

ORIGINAL STUDY

Blood Pressure Trend of Patients with Stage 2 Hypertension given DOH Combination Package (ComPack) Anti-Hypertensive Medicines in Pilar, Cebu: A Community-based Study

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BLOOD PRESSURE TREND OF PATIENTS WITH STAGE 2 HYPERTENSION GIVEN DOH COMBINATION PACKAGE (COMPACK) ANTI-HYPERTENSIVE MEDICINES IN PILAR, CEBU: A COMMUNITY-BASED STUDY

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ABSTRACT

Background: In its efforts to reduce the morbidity and mortality from hypertension and its complications, the Department of Health provides free combination package (ComPack) medicines for hypertension such as Amlodipine, Losartan, and Metoprolol. However, it is not uncommon for people in the community to doubt the effectiveness of these generic medications, which has affected their compliance. This study, aimed to determine the blood pressure (BP) of hypertensive patients in Pilar, Cebu after 12 months of taking the DOH ComPack medicines.

Methods: This study was conducted in the island municipality of Pilar, Cebu. This was a prospective observational study, which involved stage 2 hypertensive patients ≥ 25 years old, prescribed with. Monotherapy or combination therapy using the ComPack medicines with the intention to treat to BP goal of $< 140/90$ mmHg.

Results: One hundred forty-one ($n=141$) of the 1, 239 hypertensive patients met the inclusion criteria. Among those compliant to Amlodipine ($n=70$), the mean age was 62 years old and the mean BP at baseline was 160/89 mmHg. Forty percent (40%) achieved the target BP after 1 month, 83% achieved the target BP after 12 months, while 17% did not achieve the target BP. The mean BP after 12 months was 125/73 mmHg, with 35 mmHg and 16 mmHg reduction in the systolic (SBP) and diastolic BP (DBP), respectively. Among those compliant to Losartan ($n=37$), the mean age was 54 years old and the mean baseline BP was 149/88 mmHg. Forty-six percent (46%) achieved the target BP after 1 month, 92% achieved the target BP after 12 months, while 8% did not achieve the target BP. The mean BP after 12 months was 127/79 mmHg, with 22 mmHg and 9 mmHg reduction in the SBP and DBP, respectively. Among those compliant to the combination therapy of Amlodipine and Losartan ($n=24$), the mean age was 62 years old and the mean baseline BP was 166/90 mmHg. Twenty-one percent (21%) achieved the target BP after 1 month, 83% achieved the target BP after 12 months, while 17% did not achieve the target BP. The mean BP after 12 months was 135 mmHg/77 mmHg, with 31 mmHg and 13 mmHg reduction in the SBP and DBP, respectively. Lastly, among those compliant to Metoprolol ($n=10$), the mean age was 59 years old, with a mean BP of 151/93 mmHg. Thirty percent (30%) achieved the target BP after 1 month, 70% achieved the target BP after 12 months, while 30% did not achieve the target BP. The mean BP after 12 months was 140/83 mmHg, with 11 mmHg and 10 mmHg reduction in the SBP and DBP, respectively.

Conclusion: The blood pressure of hypertensive patients in Pilar, Cebu improved after 12 months of taking the DOH Combination package medicines.

Chapter 1

THE PROBLEM AND ITS CONTEXT

Background of the Study

Over the past decades, hypertension has been a leading cause of morbidity and mortality worldwide. In fact, according to the WHO (2007), 60 percent of total deaths in the world is due to hypertension and diabetes mellitus.

In the Philippines, the burden of hypertension has been immense not only in terms of finances but also due to the number of years of life lost as a result of its complications. Previously in 1990, heart attack and stroke only ranked 4th and 7th causes of years of life lost or premature deaths nationwide, respectively. However, in 2010, heart attack rose to 2nd and stroke as the 3rd leading causes of premature deaths. This can be due to the prevalence of hypertension, which has been consistently high in the past years. In Central Visayas, essential hypertension is the second leading cause of morbidity in 2014 with a morbidity rate of 1, 058/100, 000 population (FHSIS Report, Region VII, 2014).

Meanwhile in the municipality of Pilar, 27% or almost one-third of the adult population are hypertensive (Pilar Hypertension Registry, 2016) (see Table 2). Remarkably, more than 50% of these patients do not have maintenance medicines. Hence, it is not surprising that in this small island, complications from hypertension such as stroke and heart attack were the leading causes of death over the past years.

Among the top reasons for the high mortality rate from hypertension in Pilar is that a large proportion of the population does not know that they have the disease due

to lack of active case finding and screening activities to identify hypertension among the high-risk adult population. Because of this lack of active case finding, the list of hypertensive patients in the registry is not updated. This has a very significant implication because as a consequence, the amount of medications requested from the Department of Health and the medication budget are low. Thus, the Rural Health Unit (RHU) easily runs out of antihypertensive medicines. With this, those who are poor and hypertensive patients that rely only from the RHU for their maintenance medicines cannot receive and regularly take their medications. Most often than not, the cases of heart attack and stroke actually come from this population.

Furthermore, the high mortality rate from hypertension can also attributed to the fact that there is lack of emergency medicines and supplies in this island. Because the municipality is a geographically isolated and disadvantaged area, people who were referred to tertiary facilities for further management and evaluation were not easily transported. Regrettably, some patients chose not to be referred due to financial constraints. With this, reducing the risk of heart attack and stroke among hypertensive patients before the complications sets in becomes imperative. These preventive measures include regular physical activity of moderate intensity, and a diet low in salt and fats. Paramount to these is the patient's regular intake to their prescribed medications.

In its efforts to reduce the morbidity and mortality from hypertension and its complications, the Department of Health provides free combination package (ComPack) medicines for hypertension such as Amlodipine, Losartan, and Metoprolol. However, it is not uncommon for people in the community to doubt the effectiveness

of these generic medications, which has affected their compliance. Hence, the researcher would like to determine the BP trend of patients given these medications in order to provide evidence that will help encourage the hypertensive individuals to comply with their medications.

Research Question:

Among adult patients ≥ 25 years old with stage 2 hypertension in the municipality of Pilar, Cebu given the ComPack antihypertensive medicines, does compliance to these medications leads to achievement of the target BP of $< 140/90$ mmHg?

General Objective:

This study aimed to determine whether the ComPack antihypertensive medicines given by the DOH were effective in achieving the target BP of $< 140/90$ mmHg.

