Comparison of Cornell and Peguero-Lo Presti Criteria in Electrocardiography to Diagnose Left Ventricular Hypertrophy in Hypertensive Patients at RSUD Tabanan

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Abstract

Left ventricular hypertrophy (LVH) is characterized by an abnormal increase in the mass of the left ventricle due to chronic elevated cardiac workload. LVH serves as a preclinical indicator of cardiovascular disease and stands as a robust predictor of cardiovascular morbidity and mortality. Detecting LVH can be achieved through various methods, including electrocardiography (ECG), radiology, and echocardiography. However, the limited availability and affordability of echocardiography underline the crucial role of ECG, especially in healthcare facilities lacking echocardiography capabilities. The primary objective of this study was to establish more precise diagnostic criteria for identifying LVH in hypertensive patients at RSUD Tabanan. This research is an analytical observational study with a cross-sectional design conducted at RSUD Tabanan. The data were extracted from medical records of hypertensive patients who had received treatment at the hospital's cardiology clinic between 2020 and 2022. Among the patients who met the inclusion and exclusion criteria, ECG assessments were conducted to determine the presence of left ventricular hypertrophy (LVH) using the Cornell criteria and Peguero-Lo Presti criteria. Additionally, echocardiography results were reviewed in the patients' medical records. Of the 111 research subjects, 10 (15.15%) subjects had LVH detected based on the Cornell criteria, 30 (45.45%) subjects had LVH detected based on the Peguero - Lo Presti criteria and 66 subjects (59.46%) had LVH detected using the echocardiography examination. The Cornell Criteria had a sensitivity of 15.15%, a specificity of 93.33% and an accuracy of 59.9% while the Peguero–Lo Presti Criteria had a sensitivity of 45.45%, a specificity of 84.44% and an accuracy of 66.2% for diagnosing LVH. The Peguero – Lo Presti criteria have higher accuracy than the Cornell criteria in diagnosing left ventricular hypertrophy in hypertensive patients according to echocardiography.

Keywords: Cornell criteria, Peguero – Lo Presti criteria, left ventricular hypertrophy.

INTRODUCTION

Hypertension remains a significant health concern in Indonesia, with cardiovascular complications being the primary cause of morbidity and mortality among hypertensive patients.(1) Hypertension is defined as a systolic blood pressure value > 140 mmHg and/or a diastolic blood pressure value > 90 mmHg.(2-4,40) According to Riskesdas (2018), The prevalence of hypertension in Indonesia, as determined through measurements in individuals aged over 18 years, stands at 34.11%. The highest prevalence is observed in South Kalimantan at 44.13%, followed by West Java at 39.60%, East Kalimantan at 39.30%, and West Kalimantan at 29.4%. In the same age group, Bali records a hypertension prevalence of 29.97%.(5,6,13) One of the cardiovascular complications of hypertension is left ventricular hypertrophy. Left ventricular hypertrophy is an abnormal increase in left ventricular mass caused by a chronic increase in cardiac workload. The most common cause is increased heart pumping due to increased afterload such as hypertension and aortic stenosis.(7,28) Left ventricular hypertrophy (LVH) is a preclinical manifestation of cardiovascular disease and is a strong predictor of cardiovascular morbidity and mortality.(8-10,30) Left ventricular hypertrophy can be assessed through physical examination, electrocardiogram (EKG), radiological imaging, and echocar-

