



## Assessment of Effect and Safety of Beta Blockers in Hypertensive Patients

Rohit Mishra<sup>1</sup>, Aishwarya Singh<sup>2\*</sup>, Huzaifa Mulla<sup>3</sup>, Sugandh Jain<sup>4</sup>, Rajeev Ranjan<sup>5</sup>,  
Rajesh Ranjan<sup>6</sup>

<sup>1</sup>Lecturer, Department of Pathology, St. George's University, West Indies, Grenada. Email: sonurohit19@gmail.com, Orcid ID: 0000-0002-2117-3459

<sup>2</sup>Lecturer, Department of Pathology, St. George's University, West Indies, Grenada. Email: ashsg@gmail.com, Orcid ID: 0000-0001-6842-3112

<sup>3</sup>Lecturer, Department of Pathology, St. George's University, West Indies, Grenada. Email: hm16@pm.me, Orcid ID: 0000-0002-3734-9199

<sup>4</sup>Emergency Physician, Department of Accident and emergency, Bahrain Specialist hospital, Manama, Bahrain. Email- jain\_sugandh@hotmail.com, Orcid ID: 0000-0001-6041-3753

<sup>5</sup>Senior Resident, Department of Surgery, Noida International Institute of Medical Sciences, G B Nagar, UP. Email: rajeevranjan\_mamc@yahoo.co.in Orcid ID: 0000-0003-3645-8825

<sup>6</sup>Professor, Department of Community Medicine, Noida International Institute of Medical Sciences, G B Nagar, UP. Email: rajesh.dr.ranjan@gmail.com Orcid ID: 0000-0002-3297-928X

\*Corresponding author

### Abstract

**Background:** To assess effect and safety of beta blockers in hypertensive patients. **Material & Methods:** One hundred twelve adult patients who were diagnosed cases of hypertension of either gender were divided into 2 groups. Each group contained 56 patients. Group I received 25 mg atenolol twice daily and group II received 25 mg metoprolol tartrate twice daily. History of diabetes, kidney disease, lipid disorder, incident cardiovascular (CV) events etc. was recorded. Blood pressure (systolic and diastolic) was recorded before starting and after starting the drug therapy. **Results:** Age group 20-40 years had 12 in group I and 11 in group II, 41-60 years had 14 in group I and 17 in group II and >60 years had 30 in group I and 28 in group II. There were 40 males and 16 females in group I and 38 males and 18 females in group II. A significant difference in males and females within the group ( $P < 0.05$ ) and non-significant intergroup difference was observed ( $P > 0.05$ ). The mean SBP found to be 149.4 mm Hg in group I and 146.7 mm Hg in group II and DBP was 85.4 mm Hg in group I and 83.6 mm Hg in group II at baseline and SBP was 135.4 mm Hg in group I and 134.6 mm Hg in group II and 78.2 mm Hg in group I and 78.0 mm Hg in group II at 6 months. Diabetes mellitus was seen in 12 in group I and 19 in group II, lipid disorders 17 in group I and 28 in group II, chronic kidney disease 11 in group I and 16 in group II and CV event 2 in group I and 4 in group II. **Conclusions:** Both beta blockers found to be equally effective in management of patients with hypertension.

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### INTRODUCTION

Hypertension is a universally occurring systemic disease. It affects about 1 billion people worldwide. Approximately 20-27% adult populations are sufferers.<sup>[1]</sup> The number

of old populations having systemic hypertension is on rise. It involves approximately 30-45% of people. It is considered to be primary precipitating factors

for cardiovascular (CVS) and kidney diseases.[2,3]

Various research papers in geriatric population have mentioned the importance of Beta-blockers for the effective treatment of essential hypertension.[4,5] Lewington et al in its meta-analysis showed a positive co- relation between cardiovascular events and usual blood pressure above a baseline level of approximately 115/75 mmHg at all ages and in both genders. Although the strength of the association is weakened with age, the absolute difference in cardiovascular risk between the highest and lowest usual blood pressure levels is much greater in older subjects.[6] There are few contrast studies also which opposes the use of beta blocker as first line treatment for hypertension and their effects have not been found to be better than placebo due to their modest effect on stroke and no significant decrease in mortality or coronary heart disease.[7,8] Considering this we selected present study to study effect and safety of beta blockers in hypertensive patients.