Specific Objectives:

Specifically, it sought to:

1. To determine the profile of the hypertensive patients.
2. To determine the proportion of hypertensive patients who will achieve the target BP after 1 month and after 12 months of compliance.
3. To determine the mean reduction in systolic and diastolic blood pressure after 12 months of taking the medications.

Significance of the Study

Putting importance to the essence of Universal Health Care that is provision to every Filipino the highest possible quality of health care that is accessible, efficient, equitably distributed, adequately funded, fairly financed, and appropriately used by an informed and empowered public, this study aimed to benefit the following groups/individuals in one-way or another:

The Community. As the primary beneficiary of this study and being the recipients of free medicines, they will gain trust in the medicines provided by the RHU and the DOH. As the ultimate recipient also of care, their compliance to medication will reduce their risk of cardiovascular morbidity and mortality.

The Rural Health Unit. As the center primarily in charge in the delivery of health services in the municipality of Pilar, the RHU personnel will be able to use the results of this study to help convince the people to comply with their medicines.

The Department of Health. As the staunch leader and stakeholder for health in the country, the DOH can use the result of this study to improve their program on the Philippine Package of Non-communicable diseases as well as increase the budget allocation.

The Future Researchers. This will serve as basis for future studies and application of evidence-based knowledge and interventions for hypertension. They can determine the applicability of the output in other rural health settings and make further modification of the output should it be necessary.

Scope and Limitations

Among the limitations in the study are the factors that influence the implementation of the program such as government support, individual participation to the program, and commitment of the healthcare workers involved in the program. These limitations however are the real-world concerns that makes this study relevant as it depicts the actual scenarios that occurs in the implementation of programs in the government and in the general population.

Management of hypertension should involve lifestyle modification and risk reduction strategies such as exercise, dietary approaches to stop hypertension, quitting smoking and many others. However, this study focused only on pharmacotherapy since the other measures were already advocated among the populace.

Moreover, since this is just an observational study, there was the intention to treat to BP goal of <140/90 mmHg as the researcher himself is the physician prescribing the medications.

In addition, the study did not compare the ComPack medicine with the available branded medicines in the market. The study also has limited number of sample since this reflects the rate of compliance to medication among the general public.

Chapter 2

REVIEW OF RELATED LITERATURE

Review of Related Literature

Sustainable Development Goals and Non-communicable Diseases. At the Sustainable Development Summit on September 2015, the UN Member States have adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 Sustainable Development Goals (SDGs). The 2030 Agenda for Sustainable Development recognizes non-communicable diseases (NCDs) as a major challenge for sustainable development. Non-communicable diseases (NCDs), which is not included in the Millennium Development Goals, are included in specific target 3 of the Sustainable Development Goals entitled *Ensure healthy lives and promote wellbeing for all at all ages* (reducing premature mortality from NCDs by one third) and are part of several other health targets (UNDP, 2015).

Achieving the SDG target for NCDs will require major interventions to deal with a context characterized by ageing populations, rapid unplanned urbanization and globalization of markets that promote inactivity and unhealthy diets, and will focus on the development and implementation of strong national plans that emphasize prevention and treatment access for all (half of all countries had neither a national plan nor budget in 2013). As part of the Agenda, Heads of State and Government committed to develop national responses to the overall implementation of this Agenda, including to reduce by one third premature mortality from NCDs; strengthen responses to reduce the harmful use of alcohol; achieve universal health coverage (UHC);

strengthen the implementation of the WHO Framework Convention on Tobacco Control (FCTC); support the research and development of vaccines and medicines for NCDs that primarily affect developing countries; provide access to affordable essential medicines and vaccines for NCDs (WHO, 2015).

Integrated Prevention and Control of Non-communicable Diseases in the Philippines. In recent years, the NCD Prevention and Control Program of the Department of Health has achieved significant milestones in addressing the public health problem on lifestyle-related diseases. One of the most notable innovations is the implementation of the integrated approach to reduce mortality, morbidity, and disability from NCDs. This is done through the promotion of healthy lifestyle with focus on addressing the common risk factors leading to NCDs. Demonstration projects and local experiences in implementing and managing NCD interventions and activities in local government units (LGUs) have likewise shown successes, and have helped enriched the program to what it is now (WHO, 2013).

As a review, Non-communicable Disease Prevention and Control Program (NCDPCP) started in 1986 with three major parallel sub-programs focused on major non-communicable diseases. The disease-based approach was implemented down to local levels for about 15 years, with some successes. In 2000, the Philippines shifted gear towards an integration approach, taking cue from the WHO Global Strategy for the Prevention and Control of NCDs. Milestones in the prevention and control. In 2003, focus on healthy lifestyle with the launching of the “Mag-Healthy Lifestyle Campaign” wherein the Guinness record for largest aerobics display was

earned. In 2005, healthy diet was incorporated in the menu when advocacy with commercial food establishments to offer healthier menu options was initiated. In 2007, the DOH updated Framework for Action for NCD Prevention and Control in the Philippines developed based on WHO Global Plan of Action and Western Pacific Regional Strategy for Prevention and Control of NCDs (Department of Health, 2009)

Moreover, Integrated NCD Prevention and Control Program has the following key characteristics: uses the integrated approach; provides comprehensive services along the continuum of care; Promotes the primary health care approach and encourages community-based implementation; Addresses equity concerns; Provides continuity of services throughout the human life cycle; Encourages evidence-based program management; Encourages partnerships and advocates for whole-of-government and whole-of-society approaches; Ensures sustainability (Department of Health, 2009).

Noncommunicable diseases focusing on hypertension. The major non-communicable diseases in the country include hypertension, diabetes, cancer and chronic obstructive pulmonary disease. However, the focus of this this literature review is only Hypertension as it is the one being investigated.

Hypertension, also known as high-blood pressure or hypertensive vascular disease, is defined as is defined as BP \geq 140/90 millimeters of mercury (mmHg) (Bell, Twigs, & Olin, 2008). From an epidemiologic perspective, there is no obvious level of blood pressure that defines hypertension. Clinically, hypertension may be defined as that level of blood pressure at which the institution of therapy reduces blood pressure-

related morbidity and mortality. Current clinical criteria for defining hypertension generally are based on the average of two or more seated blood pressure readings during each of two or more outpatient visits. A recent classification recommends blood pressure criteria for defining normal blood pressure, prehypertension, hypertension (stages I and II), and isolated systolic hypertension, which is a common occurrence among the elderly. In children and adolescents, hypertension generally is defined as systolic and/or diastolic blood pressure consistently >95th percentile for age, sex, and height. Blood pressures between the 90th and 95th percentiles are considered prehypertensive and are an indication for lifestyle interventions (Longo et al, 2012).