diography.(37) Echocardiography remains the primary choice for diagnosing LVH. However, the technique can be challenging, expensive, time-consuming, and requires skilled medical personnel, which limits its accessibility.(21,41) ECG examinations are routinely conducted to assess hypertensive patients in developing countries and can serve as an initial screening tool to identify those who may require subsequent echocardiography.(29) The importance of accurately detecting LVH through ECG has gained significant attention in recent years, as it underscores the potential for LVH to improve with appropriate therapy, thus helping to prevent or delay its clinical consequences. While ECG criteria for diagnosing LVH have evolved over the past century, these voltage criteria exhibit high specificity in identifying LVH but are associated with low sensitivity.(25,30,34,41) The ECG voltage criteria commonly used to assess the presence of LVH today are the Sokolow–Lyon voltage criteria and the Cornell criteria whose values are gender specific. (3,41) Several studies have found that the Cornell criteria are superior in diagnosing LVH compared to the Sokolow – Lyon voltage criteria, however the sensitivity value of both criteria is still low.(30) Many studies have been conducted to evaluate ECG voltage criteria and some of these studies have found that the results vary and are specific for each ethnicity.(41) A previous study conducted in Korea to compare the Sokolow–Lyon voltage criteria and the Cornell criteria for diagnosing LVH in a Korean population found that the Cornell criteria were better in diagnosing LVH.(26) Research conducted on 539 Taiwanese military members found that the Cornell and Cornell Product criteria had a stronger correlation than the Sokolow – Lyon voltage and Sokolow – Lyon voltage Product criteria with left ventricular mass index (LVMI).(35) In a recent study by Peguero et al (2017) involving 97 participants, a novel method for diagnosing LVH from ECG was explored. This method involved summing the amplitude of the deepest S wave (SD) in any single lead and the S wave in lead V4 (SV4). The study revealed a superior sensitivity of 62% compared to the 35% sensitivity of the Cornell criteria. Specificity, exceeding 90%, was found to be consistent between the two criteria with no significant differences. This newly proposed criterion is henceforth referred to as the Peguero–Lo Presti criterion and demonstrates a heightened sensitivity for diagnosing LVH when compared to the other two criteria.(27)

METHOD
Design & Study Population

This study is a diagnostic test investigation employing an analytical observational approach with a cross-sectional design. The research was carried out at heart polyclinic of the RSUD Tabanan over a span of six months, commencing in January 2022 and concluding in July 2022, or until the predetermined minimum sample size, calculated using the Lemeshow formula, was achieved, which amounted to 93 patients. The target population consisted of hypertensive patients exhibiting left ventricular hypertrophy who sought treatment at the cardiac clinic of RSUD Tabanan. The accessible population comprised hypertensive patients attending the heart polyclinic of RSUD Tabanan. The research sample was drawn from the accessible population, encompassing individuals who met the specified inclusion and exclusion criteria, selected through random sampling until the desired sample size was attained. The inclusion criteria encompassed patients whose medical records indicated a hypertension diagnosis, while exclusion criteria involved patients under the age of 18, individuals with a history of myocardial infarction, those with complete AV block, patients exhibiting left bundle branch block or right bundle branch block, individuals with cardiac pacemakers, those with congenital heart disease, and individuals with an asymmetric ventricular septum (bulging).

Study Variables

Dependent variable: left ventricular hypertrophy (LVH), Independent variable:

Cornell criteria value and Peguero – Lo Presti criteria value

Study Flow

The target population for this study comprises hypertensive patients attending the heart polyclinic at RSUD Tabanan. Within this population, patients who meet the predetermined inclusion and exclusion criteria are selected through random sampling until the minimum required sample size is reached. Subsequently, ECG and echocardiography observations are conducted based on the patients' medical records. The Peguero – Lo Presti criteria and the Cornell criteria are then subject to analysis. The Peguero – Lo Presti criteria analysis involves summing the amplitude of the deepest S wave (SD) in any lead and the S wave in lead V4 (SV4). If the deepest S wave is located in lead V4, the amplitude value of SV4 is multiplied by two.

Patients are declared to have LVH if SD + S4 $\geq$ 2.8 mV for men and $\geq$ 2.3 mV for women. Analysis of the Cornell criteria by summing the amplitudes of the R waves in aVL and S waves in V3. The sum of RaVL + SV3 is > 2.8 mV in men and > 2.0 mV in women. Whether electrocardiographic left ventricular hypertrophy is present or not, echocardiographic analysis is performed. Then echocardiography analysis was carried out using the Cube formula to calculate the patient's LV mass. Calculations for the Cube formula are obtained with the help of software available on the echocardiography device. Then the results are divided by the patient's body surface area (BSA) to get the LV mass index (LVMi) value. Patients are declared to have LVH if LVMi is > 115 gr/m2 in men and > 95 gr/m2 in women.

Statistical Analysis

Statistical analysis of the research data involved the presentation of findings in tabular format. Categorical variables were expressed in terms of frequency (n) and percentage (%), while numerical variables were represented by their mean values accompanied by the standard deviation, which applied to normally distributed data. The assessment of sensitivity, specificity, negative predictive value, and positive predictive value for the dependent variable was achieved through a 2x2 table. Data analysis was conducted using SPSS version 22 for Windows software, with statistical significance established when the p-value was less than 0.05.

