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TRAN QUOC CUONG

HYPERTENSION AMONG PEOPLE AGED 18 – 69 YEARS OLD AT THU DUC DISTRICT, HO CHI MINH CITY AND INTERVENTION EFFECTIVENESS, 2018 - 2020

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LIST OF PUBLISHED SCIENTIFIC ARTICLES RELATED TO THE THESIS

1. Tran Quoc Cuong, Le Van Bao, Nguyen Anh Tuan, Nguyen Van Chuc (2020). Current status of hypertension and its risk factors among people aged 18 - 69 years old at Thu Duc district, Ho Chi Minh City in 2018 – 2019. *Journal of Vietnam Preventive Medicine, Vol.* 30(6): 17 - 26.
2. Tran Quoc Cuong, Le Van Bao, Nguyen Anh Tuan (2021). The effectiveness of intervention to improve treatment adherence, achieving target blood pressure among hypertension patients at commune health station, Thu Duc district, Ho Chi Minh city. *Journal of Vietnam Preventive Medicine, Vol.* 507(2): 50 - 55.

INTRODUCTION

Hypertension is one of the most common non-communicable diseases today and its frequency is constantly increasing. In 2000, the world had 972 million people with hypertension and it is estimated that by 2025 this number will increase to about 1.56 billion people.

In Vietnam, in 2000, about 16.3% of adults had hypertension, it increased to 25.4% in 2009 and to 48% in 2016. In 2010, out of the total number of deaths, the deaths due to cardiovascular diseases, including hypertension, were accounted for about 30%.

There are many risk factors that lead to hypertension that can be controlled when people have the right knowledge and practice about measures to prevent hypertension. The project on prevention of hypertension has been implemented since 2011 with the aim of improving people's knowledge about hypertension prevention; training and developing human resources for the prevention and treatment of hypertension at grassroots health levels. However, from 2018 to now, due to limited resources of the project, hypertension patients are still mainly examined and treated at the district level; the management and treatment of hypertension at the commune/ward level as well as lifestyle changes in the community have not yet achieved the project's objectives.

Study objectives:

1. *Describe the current situation of hypertension, some related factors among people aged 18 - 69 years old in Thu Duc district, Ho Chi Minh city in 2018.*
2. *Evaluate the effectiveness of some intervention measures in prevention and treatment of hypertension for people of 18-69 year olds at commune level of Thu Duc district, Ho Chi Minh City, in 2019 - 2020.*

New contributions and practical value of the thesis*:*

The thesis provides data and information on the status of hypertension among people aged 18 - 69 years old in 3 communes of Thu Duc district, Ho Chi Minh City in 2018. The data and information obtained from the research are the basis for developing solutions/interventions to prevent hypertension for Thu Duc district as well as for other areas with similar factors.

Study results provide the relationship between some factors, behaviors and hypertension of people aged 18 - 69 years old in 3 research communes including: age group, sex, overweight - obesity, high waist/buttock circumference ratio, smoking, habit of eating animal fat, diabetes; hypercholesterolemia; heart-related diseaes. This is important information as a basis for the development of effective interventions for prevention and control of hypertension in the community.

The thesis also provide data, information on methods, contents, intervention action for prevention and hypertension interventions in the community, interventions on management and treatment of hypertension patients applied in the commune level. These in their turn, will help the Department of Health of Ho Chi Minh City, the District Health Center, the Commune Health Stations, the researchers and policy makers to have a basis to choose and make decisions about intervention solutions and models applies to communes/wards with similar conditions.

STRUCTURE OF THE THESIS

Thesis consisted of 127 pages without reference and annex part. It included 51 tables, 4 figures. The thesis has 2 pages of Introduction part; 28 pages of Literature Review Chapter; 25 pages of Study Subject and Methods Chapter; 32 pages of Result Chapter; 37 pages of Discussion Chapter, 2 pages of Coclusion and 1 page of Recommendation.

Chapter 1. LITERATURE REVIEW

1.1 Concepts and related content

Hypertension (SBP) is diagnosed when systolic blood pressure (SBP) is of ≥140 mmHg and/or diastolic blood pressure (DBP) is of ≥90 mmHg or while being treated with an antihypertensive agent.

The definitive diagnosis of hypertension is based on the BP measured according to correct BP measurement procedure.