Table 1 Blood Pressure Classification based on JNC 8

Blood Pressure	Systolic mmHg		Diastolic mmHg
Normal	<120	and	<80
Elevated	120-129	and	<80
Stage I Hypertension	130-139	or	80-89
Stage II Hypertension	≥140	or	≥90

Table 2 below shows the blood pressure status of the adult individuals ≥25 years old and above in the municipality of Pilar. As seen in the table, among the 4,558 adults ≥25 years old and above, 1,239 (27%) were hypertensive.

Table 2 Blood Pressure Control of patients ≥ 25 years old in Pilar, Cebu

BARANGAY	NORMAL ($<120/80$ mmHg)	ELEVATED BP	STAGE I HYPERTENSION	STAGE II HYPERTENSION		TOTAL NUMBER OF HYPERTENSIVE INDIVIDUALS	TOTAL NUMBER OF INDIVIDUALS SCREENED
				CONTROLLED HYPERTENSION ($<140/90$ mmHg but with history of High BP)	UNCONTROLLED HYPERTENSION ($\geq 140/90$ mmHg with history of High BP)		
Cawit	480	93	30	39	94	163	736
Lanao	322	51	20	25	66	111	484
Biasong	95	27	12	12	44	68	190
Dapdap	125	40	12	15	47	74	239
Imelda	133	44	21	16	60	97	274
Villahermosa	210	33	18	18	68	104	347
Esperanza	270	45	12	18	44	74	389
Lower Poblacion	191	52	22	26	56	104	347
San Isidro	190	35	18	23	5	46	271
Upper Poblacion	196	49	31	36	28	95	340
San Juan	224	33	22	24	29	75	332
*Moabog	141	18	20	29	50	99	258
**Montserrat	197	25	26	32	71	129	351
TOTAL	2774 (61%)	545 (11.9%)	264 (5.8%)	313 (6.9%)	662 (14.5%)	1239 (27%)	4558 (100%)

Depending on methods of patient ascertainment, ~80-“95% of hypertensive patients are diagnosed as having "essential" hypertension (also referred to as primary or idiopathic hypertension). In the remaining 5-20% of hypertensive patients, a specific underlying disorder causing the elevation of blood pressure can be identified. Essential hypertension tends to be familial and is likely to be the consequence of an interaction between environmental and genetic factors. The prevalence of essential hypertension increases with age, and individuals with relatively high blood pressures at younger ages are at increased risk for the subsequent development of hypertension. It is likely that essential hypertension represents a spectrum of disorders with different underlying pathophysiology. In the majority of patients with established hypertension, peripheral resistance is increased and cardiac output is normal or

decreased; however, in younger patients with mild or labile hypertension, cardiac output may be increased and peripheral resistance may be normal (Longo et al, 2012).

Hypertension and its risk for complications. Hypertension is a major independent risk factor for coronary artery disease, stroke, heart failure, and renal failure (Hernandez-Vila, 2015). Hypertension doubles the risk of cardiovascular diseases, including coronary heart disease (CHD), congestive heart failure (CHF), ischemic and hemorrhagic stroke, renal failure, and peripheral arterial disease. Heart disease is the most common cause of death in hypertensive patients. Hypertensive heart disease is the result of structural and functional adaptations leading to left ventricular hypertrophy, CHF, abnormalities of blood flow due to atherosclerotic coronary artery disease and microvascular disease, and cardiac arrhythmias (Longo et al, 2012).

Stroke is the second most frequent cause of death in the world; it accounts for 5 million deaths each year, with an additional 15 million persons having nonfatal strokes. Elevated blood pressure is the strongest risk factor for stroke. Approximately 85% of strokes are due to infarction, and the remainder are due to either intracerebral or subarachnoid hemorrhage. The incidence of stroke rises progressively with increasing blood pressure levels, particularly systolic blood pressure in individuals >65 years. Treatment of hypertension convincingly decreases the incidence of both ischemic and hemorrhagic strokes (Longo et al, 2012).

Age and Risk for Heart attack and Stroke. It is important to recognize that the strongest predictor of cardiovascular risk in any risk equation is age. Almost all persons aged 70 and over are at >20% ten-year cardiovascular risk and almost

nobody aged under 40 is at >20% ten year cardiovascular risk. Since those who benefit most from treatment are those at highest risk, this means that treatment of patients with raised blood pressure and raised cholesterol levels in their thirties benefits very few. Whereas treatment of patients with "normal" blood pressure and "normal" cholesterol levels in their seventies benefits many. This casts doubt on the wisdom of categorizing individuals as having high blood pressure or raised cholesterol and treating these individual risk factors without a consideration of both their overall risk of cardiovascular disease and of the probability that they will benefit (Von Hafe, 2016). In addition, the chance of having a stroke approximately doubles for each decade of life after age 55. While stroke is common among the elderly, a lot of people under 65 also have strokes (American Heart Association, 2016).

Gender and Risk for Heart attack and Stroke. Moreover, men age 45 or older and women age 55 or older are more likely to have a heart attack than are younger men and women (Mayo Clinic Staff). In addition, men have a greater risk of heart attack than women do, and they have attacks earlier in life. Even after menopause, when women's death rate from heart disease increases, it's not as great as men's (American Heart Association, 2016).

Smoking and Risk for Heart attack and Stroke. Smoking and long-term exposure to secondhand smoke also increase the risk of a heart attack (Mayo Clinic Staff, 2014). Cigarette smoking increases CVD risk in both men and women in a dose-dependent manner. It approximately doubles coronary heart disease (CHD) risk, which may further increase with the numbers of cigarettes smoked. Conversely, smoking cessation in primary prevention settings substantially reduces cardiac risk

within months after quitting. Hence, smoking cessation is consistently included in CVD risk management. For significant CVD risk reduction, the goal is complete smoking cessation and avoidance of passive smoking.

High fat/ High Salt intake and Risk for Heart attack and Stroke. It has been estimated that a universal reduction in dietary intake of sodium by about 1g of sodium a day, about 3g of salt, would lead to a 50% reduction in the number of people needing treatment for hypertension. The same decrease would lead to a 22% drop in the number of deaths resulting from strokes and a 16% fall in the number of deaths from coronary heart disease (Piskorz et al, 2016). Moreover, the Philippine Heart Association recommends to adopt the Dietary Approaches to Stop Hypertension (DASH) (Blumenthal, 1990) eating plan (cite) which is a diet rich in fruits, vegetables and low fat dairy products with a lower content of dietary cholesterol as well as saturated and total fat.