RESULT

The research was conducted at the heart clinic of RSUD Tabanan from January 2022 to July 2022, with a total of 111 eligible participants meeting the inclusion and exclusion criteria.

Subjects Characteristics

In this study, 111 medical records of hypertensive patients were obtained who met the inclusion and exclusion criteria as research subjects. Of the total research subjects, it was found that 66 people (59.46%) experienced LVH and 45 people (40.54%) did not experience LVH. The research subjects were then divided into two groups based on whether they experienced or not experienced LVH. The first group is research subjects who have experienced or with LVH, while the second group is research subjects who have not experienced or without LVH.

Table 1 shows the basic characteristics of the research subjects comparing demographic characteristics, risk factors, hemodynamics, and history of medication used by the subjects. Of the 111 research subjects, there were 57 people (51.35%) female, more than male research subjects, namely 54 people (48.65%).

Table 1. Characteristics of Research Participants

Variable	With LVH (n=66)	Without LVH (n=45)	p-value
Age (year ± SD)	64.94(11.53)	65.56(12.95)	0.560
Gender (n,%)			0.112
Male	28(42.4)	26(57.8)	
Female	38(57.6)	19(42.2)	
BMI (kg/m2 ± SD)	24.61(3.88)	24.15(3.7)	0.405
Sistole (mmHg ± SD)	127.8(22.2)	127.04(21.66)	0.855
Diastole (mmHg ± SD)	74.44(13.05)	72.42(10.88)	0.524
Diabetes Mellitus (n,%)			0.661
Yes	7(10.6)	6(13.3)	
No	59(89.4)	39(86.7)	
Smoking (n,%)			0.850
Yes	8(12.1)	6(13.3)	
No	58(87.9)	39(86.7)	
Medication (ACE-1/ARB) (n,%)			0.505
Yes	61(92.4)	43(95.6)	
No	5(7.6)	2(4.4)	
Medication (CCB) (n,%)			0.113
Yes	24(36.4)	10(22.2)	
No	42(63.6)	35(77.8)	
Medication (Diuretic) (n,%)			0.897
Yes	4(6.1)	3(6.7)	
No	62(93.9)	42(93.3)	
Medication (Penyekat Beta) (n,%)			0.299
Yes	36(54.5)	29(64.4)	
No	30(45.5)	16(35.6)	

In this study, of the 66 people in the group with LVH, 28 people (42.4%) were male and 38 people (57.6%) were female, while of the 45 people in the group without LVH, 26 people (57.8%) were male and 19 people (42.2%) were female. In the group with LVH, the mean age of patients was 64.94 years, while in the group without LVH, the mean age of patients was 65.56 years. Body mass index (BMI) in the group with LVH was found to be 24.61 kg/m2 while in the group without LVH it was found to be 24.15 kg/m2. The mean systolic blood pressure (BP) in the group with LVH was found to be 127.8 mmHg, while in the group without LVH it was found to be 127.04 mmHg. The mean diastolic blood pressure (BP) in the group without LVH was found to be 74.44 mmHg, while in the group with LVH it was found to be 72.42 mmHg. Gender, age, BMI, systolic blood pressure and diastolic blood pressure between the two groups were not statistically significantly different, p value >0.05.

Cardiovascular risk factors assessed were Diabetes Mellitus (DM) and smoking. In the group with LVH there were 7 (10.6%) people with DM, while in the group without LVH there were 6 (13.3%) patients with DM. In the group with LVH there were 8 people (12.1%) patients with a history of smoking, while in the group without LVH there were 6 people (13.3%) patients with a history of smoking. DM and smoking history between the two groups were found not to differ statistically significantly.

Antihypertensive drugs used in the subjects of this study included ACE-I, ARB, diuretics and beta blockers. In the group with LVH, there were 61 (92.4%) people using ACE-I/ARB class drugs, while in the group without LVH there were 43 (95.6%) people using ACE-I/ARB class drugs. CCB class drugs were found to be used more frequently in the group with LVH, namely in 24 people (36.4%) compared to the group without LVH, namely in 10 people (22.2%). In the group with LVH, there were 4 (6.1%) people using diuretic drugs, while in the group without LVH there were 3 (6.7%) people using diuretic drugs. In the group with LVH there were 36 (54.5%) people using beta blocker

drugs, while in the group without LVH there were 29 (64.4%) people using beta blocker drugs. The use of ACE-I/ARB, CCB, diuretics and beta blockers between the two groups was found not to differ statistically significantly.