Table 1.2 Classification of hypertension according to ESC/ESH and Vietnam's Ministry of Health

Hypertension classification	**SBP (mmHg)**		**DBP (mmHg)**
Optimal BP	< 120	And	< 80
Normal BP	120 - 129	And/or	80 - 84
High normal BP	130 - 139	And/or	85 - 89
Hypertension grade 1	140 - 159	And/or	90 - 99
Hypertension grade 2	160 - 179	And/or	100 - 109
Hypertension grade 3	≥ 180	And/or	≥ 110
Isolated systolic hypertension	≥ 140	And	< 90

Causes of hypertension: The majority of hypertension in adults is of unknown cause (primary hypertension), only about 10% of cases have a cause (secondary hypertension).

Complications of hypertension: stroke, transient ischemic attack, left ventricular hypertrophy, heart failure, myocardial infarction, angina attack, peripheral vascular disease, retinal hemorrhage, papilledema, proteinuria, serum creatinine increased, renal failure, etc.

1.2. Hypertension and related factors

- In the world: According to WHO reports in 2013 and 2014, the prevalence of hypertension in adults aged 18 years and

over is of about 22%. The prevalence of hypertension varies from region to region, with the highest in Africa (30%) and the lowest in the Americas (18%). In Southeast Asia, the proportion of adults with hypertension is about 25%.

- In Vietnam: Results of the National Health Survey in the period 2001 - 2002 showed the rate of hypertension in adults of 16.9%. In 2008, the prevalence of hypertension among people aged 25-64 years old was 25.1%. In 2015, the prevalence of hypertension in people aged 25 years old and older was 47.3%. According to the data of National Survey on risk factors for non-communicable diseases in 2015, 18.9% of 18-69 year olds people had hypertension (for male: 23.1%; for female: 14.9%).

- Factors related to hypertension: 3 nhóm yếu tố:

(1) Personal characteristic factors: Age, gender, education, occupation; genetics/race, family history of hypertension, ...

(2) Lifestyle behavioral factors (also known as risk behavior factors): Smoking, alcohol abuse, eating salty foods, less physical activity, stress, excessive anxiety, ...

(3) Metabolic factors: Hyperglycemia, increased cholesterol, overweight - obesity, ...

1.3 Intervention solutions on risk factors and management of treatment for hypertention in the community

In Vietnam: In 2010 and 2011, the Prime Minister issued Decision 2331/QD-TTg and Decision 2406/QD-TTg about the list of National Target Programs for the period 2012 - 2015, of which there was a “Project on Prevention of Hypertension”.

The National Program on Hypertension Prevention has proposed a model of hypertension management at the grassroots health level, including 3 fields: (1) Management of hypertension by consulting and coordinating the provision of antihypertension drugs at CHSs of communes/wards; (2) Training to improve the qualifications of health workers and strengthening the facilities and equipment of the grassroots health system; (3)

Communication - Health education to raise awareness about hypertension, it's related risk factors. Positive lifestyle change for all people.

In 2015, the Government issued Decision No. 376/QD-TTg approving the National Strategy for NCDs Prevention and Control for the period 2015 - 2025. In the specific goals and targets by 2015, there was the target of "reducing the rate of hypertension below 30%; increased hypertension detection and hypertension proper treatment management rate according to professional guidance in community up to 50%.

In 2017, the Government issued Decision No. 1125/QD-TTg approving Health - Population Target Program for the 2016-2020 period. In which, the target to be achieved for hypertension was 50% people with hypertension could be detected early; 30% of hypertension patients were properly managed and treated according to professional guidelines".

- *Some intervention studies to reduce risk factors and manage hypertension treatment in the community:*

The research of Nguyen Kim Ke et al. (2013) has used the control model of hypertension in the elderly to intervent the situation of hypertension in Hung Yen town. The used intervention measures were strengthening communication - health education to prevent hypertension and manage hypertension patients at CHS. Results after 2 years of intervention showed that the degree of hypertension in the elderly undergoing intervention has changed from severe to milder, 38% of the elderly have maintained a stable blood pressure.

Research of Dinh Van Thanh et al. in 2015 was conducted to studying the current situation and effectiveness of hypertension management model at the grassroots health level in Bac Giang province using the model piloted in 2 communes and other 2 control communes. As a result, the rate of managed

hypertension was increased from 20.8% to 70.7%, of which rate of those reaching target blood pressure increased from 7.3% to 68.5%. Rate of hypertension managed at CHSs has also been increased from 0% to 26.1%.