Physical activity and Risk for Heart attack and Stroke. Regular physical activity is associated with a lower risk of death from CVD and CHD, but the mechanisms behind this are not fully understood and probably multifactorial (Philippine Heart Association, 2005; Sandvik et al, 1993). Physical activity is associated with lower levels of LDL and triglycerides, higher HDL cholesterol, improved insulin sensitivity and lower blood pressure. For physical activity to be protective, it must be vigorous, aerobic, habitual and continuing. A large-scale study suggests that 3 hours a week of moderately vigorous activity or activity equivalent to 3, 5000 kilocalories is protective. However, this study was done in Caucasians and there are no current local data on this matter. Moderate vigorous activity includes

swimming, basketball, volleyball, badminton, tennis, jogging, and running (Philippine Heart Association, 2005). In addition, guiding the patient to make time to exercise as a *regular activity* is often more important than the type of exercise chosen. For cardiovascular benefit, patients should exercise for 20 to 60 minutes at least 3 times a week.

Role of Antihypertensive Medications. Drug therapy is recommended for individuals with blood pressures $\geq 140/90$ mmHg. The degree of benefit derived from antihypertensive agents is related to the magnitude of the blood pressure reduction. Lowering systolic blood pressure by 10-12 mmHg and diastolic blood pressure by 5-6 mmHg confers relative risk reductions of 35-40% for stroke and 12-16% for CHD within 5 years of the initiation of treatment. Risk of heart failure is reduced by >50%. Hypertension control is the single most effective intervention for slowing the rate of progression of hypertension-related chronic kidney disease (Longo et al, 2012). Table 3 shows the antihypertensive medicines provided by the DOH.

There is considerable variation in individual responses to different classes of antihypertensive agents, and the magnitude of response to any single agent may be limited by activation of counter-regulatory mechanisms that oppose the hypotensive effect of the agent. Most available agents reduce systolic blood pressure by 7-13 mmHg and diastolic blood pressure by 4-8 mmHg when corrected for placebo effect. More often than not, combinations of agents, with complementary antihypertensive mechanisms, are required to achieve goal blood pressure reductions. Selection of antihypertensive agents and combinations of agents should be individualized, taking into account age, severity of hypertension, other cardiovascular disease risk factors,

comorbid conditions, and practical considerations related to cost, side effects, and frequency of dosing (Longo et al, 2012).

Table 3 Antihypertensive medicines provided by the Department of Health

Class	Drug Name	Usual Daily Dosage
Calcium Channel Blocker	Amlodipine	10 mg/tab once a day
Angiotension Receptor Blocker (ARB)	Losartan	50mg/tab to 100mg/tab once or twice a day
Beta-blocker	Metoprolol	50mg/tab to 100mg/tab once or twice a day

Amlodipine: A Calcium Channel Blocker. Calcium antagonists reduce vascular resistance through L-channel blockade, which reduces intracellular calcium and blunts vasoconstriction. This is a heterogeneous group of agents that includes drugs in the following three classes: phenylalkylamines (verapamil), benzothiazepines (diltiazem), and 1,4-dihydropyridines (amlodipine). Used alone and in combination with other agents (ACEIs, beta blockers, α -adrenergic blockers), calcium antagonists effectively lower blood pressure; however, it is unclear if adding a diuretic to a calcium blocker results in a further lowering of blood pressure. Side effects of flushing, headache, and edema with dihydropyridine use are related to their potencies as arteriolar dilators; edema is due to an increase in transcapillary pressure gradients, not to net salt and water retention (Longo et al, 2012).

Losartan: An Angiotensin Receptor Blocker. ARBs provide selective blockade of AT_1 receptors, and the effect of angiotensin II on unblocked AT_2 receptors may augment their hypotensive effect. ARBs are effective antihypertensive agents that may be used as monotherapy or in combination with diuretics, calcium

antagonists, and alpha blocking agents. ARBs have been shown to improve insulin action and ameliorate the adverse effects of diuretics on glucose metabolism. Although the overall impact on the incidence of diabetes is modest, compared with amlodipine (a calcium antagonist), valsartan (an ARB) has been shown to reduce the risk of developing diabetes in high-risk hypertensive patients. ACEI/ARB combinations are less effective in lowering blood pressure than is the case when either class of these agents is used in combination with other classes of agents. In patients with vascular disease or a high risk of diabetes, combination ACEI/ARB therapy has been associated with more adverse events (e.g., cardiovascular death, myocardial infarction, stroke, and hospitalization for heart failure) without increases in benefit. However, in hypertensive patients with proteinuria, preliminary data suggest that reduction of proteinuria with ACEI/ARB combination treatment may be more effective than treatment with either agent alone (Longo et al, 2012).

Side effects of ACEIs and ARBs include functional renal insufficiency due to efferent renal arteriolar dilation in a kidney with a stenotic lesion of the renal artery. Additional predisposing conditions to renal insufficiency induced by these agents include dehydration, CHF, and use of nonsteroidal anti-inflammatory drugs. Dry cough occurs in ~15% of patients, and angioedema occurs in <1% of patients taking ACEIs. Angioedema occurs most commonly in individuals of Asian origin and more commonly in African Americans than in whites. Hyperkalemia due to hypoaldosteronism is an occasional side effect of both ACEIs and ARBs (Longo et al, 2012).

Metoprolol: A Beta Blocker. β -Adrenergic receptor blockers lower blood pressure by decreasing cardiac output, due to a reduction of heart rate and

contractility. Other proposed mechanisms by which beta blockers lower blood pressure include a central nervous system effect and inhibition of renin release. Beta blockers are particularly effective in hypertensive patients with tachycardia, and their hypotensive potency is enhanced by co-administration with a diuretic. In lower doses, some beta blockers selectively inhibit cardiac β_1 receptors and have less influence on β_2 receptors on bronchial and vascular smooth muscle cells; however, there seems to be no difference in the antihypertensive potencies of cardio-selective and nonselective beta blockers. Certain beta-blockers have intrinsic sympathomimetic activity, and it is uncertain whether this constitutes an overall advantage or disadvantage in cardiac therapy. Beta blockers without intrinsic sympathomimetic activity decrease the rate of sudden death, overall mortality, and recurrent myocardial infarction. In patients with CHF, beta blockers have been shown to reduce the risks of hospitalization and mortality (Longo et al, 2012).