Table 2. Characteristics of Research Subjects Based on ECG Parameters

Variable	With LVH (n=66)	Without LVH (n=45)	p-value
Aksis QRS (n,%)			0.221
Normal	61(92.4)	44(97.8)	
LAD	5(7.6)	1(2.2)	
Sokolow – Lyon (n,%)			0.727
Valid	6(9.1)	5(11.1)	
Not valid	60(90.9)	40(88.9)	
Cornell (n,%)			0.172
Valid	10(15.2)	3(6.7)	
Not valid	56(84.8)	42(93.3)	
Peguero – Lo Presti (n,%)			0.001
Valid	30(45.5)	7(15.6)	
Not valid	36(54.5)	38(84.4)	

Based on the results of ECG readings in this study, of the 111 research subjects, there were 105 people with a normal QRS axis and 6 people with a LAD axis. Of the 6 people with LAD axis, there were 5 people in the group with LVH and 1 person in the group without LVH, this was not statistically different. Based on measurements using the Sokolow – Lyon criteria, there were 6 people (9.1%) in the group with LVH and 5 people (11.1%) in the group without LVH who met the Sokolow – Lyon criteria. According to measurements using the Cornell criteria, there were 10 people (15.2%) in the group with LVH and 3 people (6.7%) in the group without LVH who met the Cornell criteria. Meanwhile, according to measurements using the Peguero – Lo Presti criteria, there were 30 people (45.5%) in the group with LVH and 7 people (15.6%) in the group without LVH who met the Peguero – Lo Presti criteria. Samples that met the Peguero – Lo Presti criteria between the two groups were found to be significantly different with a value of p=0.001.

Table 3. Characteristics of Research Subjects based on Echocardiographic Parameters

Variable	With LVH (n=66)	Without LVH (n=45)	p-value
Ejection Fraction (% ± SD)	56.7(12.41)	59.35(13.99)	0.162
IVSD (mm ± SD)	1.21(0.19)	1.08(0.16)	<0.001
LVIDd (mm ± SD)	4.86(0.85)	4.13(0.59)	<0.001
LVPWd (mm ± SD)	1.12(0.15)	1.02(0.16)	0.010
LVMI (gr/m2 ± SD)	132.1(30.55)	86.91(14.26)	<0.001
Geometri LV (n,%)			<0.001
Normal	0 (0.0)	12 (26.7)	
Concentric Remodeling	0 (0.0)	33 (73.3)	
Concentric Hypertrophy	49 (74.2)	0 (0.0)	
Eccentric Hypertrophy	17 (25.8)	0 (0.0)	

IVSD : Inter Ventricular Septal Diameter, LVIDd : Left Ventricular Internal Diameter end diastole, LVPWd : Left Ventricular Posterior Wall Diameter end diastole, LVMI : Left Ventricular Mass Index.