Research conducted by Pham The Xuyen et al. in 2019 focusing on the status of hypertension in people aged 45 - 64 years old in Dien Bien district, Dien Bien province and the cost - effectiveness of intervention measures has been conducted in 1 commune with 1 other commune used for control. The used intervention measures included training knowledge and skills on hypertension management for commune health workers, village health workers and intensive communication - health education on healthy lifestyle, on treatment of hypertension without or with drugs and hypertension monitoring, management,... Results of 12 months of intervention showed the increased rate of hypertension patients achieving blood pressure of target level with an intervention index of 29.6%.

Chapter 2. STUDY SUBJECTS AND METHODS

2.1 Study subjects, place and time

2.1.1 Study subjects

For Objective 1: People of 18 - 69 years old that having permanent residence and have been living in the study area for at least 12 months, consenting and voluntary.

For Objective 2: Subjects of community-based hypertension prevention were people aged 18 - 69 years old enrolled in Objective 1. The subjects for intervention were those aged 18 - 69 years old, diagnosed with hypertension of grade 1, grade 2, undergoing interventional hypertension treatment at CHS and voluntarily accepted to participate in the study.

2.1.2 Study site and time

Study site: At 3 communes: Linh Xuân, Tam Phu, Hiep Binh Chanh, Thu Duc district, Ho Chi Minh city.

Study time: From August 2018 till Decmber 2019.

2.2 Research methods

2.2.1 Research design

For Objective 1: Cross-sectional description design with analysis, combined with using retrospective data.

For Ojective 2: Including 2 designs: (1) Community preventive intervention using control, and (2) Treatment intervention without control.

2.2.2 Sample size and sampling method

For Objective 1: Applying the formula calculating sample size for descriptive research to estimate a proportion, n was found of 575 people/ward x 3 wards = 1,725 people. In fact, 2,203 people were surveyed (Linh Xuan ward: 581 people; Tam Phu ward: 789 people and Hiep Binh Chanh ward: 833 people).

3 wards were selected by simple random method (drawing from a total of 12 commune/wards of Thu Duc district). In each commune, households were selected according to the “door to

door" method. In selected households, people aged 18 - 69 years old (regardless of male and female) meet the selection and exclusion criteria were selected for the study.

For Objective 2: (1) The sample size for evaluation the effectiveness of hypertension prevention intervention at intervented commune (Linh Xuan) was 581 people aged 18 - 69 years old; for two control communes, the sample size was 1,622 people aged 18 - 69 years old (Tam Phu: 789 people and Hiep Binh Chanh: 833 people). 3 wards for Objective 1 was simple randomly selected, for intervention, 1 ward (Linh Xuan) was randomly selected. The remaining 2 wards (Tam Phu and Hiep Binh Chanh) were used as controls. Subjects to evaluate the effectiveness of intervention were selected from those enrolled for investigating in Objective 1. (2) The sample size for hypertension treatment intervention at CHS was calculated according to the formula for calculating intervention sample size, as the result, 187 patients with hypertension were calculated. In fact, 292 hypertension patients were selected in Linh Xuan ward.

2.2.3 Research variables and indicators

For Objective 1: Group of variables and indicators to study the status of hypertension and some factors related to hypertension in people 18 - 69 years old.

For Objective 2: (1) Group of variables and indicators for study the effectiveness of hypertension prevention intervention in community; (2) Group of variables and indicators for investigating the effect of treatment intervention for hypertension at CHS.

2.2.4 *Information collecting method*

For Objective 1: (1) Direct interview combined with retrospective review of the subject's medical examination books and periodic health examination records; (2) Measure blood

pressure; measure height, weight, waist and hip circumference; Calculate BMI and waist/hip circumference.

For Objective 2: (1) For the subjects at community hypertension intervention site: the data collection method was the same as for Objective 1; (2) For subjects undergoing intervented treatment for hypertension at CHS: (a) Screening to select subjects for intervention; (b) Before intervention: interviewing face-to-face, reviewing medical records, prescriptions and medications that have been or currently being used for treating the hypertension; collecting the clinical and subclinical records. (c) Intervention of treatment management of hypertension: reviewing the outpatient medical record of hypertension; recording the clinical examination results at the period of 3, 6, 12 months after intervention (d) Evaluating the results of hypertension treatment management after 18 months of intervention: face-to-face patient interviewing, recording the clinical examination, paraclinical examination results and outpatient medical records.