Review of Past Studies

Antihypertensive medicine and blood pressure control. The ultimate goal of antihypertensive therapy is cardiovascular risk reduction (Antonakoudis et al, 2007). In one study, Sani et al (2008) performed a cross-sectional study on the current status of BP control among treated hypertensive in their outpatient clinic. One hundred consecutive patients with essential hypertension who have been attending their patient hypertension clinic and have been on treatment for at least 6 months were recruited. The pre-treatment BP and BP records in the previous 2 visits were noted. Patients were said to have good BP control if their BPs are < 140/90 mmHg (<130/80

mmHg for high risk patients) at the time of the study and in the last visit. There were 49 males and 51 female (M: F; 1:1), aged 26 to 85 (mean 52.33 +/- 12.29) years. The duration of hypertension ranged 6 months to 30 (mean 7.37 +/- 7.1) years. The duration of treatment in their centre was 6 months to 10 (mean 3.22 +/- 2.23) years. Blood pressure was controlled in 33 (33%) of the patients. Pre-treatment mean blood pressure was significantly higher than the BP value at the time of the study (155.87 +/- 26.02/97.81 +/- 11.89 mmHg versus 143.40 +/- 24.14/86.53 +/- 12.71 mmHg) ($p < 0.05$). Diuretics were the commonest antihypertensive prescribed either alone or in combination (69%), followed by a calcium antagonist (56%) and centrally acting drugs (38%). Twenty-seven were on single antihypertensive, 43 (43%) on 2, 25 (25%) on 3 and 5 (5%) on 4 classes of antihypertensive. The result revealed that blood pressure control was associated with taking more than one antihypertensive medication and compliance. The researchers concluded that control of BP in patients receiving antihypertensive drugs is still far from optimal in the study population in Nigeria just as in other countries. Many patients had multiple cardiovascular risk factors. Hence, adherence to medication should be encouraged.

Combination therapy versus monotherapy. According to Noubiap (2013), most current clinical hypertension guidelines—for instance those from the European Society of Hypertension (ESH)/European Society of Cardiology (ESC), the Joint National Committee 8—recommend the initiation of antihypertensive treatment with a monotherapy or a combination therapy, depending on the grade of hypertension and the cardiovascular risk profile of the patient (James, et al, 2014; Mancia et al, 2013). However, only a third or less of patients will have their blood pressure controlled with

a single drug, even those with grade 1 or 2 hypertension (according to the 2013 ESH/ESC classification), while two third need at least two drugs (Mancia et al, 2013; Dusing, 2010).

According to Corrao et al (2011), patients started on combination therapy had an 11% CV risk reduction with respect to those starting on monotherapy (95% CI: 5% to 16%). Compared with patients who maintained monotherapy also during follow-up, those who started on combination therapy and kept it along the entire period of observation had 26% reduction of CV risk (95% CI: 15% to 35%).

DEFINITION OF TERMS

The following terms were operationally defined in this study:

Anti-hypertensive Medicine refers to the free medicines for hypertension given by the Department of Health, which includes Amlodipine 10mg/tab, Losartan 50mg/tab, and Metoprolol 50mg/tab.

Blood Pressure Trend refers to the reduction in the blood pressure of the hypertensive patients taken 1 month and 12 months after taking the ComPack Medicines.

Combination Package (ComPack) medicines refer to the anti-hypertensive medicines such as Amlodipine, Losartan, and Metoprolol given by the DOH.

Combination Therapy refers to the use of at least 2 antihypertensive medications.

Compliance refers to in this study as the intake of the hypertensive medications for at least 10 months or has not stopped taking the medication for more than 2 months before the end of the study period.

DOH refers to the Department of Health who is in charge of distributing the ComPack medicines.

Monotherapy refers to the use of any single antihypertensive ComPack medicine.

Stage 2 Hypertension refers to a systolic blood pressure of ≥ 140 or a diastolic BP of

≥ 90 mmHg

Chapter 3

RESEARCH METHODOLOGY

Research Design

This study utilized a prospective observational study design to determine the trend in the blood pressure of the hypertensive patients. Blood pressure of the patients were taken at baseline upon enrolment to the hypertension registry, 1 month after, and 12 months after taking the medications.

Locale of the Study

The study was conducted in the municipality of Pilar, Cebu. The Ponson Island also known as the municipality of Pilar, is a 5th class island municipality situated in the Northeastern part of Cebu. It is part of the four municipalities that comprise the Camotes groups of islands in addition to San Francisco, Poro, and Tudela. It has a total land area of 224.94 km² or 3264.07 hectares. It has 13 barangays. Farthest from the North is the Upper Poblacion, where the Rural Health Unit is located. This area is nearer to Ormoc City thus referrals are mostly referred to Ormoc because of this proximity. At the Southern tip is Barangay Cawit. This is the one closer to the other municipalities of Camotes, and closer to Cebu. Figure 5 and 6 shows Pilar in the Map of Cebu and the Map of Pilar, Cebu, respectively.

Pilar has a total population of 11, 363 and 1, 894 households (Cebu Provincial Health Office, August 2016). Thirteen barangays comprise the municipality of Pilar namely, Upper Poblacion, Lower Poblacion, Villahermosa, Esperanza, Dapdap, Imelda, Lanao, Biasong, Cawit, Moabog, Montserrat, San Isidro, and San Juan.

Barangay Lanao has the largest land area but Cawit has the largest population. The Municipal Hall and the Rural Health Unit is located in the Upper Poblacion.



Figure 1

Map of Cebu showing Ponson Island/ otherwise known as Pilar, Cebu

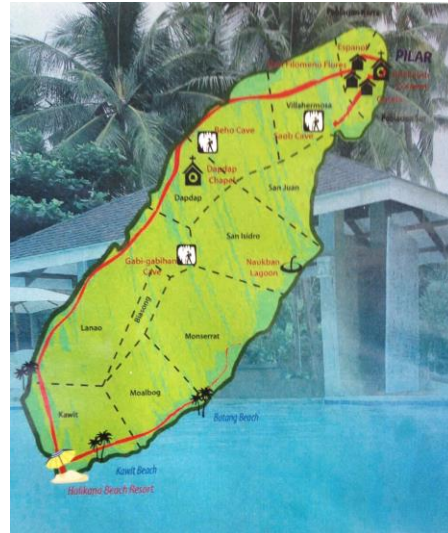


Figure 2

Map of Pilar, Cebu

Study Subject

The respondents of this study were the stage 2 hypertensive patients aged 25 years old and above, who were enrolled in the Pilar Sweethearts Club from January 2016 up to December 2016 and was followed up for 12 months.