Based on echocardiography results, the mean ejection fraction value in the group with LVH was 56.7%, while in the group without LVH it was found to be 59.35%, this was not statistically significantly different. The mean IVSD value in the group with LVH was 1.21, while in the group without LVH it was found to be 1.08, this was statistically significantly different with a p value <0.001. The mean LVIDd value in the group with LVH was 4.86, while in the group without LVH it was found to be 4.13, this was statistically significantly different with a p value <0.001. The average LVPWd value in the group with LVH was 1.12, while in the group without LVH it was found to be 1.02, this was statistically significantly different with a value of p=0.010. The mean LVMI value in the group with LVH was found to be 132.1 gr/m2, while in the group without LVH it was found to be 86.91 gr/m2, this was significantly different with a p value <0.001. LV geometry in the group with LVH was found to be 49 people (74.2%) with concentric hypertrophy and 17 people (25.8%) with eccentric hypertrophy. Meanwhile, LV geometry in the group with LVH was found to be 12 people (26.7%) and 33 people (73.3%) with concentric remodeling.
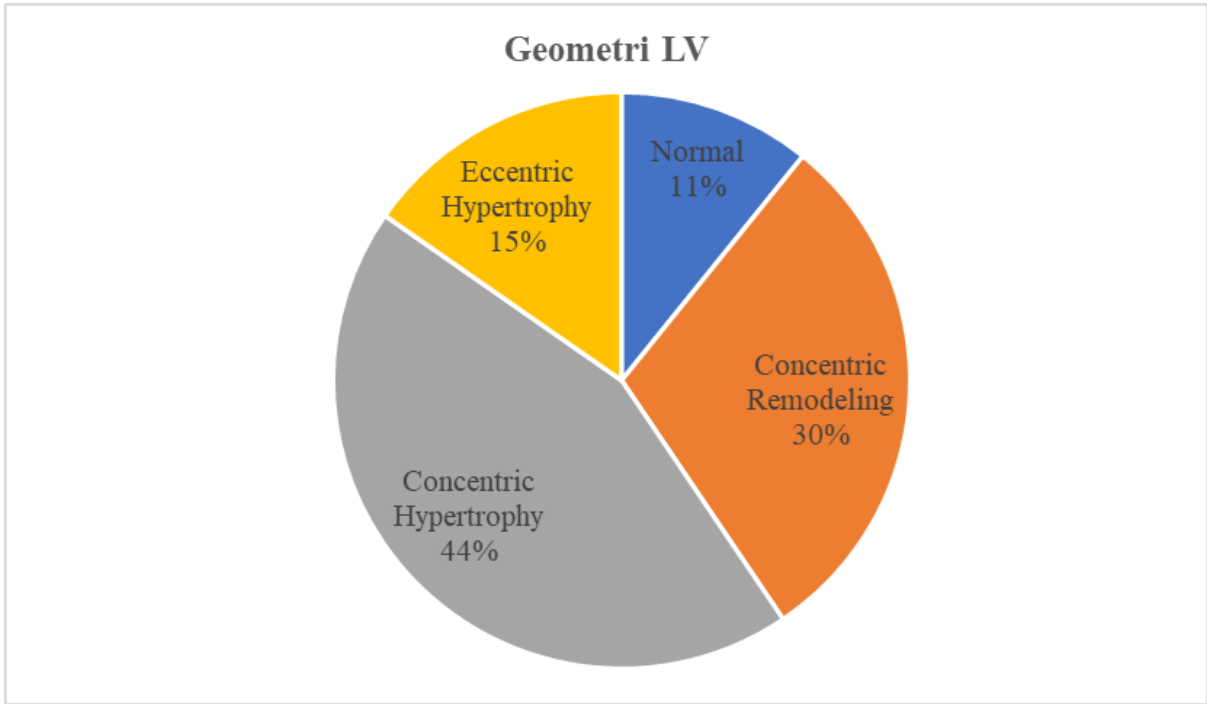

Figure 1. Pie chart illustrating Left Ventricular Geometry in Hypertensive Patients at RSUD Tabanan

Diagnostic Accuracy of the Sokolow-Lyon Criteria for LVH Diagnosis in Hypertensive Patients at RSUD Tabanan: This study revealed that the Sokolow-Lyon criteria demonstrated a sensitivity of 9.09%, specificity of 88.89%, a positive predictive value (PPV) of 54.55%, a negative predictive value (NPV) of 40%, and an overall accuracy of 47.3% in diagnosing LVH

Table 4. Diagnostic performance of the Sokolow–Lyon Criteria to Diagnose LVH in Hypertensive Patients at RSUD Tabanan

| SL Criteria | LVH | | Total | P Value | Sens | Spes | PPV | NPV | Accuracy |
	Yes	No							
+	6	5	11						
-	60	40	100	0.727	9.09%	88.89%	54.55%	40.00%	47.3%
Total	66	45	111						
	59.46	40.54	100.00						

Diagnostic performance of the Cornell Criteria for LVH Diagnosis in Hypertensive Patients at RSUD Tabanan: This study found that the Peguero-Lo Presti criteria exhibited a sensitivity of 15.15%, specificity of 93.33%, a positive predictive value (PPV) of 76.92%, a negative predictive value (NPV) of 42.86%, and an overall accuracy of 59.9% for diagnosing LVH.