## MATERIAL AND METHODS

A sum total of one hundred twelve adult patients who were diagnosed cases of hypertension of either gender. All who were not on any medication for hypertension were included in the study. Those who willingly gave their written consent were part of the study. Patients below 18 years and those were not interested were excluded.

Randomization into 2 group was done. Each group contained 56 patients. Group I received 25 mg atenolol twice daily and group II

received 25 mg metoprolol tartrate twice daily. A thorough clinical examination was carried out. History of diabetes, kidney disease, lipid disorder, incident cardiovascular (CV) events etc. was recorded. Blood pressure (systolic and diastolic) was recorded before starting and after starting the drug therapy. Results of the study was entered in MS excel sheet and studied statistically. P value below 0.05 was considered significant.

## RESULTS

Age group 20-40 years had 12 in group I and 11 in group II, 41-60 years had 14 in group I and 17 in group II and >60 years had 30 in group I and 28 in group II. A non- significant difference was observed ( $P > 0.05$ ) [Table 1].

There were 40 males and 16 females in group I and 38 males and 18 females in group II. A significant difference in males and females within the group ( $P < 0.05$ ) and non- significant intergroup difference was observed ( $P > 0.05$ ) [Table 2, Figure 1].

The mean SBP found to be 149.4 mm Hg in group I and 146.7 mm Hg in group II and DBP was 85.4 mm Hg in group I and 83.6 mm Hg in group II at baseline and SBP was 135.4 mm Hg in group I and 134.6 mm Hg in group II and 78.2 mm Hg in group I and 78.0 mm Hg in group II at 6 months. The difference found to be significant ( $P < 0.05$ ) [Table 3, Figure 2].

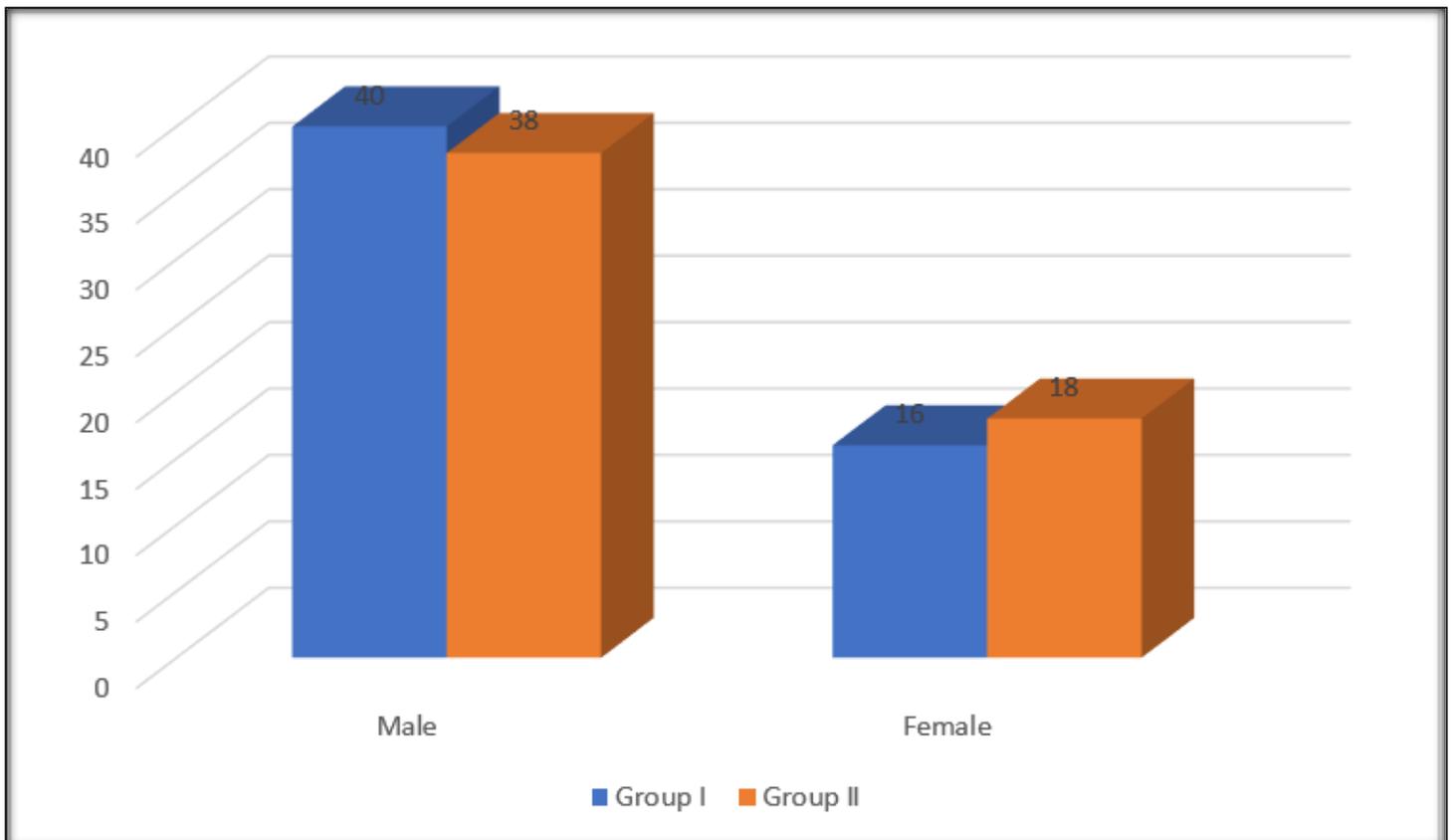
Diabetes mellitus was seen in 12 in group I and 19 in group II, lipid disorders 17 in group I and 28 in group II, chronic kidney disease 11 in group I and 16 in group II and CV event 2 in group I and 4 in group II. The difference found to be significant ( $P < 0.05$ ) [Table 4, Figure 3].