Inclusion criteria:

- Aged 25 years old and above
- With stage 2 Hypertension (BP \geq 140/90 mmHg)

- Compliant to the medication given or has not stopped taking the medication for more than 2 months before the end of the study period
- Patients who were already using the ComPack medicines but still with uncontrolled BP

Exclusion Criteria

- Not compliant to the medication or has stopped taking the medication for more than 2 months before the end of the study period
- Taking other anti-hypertensive medication other than the ComPack medicines
- Patients who have been using the ComPack medicines and with controlled blood pressure already before the start of the study.
- Patients who does not want to take the medications prescribed and opted lifestyle modification

Study Participant Selection

There were a total of 4,558 adults ≥ 25 years old and above among the 11, 363 people in Pilar, Cebu. At the end of the first and second round of BP taking, 1, 239 were diagnosed with hypertension (27%) (see Figure 3). These individuals were managed accordingly with health education and advocacies for physical activity at least 30 minutes 5x a week, dietary approaches to stop hypertension, and to quit smoking, and to take antihypertensive medications. Of the 1, 239, only 141 (11.3%) met the inclusion criteria. These individuals were then given monotherapy or combination therapy. Combination therapy was given to those with very elevated BP

(BP >160 mmHg) or if with persistently elevated BP despite monotherapy. Monotherapy with either Amlodipine, Losartan, or Metoprolol were given based on the patient's age and side effects.

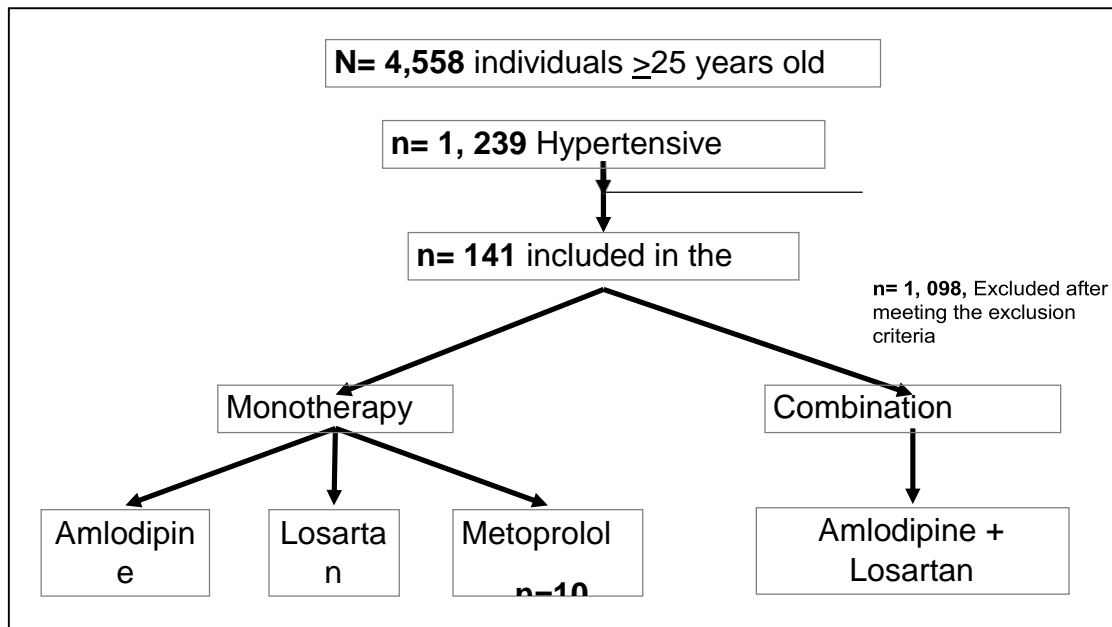


Figure 3

Study Participant Selection

Data Collection Procedures

Before the actual data gathering

After conducting a situational analysis to establish the existence of the problem through records review (Daily Service Record, Annual Morbidity and Mortality rates from the Field Health Information System (FHSIS) logbook, interview from the health personnel), the first round of blood pressure screening for all individuals 25 years old and above was conducted. Since the diagnosis of stage 2 hypertension was made

after getting a blood pressure of $\geq 140/90$ mmHg in two clinic visits, those who have elevated blood pressure during the round 1 screening were asked to go to the clinic for repeat blood pressure taking. Then, an information education campaign was conducted per barangay in all 13 barangays of Pilar to increase awareness of the people of the existence of the problem and to increase their knowledge of the disease. Third, a commitment board was signed by all individuals who attended the lectures including the barangay officials for their support. Two other lectures were also conducted among elementary and high school teachers separately.

Moreover, each barangay was asked to create a health club that promotes healthy lifestyle such as zumba club, joggers club, exercise club and others. In addition, a hypertension monitoring board was installed in each barangay health station to monitor those who are at risk and those who have uncontrolled blood pressure. A blood pressure monitoring card was made, which served as monitoring card for their blood pressure and compliance to treatment also.

Furthermore, to ensure that there were medicine supplies in the RHU, the number of medicines requested from the DOH was updated based on the actual number of patients plus the buffer stocks. Meanwhile, a program implementation review on the current hypertension program of the RHU was conducted to capacitate the health workers on the PhilPEN program, special procedures such as blood pressure taking, and in filling-up the Pilar sweethearts club card.

After the program implementation review, the round 2 of blood pressure taking was conducted to screen again those who were hypertensive but not in the master list of hypertensive patients per barangay. The list of hypertensives per barangay was

updated to ensure that exact amount of medicines was requested and to ensure allotment of medicines per patient. In addition, non-communicable disease risk assessment and profiling was conducted by the Barangay Health Workers among all 25 years old and above to further identify those who are at risk of fatal and non-fatal cardiovascular events. The data gathered in the NCD profiling was transferred by the nurses in the respective club card where all hypertensive patients were provided.

During the data gathering or monitoring of blood pressure

With the complete list of hypertensive patients, available medicines, and a monitoring card, the Pilar Sweethearts Club was launched. This time, all patients were given 1-month supply of antihypertensive medicines based on the DOH PhilPEN protocol guidelines. Timely requisition of exact supplies was also done to ensure availability of medicines and sustainability of the program. LGU budget for hypertensive medicines was also allocated as back up in case the RHU ran out of supply.