Table 5. Diagnostic Performance of the Cornell Criteria for Diagnosing LVH in Hypertensive Patients at RSUD Tabanan

| Cornell Criteria | LVH | | Total | P Value | Sens | Spes | PPV | NPV | Accuracy |
	Yes	No							
+	10	3	13						
-	56	42	98	0.172	15.15%	93.33%	76.92%	42.86%	59.9%
Total	66	45	111						
	59.46	40.54	100.00						

Diagnostic performance of the Peguero-Lo Presti Criteria for LVH Diagnosis in Hypertensive Patients at RSUD Tabanan: This study revealed that the Peguero-Lo Presti Criteria demonstrated a sensitivity of 18.9%, specificity of 51.4%, a positive predictive value (PPV) of 81.08%, a negative predictive value (NPV) of 51.35%, and an overall accuracy of 66.2% for diagnosing LVH.

Table 6. Diagnostic Performance of the Peguero – Lo Presti Criteria for Diagnosing LVH in Hypertensive Patients at RSUD Tabanan

| Criteria PLP | LVH | | Total | P Value | Sens | Spes | PPV | NPV | Accuracy |
	Yes	No							
+	30	7	37		45.45%			51.35%	
-	36	38	74	0.001		84.44%	81.08%		66.2%
Total	66	45	111						
	59.46	40.54	100.00						

Comparison between ECG Criteria in Diagnosing LVH in Hypertensive Patients at RSUD Tabanan: in this study it was found that 11 patients who met the Sokolow-Lyon criteria experienced LVH on echocardiography examination, whereas according to the Cornell criteria it was found that 13 patients who met these criteria experienced LVH on echocardiography examination and on The Peguero – Lo Presti criteria showed that 37 patients who met these criteria experienced LVH on echocardiography.

Table 7. Comparison of Sokolow – Lyon, Cornell and Peguero – Lo Presti criteria in diagnosing LVH in Hypertension patients

Results	Methods			Total	P Value
	SL	**Cornell**	**PLP**		
Valid	11	13	37	61	
Not valid	100	98	74	272	<0.001
Total	111	111	111	333	

The significance value is 0.000 so the significance value is smaller than 0.05 and it can be concluded that there are differences in results between the SL, Cornell and PLP methods. The following is a different test of each method:

Methods	P Value	Note
SL vs Cornell	0.720	No difference
SL vs PLP	<0.001	Significantly difference
Cornell vs PLP	<0.001	Significantly difference

The results above show that the PLP method gives different results from SL and Cornell, while SL and Cornell give results that tend to be the same. Based on the criteria results (suitable/not), it can be said that the PLP method gives the best results.

DISCUSSION

This study employs an analytical observational approach with a cross-sectional design, focusing on the comparative evaluation of the Cornell and Peguero-Lo Presti criteria in electrocardiography (ECG) for diagnosing left ventricular hypertrophy (LVH) in hypertensive patients at RSUD Tabanan. ECG presents an effective, readily accessible, and cost-efficient method for LVH assessment, characterized by its user-friendliness. However, the reliability of ECG is frequently subject to scrutiny in contrast to more specialized diagnostic tools like echocardiography, magnetic resonance imaging, and autopsy studies.(4,29) Based on the basic characteristics of the research subjects, the results showed that more than half of the research subjects were female, with a percentage of 51.35% female patients and 48.65% male patients. Meanwhile, the average age between the two groups is around 65 years. The data from this study is in accordance with the prevalence of hypertension contained in the Guidelines for Management of Prevention of Cardiovascular Disease in Women prepared by the Association of Indonesian Cardiovascular Specialists in 2015. In this guideline it is explained that in the fifth decade the incidence of hypertension increases more sharply in women, so that at the age of six dozens of times, the prevalence of hypertension in women is higher than in men.(19)