2.2.5 ***Intervention mearures and action***

- *Prevention of hypertension at community of Linh Xuan wards:*

+ Providing the training for local health workers on knowledge of hypertension prevention, communication skills and counseling on hypertension prevention and practice on using blood pressure meters.

+ Distributing leaflets contained measures to prevent and control hypertension in community for subjects; Hanging up posters about prevention of hypertension in public places; Broadcasting by ward's loudspeaker system the information on hypertension prevention and control and organizing seminars to disseminate knowledge about hypertension prevention in the community.

- *Trentment management of hypertension patients at Linh Xuan Health Station:*

+ Providing the training for health workers of CHS on the diagnosis and treatment of hypertension according to the guidelines of Ministry of Health (MOH).

+ Organizing seminars to disseminate knowledge to hypertensive patients about risk factors related to hypertension, cardiovascular, measures to prevent complications of hypertension; practice regulations on compliance with treatment regimens for hypertension, ...

+ Examining and prescribing drugs to treat hypertension patients according to the health insurance scheme (once a month); providing subclinical X-ray for patients (3 months/time). The tests and electrocardiograms were performed at Thu Duc District Hospital

2.3 Data treatment and analysis

Data was entered and processed using Epidata 3.1 and SPSS 20.0 software to analyze the data. Using biomedical statistical methods with statistical threshold $\alpha = 0.05$. Calculate the OR (Odds Ratio) and its 95%CI to assess the relationship status of the factors.

Evaluation of related factors according to logistic regression model through adjusted OR. Evaluating the effectiveness of interventions by efficiency index and intervention index.

2.4 Research ethics

The research design of thesis was approved for ethics in biomedical research by the Decision IRB-43/2018 dated December 28, 2018 and the Decision IRB-04/2020 dated April 14, 2020 issued by the National Institute of Hygiene and Epidemiology.

The rights and benefits of research subjects are guaranteed in accordance with the ethical regulations approved by the

Ethics Committee of the National Institute of Hygiene and Epidemiology. Collected data and information are the common variables, not delicate variables that need to be kept secret. The research design has ensured the free willing and consent of the research subjects.

Chapter 3. RESULTS

3.1 current situation of hypertension, some related factors among people aged 18 - 69 years old in Thu Duc district, Ho Chi Minh city in 2018

- Situation of hypertension among peoples aged 18 - 69 years old in 2018:

Table 3.3 Current status of hypertension among study subjects

Hypertension status		Number	Rate (%)
Hypertension diagnosed and treated (n = 2.203)	Hypertension	566	25.7
	No Hypertension	1.637	74.3
Hypertension detected among the subjects (n = 2.203)	Hypertension	172	7.8
	No Hypertension	2.031	92.2
Total (n = 2.203)	Hypertension	738	33.5
	No Hypertension	1.465	66.5

The overall prevalence of hypertension in 3 wards is 33.5%.

Table 3.4 Classification of blood pressure found by the study (n=2,203)

Classification of blood pressure	Number	Rate
Optimal BP	473	21.5
Pre-hypertension	992	45.0
High blood pressure	738	33.5
Hypertension grade 1	419	19.0
Hypertension grade 2	151	6.8
Hypertension grade 3	37	1.7
Isolated systolic hypertension	131	5.9

Table 3.6. Distribution of hypertension prevalence by ward

Ward	Diagnosed hypertension		New detected hypertension patients		Total	
	#	%	#	%	#	%
Hiep Binh Chanh (n = 833)	211	25.3	82	9.8	293	35.2
Linh Xuan (n = 581)	178	30.6	27	4.6	205	35.3
Tam Phu (n = 789)	177	22.4	63	7.7	240	30.4
All 3 wards	566	25.7	172	7.8	738	33.5

- Some factors related to hypertension in people aged 18 - 69 years old:

Table 3.10 Results of multivariable logistic regression analysis of relationship between the individual characteristics, body mass index and hypertension