**Table 1:** Age distribution.

Age groups (years)	Group I (56)	Group II (56)	P value
20-40	12	11	>0.05
41-60	14	17	>0.05
>60	30	28	>0.05

**Table 2:** Gender distribution.

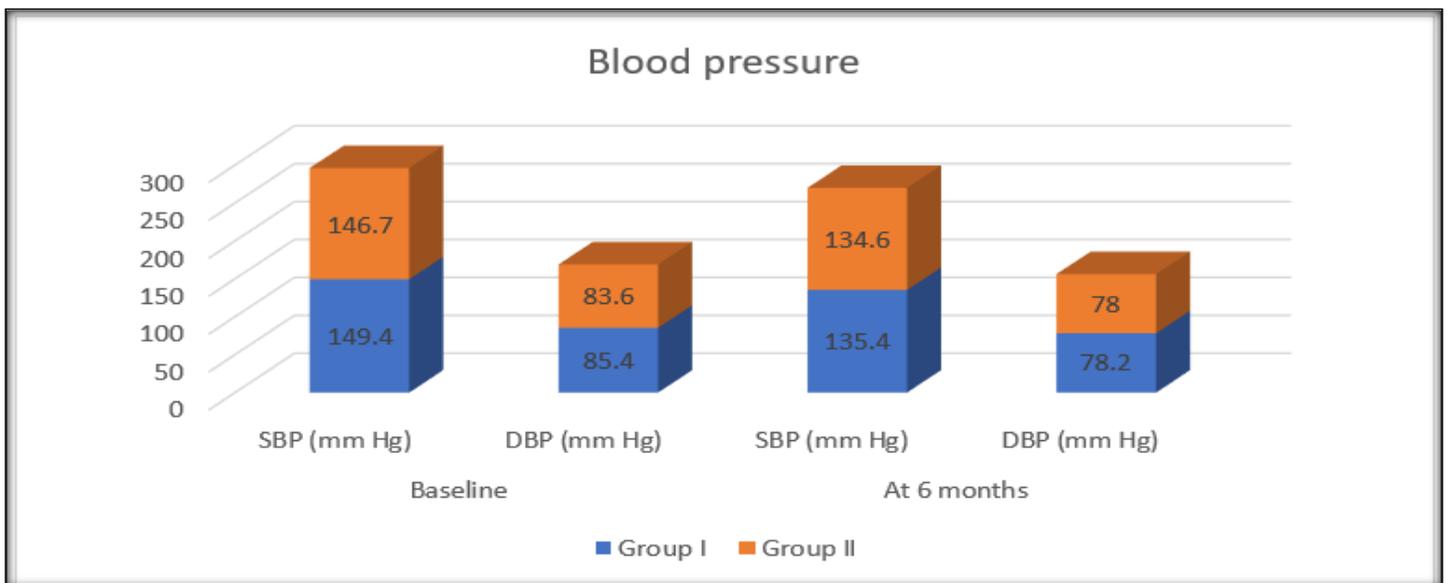
Gender	Group I	Group II	P value
Male	40	38	>0.05
Female	16	18	>0.05
P value	<0.05	<0.05	