In this study, it was observed that almost all research subjects were using ACE-I or ARB antihypertensive therapy, with a prevalence of 92.4% in the group with LVH and 95.6% in the group without LVH. On the other hand, CCB antihypertensive therapy was more frequently employed in the group with LVH, accounting for 36.4%, compared to 22.2% in the group without LVH. The use of diuretic antihypertensive therapy exhibited minimal variation between the LVH and non-LVH groups, standing at 6.1% and 6.7%, respectively. Furthermore, it was noted that 54.5% of the LVH group utilized beta-blocker antihypertensive therapy, while 64.4% in the non-LVH group employed beta-blockers for their treatment. This data highlights that many patients in both groups opted for combination antihyperten-

sive therapy. According to the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH), the initiation of therapy in most patients should commence with a single-pill combination (SPC) or a combination of two drugs to enhance the speed, efficiency, and predictability of blood pressure control. Monotherapy, meanwhile, is primarily recommended for low-risk patients with stage 1 hypertension (systolic blood pressure <150 mmHg), very high-risk patients with high-normal blood pressure, or frail/vulnerable elderly patients.(40)

In terms of the research subjects' characteristics as determined by echocardiography, the average ejection fraction in the LVH group was 56.7%, while in the non-LVH group, it was 59.35%. The disparity between these two groups is believed to be attributed to the fact that 17 subjects in the LVH group exhibited LV geometry with eccentric hypertrophy. In such LV geometry, patients typically maintain normal systolic LV function, albeit on the lower end of the normal range or slightly diminished. This observation aligns with the guidelines for the management of hypertensive patients published by the European Association of Cardiovascular Imaging (EACVI) and the American Society of Echocardiography (ASE) in 2015.(20)

In this study, IVSd, LVIDd and LVPWd values were higher in the group with LVH, where these three components contributed to the calculation of left ventricular mass. The greater the value of these three components, the greater the LV mass and the greater the possibility of experiencing LVH (Lang et al, 2015). In concentric hypertrophic LV geometry, you will find a thickened IVSd (with a value higher than the normal value) and LV EDD with a size that is still within normal limits. (20)

In this study, hypertensive patients exhibited predominantly concentric hypertrophy as the most common LV geometry, followed by concentric remodeling, eccentric hypertrophy, and normal geometry. These findings align with the guidelines for managing hypertensive patients, as outlined by the European Association of Cardiovascular Imaging (EACVI) and the American Society of Echocardiography (ASE) in 2015. According to these guidelines, concentric hypertrophy is the prevailing LV geometry observed in hypertensive patients. Newly diagnosed hypertensive patients typically present with a normal LV geometry, while those with long-standing and uncontrolled hypertension are more likely to experience changes in LV size. (20)

In this study it was found that the Peguero – Lo Presti criteria had a sensitivity of 45.45% and a specificity of 84.44% for diagnosing LVH. This finding is slightly different from previous research conducted by Peguero et al which found a higher sensitivity of this criterion, namely 62% and an equally good specificity, namely 90%.(20) This difference is thought to be due to different research subject populations. Peguero et al conducted ECG analysis on a Caucasian ethnic population while this study was conducted on an Asian ethnic population.

In this study, the Kruskal Wallis test was used to determine whether there are statistically significant differences between the methods. It was found that the PLP method gave different results to SL (p<0.001) and Cornell (p<0.001), while SL and Cornell gave results that tended to be the same (p= 0.720). Based on the criteria results (suitable/not), it can be said that the PLP method gives the best results. In this study it was also found that the sensitivity of the Peguero – Lo Presti criteria was better than the Cornell and Sokolow – Lyon criteria. The sensitivity value of the Peguero – Lo Presti criteria was 45.45%, while the sensitivity of the Cornell and Sokolow – Lyon criteria was found to be 15.15% and 9.09%. This finding is in accordance with previous research conducted by Peguero et al in America which found that the Peguero – Lo Presti criteria had better sensitivity than the Cornell criteria and the Sokolow – Lyon criteria in diagnosing LVH.. (27)

CONCLUSIONS

Based on the results of data analysis obtained in this study, it can be concluded that the Peguero – Lo Presti criteria have higher accuracy than the Cornell Presti criteria in diagnosing left ventricular hypertrophy in hypertensive patients according to echocardiography and the Peguero – Lo Presti criteria have a sensitivity of 45.45% , specificity 84.4%, NPV 51.35% and PPV 81.08% to diagnose LVH in hypertensive patients at RSUD Tabanan. The research suggestion is that the Peguero – Lo Presti criteria on ECG should be used as criteria for diagnosing LVH in hypertensive patients from ECG examination, especially where ECG examination is still an option and echocardiography examination is not yet available.

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CONFLICT OF INTEREST

There is no *conflict of interest*.

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