The Effect of Health Education on Blood Pressure in an Urban Poor Community

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ABSTRACT

The objective of the study was to evaluate the effect of cardiovascular health education on change in blood pressure at 3, 6, 12, and 18 months follow-up. This was a prospective cohort study. Participants were from an urban poor community in Metro Manila. Included were the 98 adults at least 40 years of age with hypertension, without cardiovascular disease. Among those previously diagnosed with hypertension, 20.3% had controlled blood pressures at the time of screening. There were 29.6% newly diagnosed cases of hypertension in the study. During the 18-month intervention phase, cardiovascular disease health education and counseling on risk factor control were given along with medical check-ups. Systolic and diastolic blood pressures were measured at 3, 6, 12, and 18 months. The decreases in mean systolic blood pressures from the baseline at 3, 6, 12 and 18 months were 11.9, 15.2, 9.1, and 14.1-mm Hg, respectively. The diastolic blood pressures decreased by 6.9, 9.3,.4.6, and 4.4 mm Hg. These differences were statistically significant. For the urban poor, health education on risk factor modification and cardiovascular diseases can be an important tool in improving blood pressure.

Key Words: blood pressure, urban poor, health education, lifestyle changes

INTRODUCTION

The incidence of poverty in the Philippine population is 16.7%, numbering about 17.7 million people.[1] Socio-economic factors limit their capacity to buy even the cheaper generic medication for hypertension and other diseases. Those with no access to medication would have to rely on lifestyle changes to maintain blood pressure.

Hypertension is a risk factor for coronary artery disease, heart failure, stroke, peripheral arterial occlusive disease, chronic kidney disease, aneurysms, retinopathy, among others. It is the most preventable risk factor worldwide for premature death.[2] The Department of Health also reports that diseases of the heart and the vascular system are the two leading causes of death in the Philippines,[3] and hypertension is the 3rd leading cause of morbidity.[4]

Blood pressure improvement may be accomplished through lifestyle changes, aside from just pharmacologic means, as shown by a number of studies.[6-10] Health education has been shown in a pretest-posttest study to effect positive changes on some lifestyle aspects such as regular exercise and avoiding salty foods but did not affect body mass index and stress.[11] Blood pressure, as well as overall lifestyle modification adherence, were moderately improved following the one-on-one and group educational interventions in a meta-analysis by Tam et al. (2020) of 13 studies between 2009 and 2019. Standard education comprised of general hypertension facts was given to the control group, while additional lifestyle modification advice was given to the educational intervention group. It was recommended that health education be incorporated into health promotive activities for greater effect.[12]

There are a lot of government and non-government programs that aim to teach and spread information on various health issues, and there is a need to define if this health education at the community level can make a significant change in hypertension. Thus, this study was undertaken with the hypothesis that health education has a significant positive impact on hypertension control. This study aimed to evaluate the effect of health education regarding coronary artery disease and risk factor modification through lifestyle changes on blood pressure at 3, 6, 12, and 18 months.

METHODS

This was a prospective cohort study conducted in one urban poor community in Metro Manila, identified with a per capita income that is insufficient to sustain basic needs.[1] Convenience sampling was utilized in 2010 to recruit adults with the inclusion criteria of being at least 40 years of age without maximum age limit, with systolic blood pressures ≥140 mm Hg or diastolic blood pressures ≥90 mmHg on at least two occasions taken at

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Table 1. Baseline Characteristics of Hypertensive Patients Eligible for Follow-up

Parameter	No.	Percent
Age Group		
40 - 49	35	35.71
50 - 59	42	42.86
≥60	21	21.43
Total	98	100
Sex		
Male	38	38.78
Female	60	61.22
Civil Status		
Single	4	4.08
Married	72	73.47
Widow/er	20	20.41
Separated	2	2.04
Educational Attainment		
Elementary	29	30.21
High School	42	43.75
Vocational	5	5.21
College	20	20.83
Occupation Classification		
Professionals	1	1.02
Technician and Associate Professionals	1	1.02
Clerks	4	4.08
Service & Shop & Market Sales Workers	12	12.24
Craft & Related Trade Workers	10	10.20
Plant & Machine Operators & Assemblers	7	7.14
Elementary	12	12.24
Occupation		
Housewives	25	25.51
Unemployed	26	26.53
Hypertension		
Yes (by history)	69	70.41
No (diagnosed during the survey)	29	29.59
Smoking History		
Yes	20	20.41
No	78	79.59
Family History of coronary artery disease		
Yes	11	11.22
No	87	88.78
Body Mass Index		
Increased(≥25kg/m^2)	48	48.98
Normal (<25kg/m^2)	50	51.02
Waist Circumference		
Increased (Male≥102; Female≥88)	18	18.37
Normal (Male<102; Female<88)	80	81.63