**Figure 1:** Gender distribution

**Table 3:** Comparison of blood pressure before and after starting the therapy

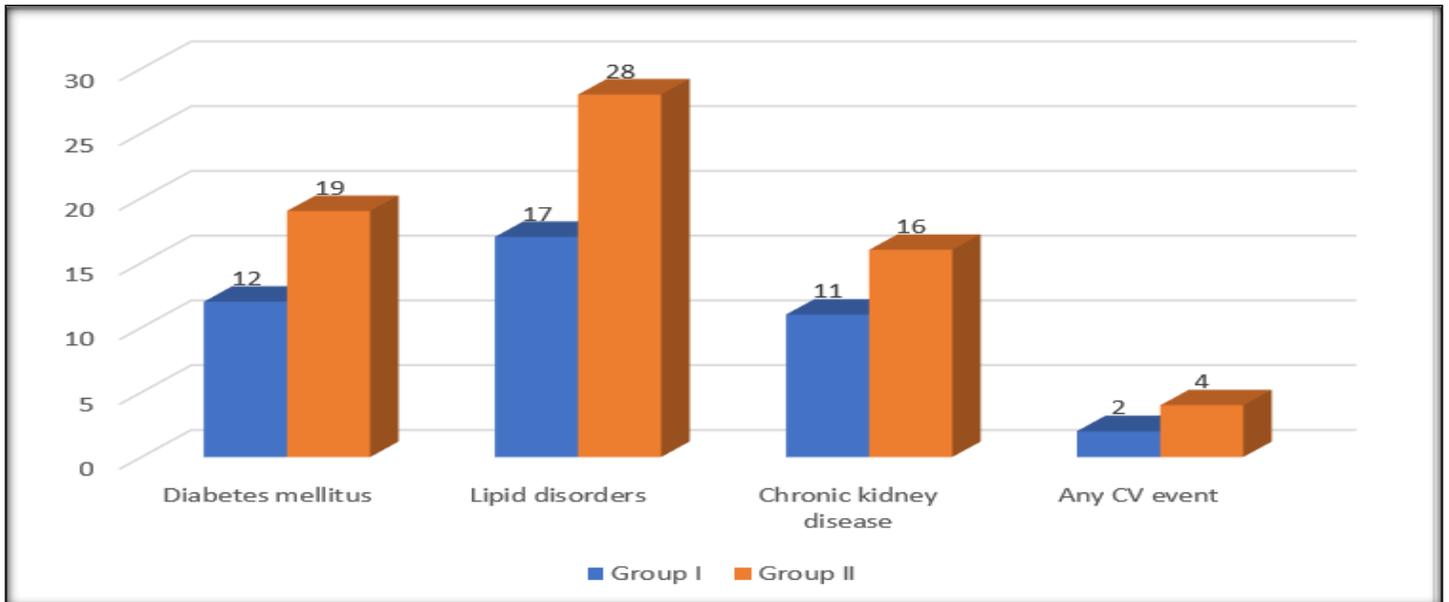
Parameters	Variables	Group I	Group II	P value
Baseline	SBP (mm Hg)	149.4	146.7	<0.05
	DBP (mm Hg)	85.4	83.6	<0.05
At 6 months	SBP (mm Hg)	135.4	134.6	<0.05
	DBP (mm Hg)	78.2	78.0	>0.05



**Figure 2:** Comparison of blood pressure before and after starting the therapy

**Table 4:** Comparison of parameters

Parameters	Group I	Group II	P value
Diabetes mellitus	12	19	<0.05
Lipid disorders	17	28	<0.05
Chronic kidney disease	11	16	<0.05
Any CV event	2	4	<0.05