All hypertensive patients were advised to follow-up after 1 month to monitor their blood pressure and replenish their supplies. Each month, the patient comes back to the RHU for BP taking and replenishment of supply.

All data on the blood pressure and compliance monitoring were based on the club card provided, which lists the monthly BP and the medications taken.

Research Instruments

This study utilized two instruments, namely the Noncommunicable Disease (NCD) Risk Assessment Form, and the Pilar Sweethearts Club Card. First, the Non-communicable Disease Risk Assessment and Screening for was used to gather the data on the profile of the patient such as age, gender, smoking status, presence or absence of diabetes, diet, physical activity, and medications taken.

Lastly, the Pilar Sweetheart Club card that contains the patient's latest blood pressure and compliance to medications. This was a researcher-made club monitoring card that contains the basic information for risk stratification such as age, gender, presence or absence of diabetes, and systolic blood pressure (See appendix B).

For the record, an automatic blood pressure was used for uniformity in taking the blood pressures by the health workers. Automatic blood pressure machines are the ones available already in each barangay health stations. Each barangay health workers underwent training on how to get the blood pressure of their patients.

Tools of Analysis

Descriptive statistics such as simple frequency and percentages and simple mean were used to analyze the data gathered in this study.

Chapter 3

RESULTS, ANALYSIS, AND DISCUSSION

Results

Table 4 presents the profile of the hypertensive patients under the present study. Among the 4,558 adults ≥ 25 years old, 1,239 (27.0%) were hypertensive. The mean age is 59 years old, with 62 years old for both Amlodipine and the Amlodipine + Losartan group. The mean age for the Losartan and Metoprolol group was 54 years old, respectively. Majority of the respondents were females (n=79, 56%) with 8% (n=11) having diabetes mellitus. Only 16% of the respondents have normal body mass index and majority were overweight (n=56, 40%) and obese types I and II. Majority of the respondents were never smokers but a minority were current smokers, passive smokers, and has stopped smoking for more than 1 year. Majority (n=84, 16%) have not consumed alcohol and has been compliant to low fat diet with only 16% having high fat diet. However, due to the geographical location of the municipality being in an island, 93% (n=131) reported high salt intake with 95% (n=5) have poor physical activity. None of the respondents consumes 3 servings of fruits or vegetables daily.

Table 4 Profile of the Hypertensive Individuals in Pilar, Cebu, (n=141)

Profile	Amlodipine (n= 70)	Losartan (n=37)	Metoprolol (n=10)	Amlodipine + Losartan (n=24)	Total
Age, mean (years)	62	54	59	62	59
Gender					
Male	34 (49%)	16 (43%)	2 (20%)	10 (42%)	62 (44%)
Female	36 (51%)	21 (57%)	8 (80%)	14 (58%)	79 (56%)
Comorbidities					
Diabetes mellitus	4 (6%)	2 (5%)	1 (10%)	4 (17%)	11 (8%)
Body Mass index					
Normal	5 (7%)	15 (41%)	1 (10%)	2 (8%)	23 (16%)
Overweight	33 (47%)	8 (22%)	5 (50%)	10 (42%)	56 (40%)
Obese I	24 (34%)	11 (30%)	4 (40%)	10 (42%)	49 (35%)
Obese II	8 (11%)	3 (8%)	0 (0%)	2 (8%)	13 (9%)
Smoking history					
Never smoked	56 (80%)	25 (68%)	6 (60%)	16 (67%)	103 (73%)
Current Smoker	6 (9%)	8 (22%)	0 (0%)	4 (17%)	18 (13%)
Passive smoker	5 (7%)	3 (8%)	4 (40%)	2 (8%)	14 (10%)
Stopped >1 year ago	2 (3%)	1 (3%)	0 (0%)	2 (8%)	5 (4%)
Stopped <1 year ago	1 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)
Alcohol intake					
Never consumed	62 (89%)	25 (68%)	9 (90%)	22 (92%)	118 (84%)
Yes, drinks alcohol	8 (11%)	12 (32%)	1 (10%)	2 (8%)	23 (16%)
High Fat intake					
Yes	8 (11%)	11 (30%)	2 (20%)	2 (8%)	23 (16%)
No	62 (89%)	26 (70%)	8 (80%)	22 (92%)	118 (84%)
High Salt Intake					
Yes	66 (94%)	35 (95%)	10 (100%)	20	131 (93%)
No	4 (6%)	2 (5%)	0 (0%)	4	10 (7%)
Physical Activity, at least 2 1/2 hours per week					
Yes	2 (3%)	5 (14%)	0 (0%)	0 (0%)	7 (5%)
No	68 (97%)	32 (86%)	10 (100%)	24 (100%)	134 (95%)
Dietary fiber, 3 servings of fruits or vegetables daily					
Yes	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
No	70 (100%)	37 (100%)	10 (100%)	24 (100%)	141 (100%)

Table 5 presents the proportion of patients who achieved the target BP of <140/90 1 month after and 12 months after. As seen in Table 1, among the 141 hypertensive patients, only 38% (n=53) achieved the target BP of <140/90 mmHg with 40% (n=28) in the Amlodipine, 46% (n=17) in the Losartan group, 30% in the Metoprolol group, and only 21% in the combination therapy Amlodipine + Losartan. Over the next 12 months, already 85% (n=119) of the patients achieved the target BP while 15% (n=21) still did not achieve the target BP. Eighty-three percent (83%, n=58) in the Amlodipine group, 92% (n=34) in the Losartan group, 70% (n=7) in the Metoprolol group, and 83% (n=20) in the Amlodipine + Losartan group. Losartan may have the highest proportion who achieved the target BP probably because it is given to patients who are younger compared to amlodipine, which was initially prescribed among older people who may have developed calcification and stiffening of the blood vessels. There are more patients who failed to achieve the target BP in the Metoprolol group (n=3, 30%) because these patients refuse to take the other 2 medications due to side-effects. Meanwhile, 17% (n=12) in the Amlodipine group, 8% (n=3) in the Losartan group, and 12% (n=3) in the Amlodipine + Losartan group did not achieve the target BP. Despite this failure, still a high percentage of people would achieve the target BP with good compliance. Thus, patients must be reassured if their BP does not reach the target or should be worked up for secondary causes of resistant hypertension.