least two weeks apart, or if there was a previous diagnosis by a physician. Participants must be without cardiovascular disease (e.g., chronic stable angina, acute coronary syndrome, revascularization procedures, transient ischemic attacks or cerebrovascular accidents). Exclusion criteria were presence of cardiovascular disease, evidence of hypertension-mediated target organ damage on electrocardiogram, and those who could not give informed consent. Patients already taking hypertension medication at the time of screening were not excluded, as the effect of the educational intervention was assessed per individual in a pretest-intervention-posttest manner.

Using *STATA v13*, a minimum of 20 subjects were required for this study, based on mean systolic blood pressure on the intervention group on pre- (140) and post- (124.67) implementation of health education and lifestyle program in hypertensive patients in the study of Mejia et al. (2019),[13] assuming 20 common standard deviations, 5% level of significance and 90% power.

Consent was obtained and screening of the community was done by scheduled batches of up to 30 people, twice a month. The screening included a short history, demographic information including age, sex, civil status, educational attainment and occupation, and baseline physical exam which included measurement of blood pressure, waistline measurement, and BMI. Patients with hypertension but still without cardiovascular disease underwent electrocardiography testing to check for evidence of hypertension-mediated target organ damage to the heart.

In the intervention phase, scheduled clinics were held twice a month. Physical examinations and interviews were conducted by the Philippine Heart Center doctors. During clinic visits, medical advice, health education, and counseling were given on cardiovascular diseases, hypertension, diabetes, hypercholesterolemia, and obesity. Healthy dietary behavior was taught, such as limitation of fatty foods, avoiding excessive caloric and salt intake. A minimum of 30 to 60 minutes of moderate-intensity activity 3 to 4 times weekly (walking, jogging, cycling, or other aerobic activity) supplemented by an increase in daily aerobic activities was encouraged. Limitation of alcohol intake, smoking cessation, and reduce weight for the obese were advised. Information education materials were given out to strengthen the message of the lectures.

Periodic evaluation of the efficacy of the intervention was done on the third, sixth, twelfth, and eighteenth months. Data from patients who were lost to follow up were not removed from the study, as their data at the months that they followed up were compared to their baselines.

Comparisons between pre- and post-intervention blood pressures were statistically analyzed. All hypothesis testing was done at a level of significance of α =0.05, 2-tailed.

RESULTS

This urban community has 2,161 residents, 482 (22.3%) were age 40 years and above, of which 287 (59.5%) were screened. Ninety-eight people out of the 287 screened were hypertensive but without cardiovascular disease and were enrolled in the study. Many participants (29.6%) were not aware they were hypertensive and were

Table 2. Mean Systolic Blood Pressure Response of Patients Followed-up

Time of Follow-up	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean (SD)	p value
3 months	149 (25.83)	137 (15.57)	11.92 (26.32)	0.002
6 months	148 (27.24)	133 (16.32)	15.22 (26.47)	0.001
12 months	148 (25.71)	139 (18.71)	9.11 (25.96)	0.020
18 months	149 (24.78)	135 (25.04)	14.08 (29.62)	0.026

Table 3. Mean Diastolic Blood Pressure Response of Patients Followed-up

Time of Follow-up	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean (SD)	p value
3 months,	89 (12.47)	82 (10.75)	6.89 (13.47)	0.000
6 months	89 (13.72)	80 (9.99)	9.33 (12.98)	0.000
12 months	89 (12.87)	84 (12.24)	4.55 (12.99)	0.016
18 months	87 (10.31)	83 (13.32)	4.39 (11.73)	0.046