**Figure 3:** Comparison of parameters

## DISCUSSION

Hypertension is a serious emergency worldwide. It is the reason for more than 7.5 million mortality universally and the number is expected to be raised to 1.56 billion adults till 2025.<sup>[9]</sup> Hypertension is the leading cause of brain hemorrhage, chronic heart disease etc.<sup>[10,11]</sup> Peripheral vascular disease (PVD), kidney failure, altered vision, retinal hemorrhage and coronary heart disease (CHD) are other complications of hypertension. It is regarded as silent killer as in most of the cases, the condition remains undiagnosed.<sup>[12,13]</sup> A wide range of medications are used for the management of cases of hypertension. Many drugs provide useful effects while few show few side effects.<sup>[14,15]</sup> Considering this we selected present study to study effect and safety of beta blockers in hypertensive patients.

Our results showed that there were 112 adult patients with hypertension. They were divided

into 2 groups of 56 each based on type of medication used. Group I received 25 mg atenolol twice daily and group II received 25 mg metoprolol tartrate twice daily. Parker et al,<sup>[16]</sup> conducted a study in which there were 3517 incident of myocardial infarction, 3272 incident of heart failure and 3664 CVA events. Hazard ratios for MI, HF, and stroke in metoprolol tartrate users were 0.99, 0.99 and 0.99 respectively. An alternative approach using propensity score matching yielded similar results in 11 176 new metoprolol tartrate users, who were similar to 11 176 new atenolol users with regard to demographic and clinical characteristics.

We observed that age group 20-40 years had 12 in group I and 11 in group II, 41-60 years had 14 in group I and 17 in group II and >60 years had 30 in group I and 28 in group II. There were 40 males and 16 females in group I and 38 males and 18 females in group II. Vogele et al,<sup>[17]</sup> included 15 studies and found that risk of

events were comparatively higher with beta blockers as compared to other antihypertensive agents. They revealed no benefit compared to other antihypertensive agents or placebo regarding mortality.

We observed that mean SBP found to be 149.4 mm Hg in group I and 146.7 mm Hg in group II and DBP was 85.4 mm Hg in group I and 83.6 mm Hg in group II at baseline and SBP was 135.4 mm Hg in group I and 134.6 mm Hg in group II and 78.2 mm Hg in group I and 78.0 mm Hg in group II at 6 months. Chan et al<sup>18</sup> in their study evaluated the effect of  $\beta$ -blockers (carvedilol and nebivolol) or atenolol in 118133 and 267891 patients respectively. The pooled hazard ratios (HRs) of acute myocardial infarction, stroke, hospitalization for heart failure, and most metabolic complications were not different between the third-generation  $\beta$ -blockers versus atenolol after propensity score matching and empirical calibration. A significant higher risk of stroke was seen with third-generation  $\beta$ -blockers as compared to angiotensin-converting enzyme inhibitors and thiazide diuretics.<sup>[18]</sup>

## REFERENCES

1. Blood Pressure Lowering Treatment Trialists' Collaboration, Turnbull F, Neal B, Ninomiya T, Algert C, Arima H, et al. Effects of different regimens to lower blood pressure on major cardiovascular events in older and younger adults: meta-analysis of randomised trials. *BMJ*. 2008;336(7653):1121-3. doi: 10.1136/bmj.39548.738368.BE.
2. Staessen JA, Gasowski J, Wang JG, Thijs L, Den Hond E, Boissel JP, et al. Risks of untreated and treated isolated systolic hypertension in the elderly: meta-analysis of outcome trials. *Lancet*. 2000;355(9207):865-72. doi: 10.1016/s0140-6736(99)07330-4.
3. Vasan RS, Beiser A, Seshadri S, Larson MG, Kannel WB, D'Agostino RB, et al. Residual lifetime risk for developing hypertension in middle-aged women and men: The Framingham Heart Study. *JAMA*. 2002;287(8):1003-10. doi: 10.1001/jama.287.8.1003.
4. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R; Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet*. 2002;360(9349):1903-13. doi: 10.1016/s0140-6736(02)11911-8.

