 (50.7)	102 (51.3)	0.449
BP control(Good) (N,%)	21 (44.7)	68 (44.7)	89 (44.7)	0.001

Summary of table 1 results

- **Hypertensive elderly patients with LVH:**
 - Ethnicity
 - more obese
 - Higher DBP
 - diabetes hypertensive
 - poorer BP control
 - Metabolic syndrome

Table 2 shows the sensitivity and specificity of ECG.

ECG Sokolow Criteria	Echocardiograph	
	LVH	no LVH
positive	4(8.5)	6(3.9)
negative	43(91.5)	146(96.1)
Total	47(100.0)	152(100.0)

RESULTS of table 2

- **The prevalence of LVH based on**
 - **Echo - 24%**
 - **Sokolow criteria - 5%**
- **The sensitivity of Sokolow Criteria was 8.5%**
- **The specificity was 96.1%**

Table 3 shows the 4 significant predictors of LVH

	Adjusted OR	(95% CI)	P- value
DBP	1.088	(1.024, 1.156)	0.007
BMI	1.113	(1.031, 1.203)	0.006
Good BP Control	0.342	(0.138, 0.848)	0.021
DM Hypertensive	3.346	(1.458, 7.676)	0.004

Summary of table 3

- **Elderly hypertensive patient with underlying diabetes hypertensive disorder & higher DBP were 3.346 times & 1.099 times more likely to have LVH respectively.**
- An increase of 1 kg/m² in BMI will increase 1.113 odds in developing LVH.
- **Patients with good blood pressure control will have 0.342 times less likely to get LVH**
- **There was no relationship between LVH and age, ethnicity, duration of BP as well as type of medication used.**

Discussion (1)

- **The prevalence of LVH in this study was consistent with other studies in primary care setting(15% to 73%)⁴.**
- **Sensitivity and specificity of ECG in detecting LVH was consistent with other studies. (overall sensitivity was 6.9% and specificity was 98.8%)⁷.**
- **The predictors of LVH in this studies were consistent with other studies ⁸.**

4. Daniel et al BMJ 2007

7. Daniel L et al Circulation. 1990

8. Jose et al Rev Esp Cardiol 2006

Discussion(2)

- **Generally diabetes can cause echocardiographic evidence for the existence of a distinct diabetic cardiomyopathy**
- **Similarly those higher BMI or patients prone to :-**
 - **diabetes (48.8% vs.38.4%)**
 - **dyslipidaemia (71.7 % vs.71.4%)**

Discussion(3)

- **The negative relationships between LVH could be explained by many reasons.**
- **Age:** LVH could be regressed among elderly group in view their BP control was better than the young (43.4% vs.38.8%).

Discussion(4)

- **Duration and control of BP:** Those on treatment for longer duration with good blood pressure control may regress the LVH.
- **Type of antihypertensive:** Duration of patients on ACEI or ARB was too short to show the benefit over other antihypertensive agents in reducing LVH.
- Further research is needed to explore the causes for the above observed findings.

Strength & Limitation

- **Standard test for diagnosis of LVH was available in this study.**
- **selection bias**
 - **Convenient sampling**
 - **ECG and ECHO test were not free, patient who were willing to pay were more concern their health.**

Conclusion

- **Prevalence of LVH was high among elderly hypertensive population in primary care setting**
- **ECG is poor in detecting LVH.**

Recommendation

- **A larger randomization, multicentre population survey is needed to give a true prevalence in Malaysia.**
- **Future research to develop a new diagnostic ECG criteria with a better sensitivity as well as to maintain its high specificity is needed .**
- **Consider for ECHO in those high risk patients even though ECG was normal.**

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7. **Daniel L, Shrif BL, Keaven MA, Jane CC, William BK, William PC. Determinants of sensitivity and specificity of electrographic criteria for left ventricular Hypertrophy. Circulation. 1990;81:815-20.**
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