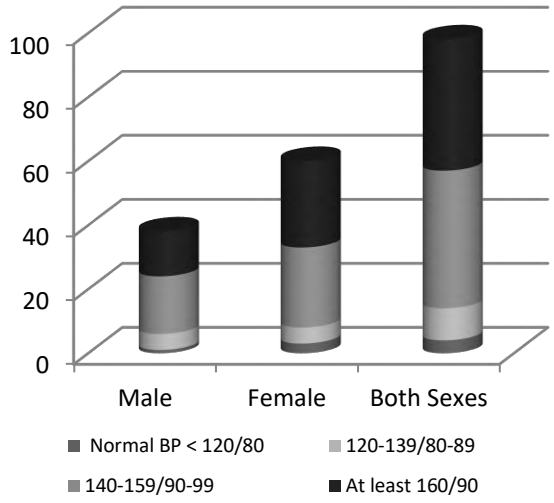

Figure 2. Distribution of Hypertensive Patients by Blood Pressure Values, Age and Sex at the Time of the Survey

diagnosed during the study with systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mmHg on at least two occasions taken at least two weeks apart. Excluded from the study were 21 participants with documented or known cardiovascular disease and seven with hypertension-mediated target organ damage to the heart by ECG. The baseline characteristics of the hypertensive patients are shown in *Table 1*.

Not all participants returned for follow-up on all the pre-specified follow-up period despite information campaign on the benefits of the program and regular meetings with the community health volunteers. Various efforts had been exerted to motivate the target population to participate in the activity, such as personal door-to-door invitations and reminders by the health volunteers per village area. On the 3rd month, 56 had followed up, 42 on the 6th month, 51 on the 12th month, and 31 on the 18th month. The predominant reason for drop out was the lack of time since they had to work. Those with work outside the community would incur loss of valuable income had they gone for the consultations and program. Most housewives had household chores and children they could not leave unattended. Others said they did not feel any abnormal symptoms so it seemed unnecessary for them to attend health education and check-ups. A few felt there was no use consulting since they did not have the necessary funds to buy the medicines prescribed to them.

At the time of the screening, the distribution of hypertensive patients by blood pressures and sex is graphically illustrated in *Figure 1.* It can be seen that most of the subjects (85.7%) had uncontrolled blood pressures at the time of screening.

After the intervention program of counseling on atherosclerosis risk factor modification, lectures on cardiovascular diseases, and medical advice, there was a significant decrease in mean systolic blood pressures in patients followed up at 3, 6, 12, and 18 months, as shown in *Table 2*.

Likewise, mean diastolic blood pressures significantly decreased at follow-up, as seen in *Table 3.*

DISCUSSION

One hundred twenty-five people or 43.5% of those screened in the urban community had high blood pressure. The prevalence was greater than the 25.3% reported in the 7th National Nutrition Survey[14] or the 21% reported in the Presyon 2 study[15]. However, the National Nutrition Survey included adults in the 20-39 years age group, and the Presyon 2 included adults at least 18 years old. The 7th National Nutrition Survey recommended preventive measures focused on the 40–59-year-old middle-aged adult and the elderly at least 60 years of age. Behavioral change modification was also recommended to decrease the mortality and morbidity of non-communicable diseases.[14]

Twenty-nine percent (29.6%) were not aware they were hypertensive. Undiagnosed hypertension in this urban community was greater than at the national level (23.8%)[15]. This could be a target for intervention in other similar communities.

In the subgroup of hypertensive adults of the Presyon 2 study, the mean BMI overall was 24.30, with 23.87 for hypertensive males, and 24.74 for hypertensive females.[15] This is in contrast to our findings of higher mean BMIs of 25.63 overall, 25.05 for males, and 26.0 for females, despite being in an economically challenged community.

However, the average hypertensive in this urban poor community did not demonstrate central obesity (increased waist circumference). The percentage of central obesity among the hypertensive people in this urban community was only 18.3%, compared to the 21.6% among hypertensives in the whole Philippines.[4]

In the Philippines and other Asian countries such as Thailand, Sri Lanka, India, China, Nepal, Iran, and Pakistan, there has been an increase in the prevalence of hypertension and an increase in stroke mortality. In urban adult populations of Asia, the prevalence of hypertension ranges from 15-35%. According to Singh, hypertension and stroke occur at a relatively younger age in Asians and the risk of hypertension increases at lower levels of body mass index of 23-25 kg/m^2. Risk factors for hypertension in most Asian countries include sedentary behavior, being overweight, alcohol, salt intake, diabetes mellitus, and smoking. Singh stated a need for prevention programs based on cross-sectional surveys.[16]

Reyes-Gibbi reported a 23% hypertension prevalence in a rural area of the Philippines, with only 12% previously diagnosed with hypertension. Although 47% reported taking medication for hypertension, only 17% had a controlled blood pressure. Age greater than 50 years and body mass index of at least 25 were shown to be associated with hypertension.[17] In this study, 20.3% of those previously diagnosed with hypertension had controlled blood pressures at the time of screening.