We observed that diabetes mellitus was seen in 12 in group I and 19 in group II, lipid disorders 17 in group I and 28 in group II, chronic kidney disease 11 in group I and 16 in group II and CV event 2 in group I and 4 in group II. Cayley et al,<sup>[19]</sup> found that placebo exhibited higher risk for CVDs as compared to first-line beta blockers. There was reduction in stroke risk. Coronary heart disease risk was not significantly different between beta blockers and placebo. The effect of beta blockers on cardiovascular disease was significantly worse than that of calcium channel blockers but was not significantly different from that of diuretics or RAS inhibitors. Both line of treatment revealed no difference in coronary heart disease risk. It was found that patients taking beta blockers were more likely to discontinue treatment because of adverse effects than those taking diuretics.

## CONCLUSIONS

Both beta blockers found to be equally effective in management of patients with hypertension.



5. Messerli FH, Beevers DG, Franklin SS, Pickering TG. beta-Blockers in hypertension-the emperor has no clothes: an open letter to present and prospective drafters of new guidelines for the treatment of hypertension. *Am J Hypertens.* 2003;16(10):870-3. doi: 10.1016/s0895-7061(03)01017-3.
6. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R; Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet.* 2002;360(9349):1903-13. doi: 10.1016/s0140-6736(02)11911-8.
7. Ong HT. Beta blockers in hypertension and cardiovascular disease. *BMJ.* 2007;334(7600):946-949. doi:10.1136/bmj.39185.440382.47
8. Wiysonge CS, Bradley H, Mayosi BM, Maroney R, Mbewu A, Opie LH, et al. Beta-blockers for hypertension. *Cochrane Database Syst Rev.* 2007;(1):CD002003. doi: 10.1002/14651858.CD002003.pub2.
9. Beevers DG. The end of beta blockers for uncomplicated hypertension? *Lancet.* 2005;366(9496):1510-2. doi: 10.1016/S0140-6736(05)67575-7.
10. Massie BM. Review: available evidence does not support the use of beta blockers as first line treatment for hypertension. *Evid Based Med.* 2007;12(4):112.
11. Reid JL. Optimal features of a new beta-blocker. *Am Heart J.* 1988;116(5 Pt 2):1400-4. doi: 10.1016/0002-8703(88)90130-5.
12. Drayer DE. Lipophilicity, hydrophilicity, and the central nervous system side effects of beta blockers. *Pharmacotherapy.* 1987;7(4):87-91. doi: 10.1002/j.1875-9114.1987.tb04029.x.
13. Ho PM, Zeng C, Tavel HM, Selby JV, O'Connor PJ, Margolis KL, Magid DJ. Trends in first-line therapy for hypertension in the Cardiovascular Research Network Hypertension Registry, 2002-2007. *Arch Intern Med.* 2010;170(10):912-3. doi: 10.1001/archinternmed.2010.102.
14. Magid DJ, Shetterly SM, Margolis KL, Tavel HM, O'Connor PJ, Selby JV, et al. Comparative effectiveness of angiotensin-converting enzyme inhibitors versus beta-blockers as second-line therapy for hypertension. *Circ Cardiovasc Qual Outcomes.* 2010;3(5):453-8. doi: 10.1161/CIRCOUTCOMES.110.940874.
15. Schmittiel J, Selby JV, Swain B, Daugherty SL, Leong TK, Ho M, et al. Missed opportunities in cardiovascular disease prevention?: low rates of hypertension recognition for women at medicine and obstetrics-gynecology clinics. *Hypertension.* 2011;57(4):717-22. doi: 10.1161/HYPERTENSIONAHA.110.168195.
16. Parker et al. Comparative effectiveness of 2-blockers in hypertensive patients. *Arch Intern Med.* 2012;172(18):1406-1412.
17. Vögele A, Johansson T, Renom-Guiteras A, Reeves D, Rieckert A, Schlender L, et al. Effectiveness and safety of beta blockers in the management of hypertension in older adults: a systematic review to help reduce inappropriate prescribing. *BMC Geriatr.* 2017;17(Suppl 1):224. doi: 10.1186/s12877-017-0575-4.
18. Chan You S, Krumholz HM, Suchard MA, Schuemie MJ, Hripcsak G, Chen R, et al. Comprehensive Comparative Effectiveness and Safety of First-Line  $\beta$ -Blocker Monotherapy in Hypertensive Patients: A Large-Scale Multicenter Observational Study. *Hypertension.* 2021;77(5):1528-38.
19. Cayley WE Jr. Are beta blockers effective first-line treatments for hypertension? *Am Fam Physician.* 2007;76(9):1306-8.

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