Table 5 Proportion of hypertensive patients achieved the target BP after 1 month and after 12 months, (n=141)

ComPack medicines	1 month after	12 months after	Failed to achieve
Amlodipine (n=70)	28 (40%)	58 (83%)	12 (17%)
Losartan (n=37)	17 (46%)	34 (92%)	3 (8%)
Metoprolol (n=10)	3 (30%)	7 (70%)	3 (30%)
Amlodipine + Losartan (n=24)	5 (21%)	20 (83%)	3 (12%)
Overall Average	53 (38%)	119 (85%)	21 (15%)

Table 6 shows the quantitative systolic and diastolic blood pressure reduction 12 months after taking the medications. Among those compliant to Amlodipine (n=70), the mean BP after 12 months was 125/73 mmHg, with 35 mmHg and 16 mmHg reduction in the systolic (SBP) and diastolic BP (DBP), respectively. Among those compliant to Losartan (n=37), the mean BP after 12 months was 127/79 mmHg, with 22 mmHg and 9 mmHg reduction in the SBP and DBP, respectively. Among those compliant to the combination therapy of Amlodipine and Losartan (n=24), the mean BP after 12 months was 135 mmHg/77 mmHg, with 31 mmHg and 13 mmHg reduction in the SBP and DBP, respectively. Lastly, among those compliant to Metoprolol (n=10), the mean BP after 12 months was 140/83 mmHg, with 11 mmHg and 10 mmHg reduction in the SBP and DBP, respectively.

The Amlodipine group has the mean baseline BP of 160/89 mmHg and has the highest mean SBP and mean DBP reduction. Thus, this can be a good first line medication for BP at least at 160/90 mmHg. Combination therapy with Amlodipine and Losartan also achieved an almost similar reduction in the SBP and DBP. The metoprolol group achieved the lowest reduction in the SBP and DBP while Losartan is a good initial medication of choice for BP at least 149/88mmHg.

Table 6 Reduction in systolic and diastolic blood pressure after 12 months of taking the medications, (n=141)

Compack Medicines	Baseline SBP	Baseline DBP	SBP after 12 months	DBP after 12 months	Mean SBP Reduction	Mean DBP Reduction
Amlodipine (n=70)	160 mmHg	89 mmHg	125 mmHg	73 mmHg	35 mmHg	16 mmHg
Losartan (n=37)	149 mmHg	88 mmHg	127 mmHg	79 mmHg	22 mmHg	9 mmHg
Metoprolol (n=10)	151 mmHg	93 mmHg	140 mmHg	83 mmHg	11 mmHg	10 mmHg
Amlodipine + Losartan (n=24)	166 mmHg	90 mmHg	135 mmHg	77 mmHg	31 mmHg	13 mmHg

Discussion

The role of antihypertensive medication in the control and reduction cardiovascular morbidity and mortality is very important. The 27% overall prevalence of hypertension in Pilar, Cebu is somewhat higher compared to the prevalence of hypertension in the Philippines, which is around 21%. This can be attributed to the geographically location of the municipality being in an island, where diet is rich in salt, with majority of the respondents have poor physical activity and poor intake of fruits and vegetables.

Despite efforts to improve the lifestyle of the people through health education campaign, the behavior only changes for a short period of time and resorts back to their usual habits. There are certainly more sociodemographic variables that must be addressed as well. While behavior change cannot improved overnight, blood pressure

control must be done using pharmacotherapy to decrease the risk of the people for complications such as stroke and heart attack.

The result of this study showed that the use of the ComPack medications such as are effective in bringing down the blood pressure of the majority of the people compliant to the prescribed medication. Amlodipine can be the first choice for the older population at least 60 years old with stage 2 hypertension with initial BP of at least 160/100. Losartan can be a good choice among patients less than 60 years old with BP <150/90 mmHg. While metoprolol can be an alternative for those who experienced side effects to Amlodipine or Losartan, 30% fails to improve their BP after 1 year. Thus, alternative medications should be prescribed or patients must be worked up for secondary causes of their uncontrolled hypertension. The effectiveness of the combination therapy with Amlodipine and Losartan has similar efficacy to the monotherapy with Amlodipine. However, it must be emphasized that the combination therapy was prescribed only after failing to improve with monotherapy.

Chapter 5

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary of findings

One hundred forty-one (n=141) of the 1, 239 hypertensive patients met the inclusion criteria. Among those compliant to Amlodipine (n=70), the mean age was 62 years old and the mean BP at baseline was 160/89 mmHg. Forty percent (40%) achieved the target BP after 1 month, 83% achieved the target BP after 12 months, while 17% did not achieve the target BP. The mean BP after 12 months was 125/73 mmHg, with 35 mmHg and 16 mmHg reduction in the systolic (SBP) and diastolic BP (DBP), respectively. Among those compliant to Losartan (n=37), the mean age was 54 years old and the mean baseline BP was 149/88 mmHg. Forty-six percent (46%) achieved the target BP after 1 month, 92% achieved the target BP after 12 months, while 8% did not achieve the target BP. The mean BP after 12 months was 127/79 mmHg, with 22 mmHg and 9 mmHg reduction in the SBP and DBP, respectively. Among those compliant to the combination therapy of Amlodipine and Losartan (n=24), the mean age was 62 years old and the mean baseline BP was 166/90 mmHg. Twenty-one percent (21%) achieved the target BP after 1 month, 83% achieved the target BP after 12 months, while 17% did not achieve the target BP. The mean BP after 12 months was 135 mmHg/77 mmHg, with 31 mmHg and 13 mmHg reduction in the SBP and DBP, respectively. Lastly, among those compliant to Metoprolol (n=10), the mean age was 59 years old, with a mean BP of 151/93 mmHg. Thirty percent (30%) achieved the target BP after 1 month, 70% achieved the target BP after 12

months, while 30% did not achieve the target BP. The mean BP after 12 months was 140/83 mmHg, with 11 mmHg and 10 mmHg reduction in the SBP and DBP, respectively.

Conclusion: The blood pressure of hypertensive patients in Pilar, Cebu improved after 12 months of taking the DOH Combination package medicines.

Recommendations

Based on the findings of the study, the researcher recommends the following:

1. That the results of the study be disseminated among health care workers in the community so that it can help encourage the patients to comply with their medications.
2. To utilize the results of the study for increasing the support of the government in terms of budget for medicines.
3. To conduct further study on the risk of for cardiovascular morbidity and mortality among hypertensive patients using risk prediction models.
4. To conduct further study on the impact in the reduction of cardiovascular morbidity and mortality following control of blood pressure among hypertensive patients using pharmacotherapy.

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