Systolic and diastolic blood pressures significantly decreased at 3, 6, 12 and 18 months of follow-up. Most of the patients in this urban poor community cannot afford to purchase generic medication for hypertension. This is one of the reasons they have been giving for not complying with their medical regimen and medical appointments. However, the volunteer health workers had been regularly doing home visits, counseling and information dissemination. This was aside from the lectures and medical advice given by the Preventive Cardiology staff during the medical follow-ups. Perhaps a greater awareness on lifestyle modification may have contributed to this mean blood pressure decrease. Nonpharmacologic means such as reduction of sodium intake and weight loss had been shown to lower blood pressure in a number of studies.[6-10]

CONCLUSION

After cardiovascular disease health education and counseling on risk factor control, the decreases in mean systolic and diastolic blood pressures at 3, 6, 12 and 18 months were statistically significant. For the urban poor, health education on risk factor modification and cardiovascular diseases can be an important tool in lowering blood pressure.

Recommendations

Had it been possible to conduct clinics and lecture series on Sundays, patients who have to work Mondays through Saturdays could have then been accommodated for follow-up.

Similar intervention programs for hypertension can be done elsewhere, including the rural regions and other urban areas of the country.

The results of this study can be used as a take-off point for other cardiovascular health programs, such as smoking cessation, diabetes, cholesterol control and weight loss programs. Especially for the lower socio-economic classes that cannot afford to purchase all the medication needed, the power of health education in effecting change must be maximized.

References

1. Philippine Statistics Authority. Updated 2018 full-year official poverty statistics. 20092020 June 4. https://psa.gov.ph/poverty-press-releases/nid/162559
2. World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. 2009.
3. Department of Health. Leading Causes of Mortality. http://www.doh.gov.ph/node/198
4. Department of Health. Leading Causes of Morbidity. Department of Health. https://doh.gov.ph/node/6390
5. Chobanian, AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure: The JNC 7 Report. JAMA. 2003; 289: 2534-2573.
6. He J, Whelton PK, Appel LJ, Charleston J, Klug MJ. Long-term effects of weight loss and dietary sodium reduction on incidence of hypertension. Hypertension. 2000; 35:544–9.
7. Vollmer WM, Sacks FM, Arid J, Appel LJ, Bray GA, Simons-Morton DG, et al. Effects of diet and sodium intake on blood pressure: subgroup analysis of the DASH-sodium trial. Ann Intern Med. 2001; 135:1019–28.
8. Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer PJ, et al. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. JAMA. 2003; 289:2083–93.
9. Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. Ann Intern Med. 2002; 136:493–503.
10. Xin X, He J, Frontini MG, Ogden LG, Motsamai OI, Whelton PK. Effects of alcohol reduction on blood pressure: a meta-analysis of randomized controlled trials. Hypertension. 2001; 38:1112–7.
11. Haryani, N, Subiyanto, AA, and Suryani, N. Effect of health education on health behavior in patients with hypertension. J Health Promotion and Behavior. 2016; 1(1):9-18. https://doi.org/10.26911/thejhpb.2016.01.01.02
12. Tam, HL, Wong, EML, and Cheung, K. Effectiveness of educational interventions on adherence to lifestyle modifications among hypertensive patients: An integrative review. Int J Environ Res Public Health. 2020; 17:2513. http://dx.doi.org/10.3390/ijerph17072513
13. Mejia, PCG, Feliciano, EE, Feliciano, AZ, Sadang, JM, Pangandaman, HK, Garcia, LL, Al-Noaemi, MC, Abdelhafiz, IM, Breboneria, BL, ElRazkey, JY, Albougami, A, and Lorica, JD. The effectiveness of health education and lifestyle program in improving the blood pressure in hypertensive patients. International Journal of Advanced and Applied Sciences. 2019; 6(11): 21-29.
14. Food and Nutrition Research Institute. 7th National Nutrition Survey. https://www.fnri.dost.gov.ph/images/sources/clinical_health_partii.pdf
15. Sison J, Arceo L, Trinidad E, Bautista JA, et al. Presyon 2: Report of the Council of Hypertension. 2007.
16. Singh RB, et al. Hypertension and stroke in Asia: prevalence, control and strategies in developing countries for prevention. Journal of Human Hypertension. Oct 2009; 14 (10-11): 749-763.
17. Reyes-Gibby CC, Aday LA. Prevalence of and risk factors for hypertension in a rural area of the Philippines. J of Comm Health. 2000; 25 (5): 389-399.