Indipendent variable		Total	#	%	OR	95%CI	**p**-values
Age group	18 - 29	324	26	8.0	1	-	-
	30 - 39	355	69	19.4	2.09	1.28-3.42	< 0.05
	40 - 49	534	172	32.2	4.44	2.82-7.01	< 0.001
	50 - 59	564	243	43.1	6.22	3.95-9.78	< 0.001
	60 - 69	426	228	53.5	9.15	5.73-14.60	< 0.001
	Total (n)	2,203	738	33.5	-	-	-
Sex	Male	1,285	385	30.0	1		
	Female	918	353	38.5	2.00	1.15 – 2.65	< 0.001
	Total (n)	2,203	738	33.5			
BMI	No overw. – obese	1,760	533	30.3	1		
	Overw. – obese	443	205	46.3	2.82	1.62 – 4.91	< 0.001
	Total (n)	2,203	738	33.5			
Rate	Normal	1,490	454	30.5	1		
	High	713	284	39.8	1.66	1.25 – 2.20	< 0.001
	Total (n)	2,203	738	33.5			

All four factors of individual characteristics (age group; sex; BMI; waist circumference/hip ratio) are found associated with hypertension at a statistically significant level (OR > 1.0; p < 0.05 and p <0.001).

Table 3.11 Results of multivariable logistic regression analysis and hypertension

Independent variables		**Total**	**#**	**%**	OR	95%CI	**p-**value
Smoking	No	1,801	556	30.9	1	1.05 – 1.87	0.024
	Yes	402	182	45.3	1.4		
	Total (n)	2,203	738	33.5			
Habit of eating animal fat	No	1,982	638	32.2	1	1.13 – 2.14	0.007
	Yes	221	100	45.2	1.55		
	Total (n)	2,203	738	33.5			
Monitor the nutritional composition of daily meals	Yes	774	210	27.1	1	1.02 - 1.60	< 0.030
	No	1,229	528	42.9	1.28		
	Total (n)	2,203	738	33.5			
Recognizing hypertension, hypercholesterolemia, hyperglycemia	Visit med. facility for exama-mination	1,574	488	31.0	1	1.42 – 2.21	< 0.001
	Do not know/ No reply	629	250	39.7	1.77		
	Total (n)	2,203	738	33.5			

All 4 behavioral factors (smoking; habit of eating animal fat; monitoring nutritional composition of daily meals and recognizing hypertension, increased cholesterol, and hyperglycemia) are found associated with hypertension with statistical significance (OR >1.0; p <0.05).

Table 3.12 Results of multivariable logistic regression analysis the association between the combined pathological factors and hypertension

Independent variables		**Total**	**#**	**%**	OR	95%CI	**p**-value
Diabetis	No	2,047	621	30.3	1	2.19 – 5.07	< 0.001
	Yes	156	117	75.0	3.33		
	Total (n)	2,203	738	33.5			
hypercholesterolemia	No	1,847	508	27.5	1	1.90 – 3.32	< 0.001
	Yes	356	230	64.6	2.51		
	Total (n)	2,203	738	33.5			
Cardiovascular	No	1,867	562	30.1	1	1.61 – 2.77	< 0.001
	Yes	336	176	52.4	1.11		
	Total (n)	2,203	738	33.5			

All 3 pathological factors (Diabetis; hypercholesterolemia; cardiovascular) were found associated with hypertension (OR >1.0; p <0.001).

3.2 The effectiveness of some intervention measures for hypertension prevention and treatment among people aged 18 - 69 years old at Thu Duc district, Ho Chi Minh city (2019 - 2020)

3.2.1 The effect of intervention on hypertension prevention in community

- The effect of intervention on community behavior of hypertension prevention

In the intervention group, the proportion of subjects who knew all 10 measures to prevent hypertension (exercise regularly, do not smoke, reduce alcohol/beer consumption, lose weight, eating more green vegetables/tubes/fruits but less fat, eating less sugar, eating less salt, not go to bed too late and checking blood pressure periodically) increased significantly (from 7.2% to 56.6%); while in the control group, this rate

increased but very little (from 8.6% to 9.7%). The intervention efficiency achieved 672.3%; p <0.001.

Table 3.24 Risk behaviors for high blood pressure

Behaviors	**Intervention group (n = 581)**		**Control group (n = 1.622)**		**Interven. efficiency (%)** p-value (2 - 4)
	Before Int. No. (%)(1)	After Int. No. (%) (2)	Before No. (%)(3)	After No. (%)(4)	
Smoking	114 (19.6)	60 (10.3)	288 (17.8)	263 (16.2)	38.7 <0.01
Drinking lot of alcohol/beer	147 (25.3)	97 (16.9)	402 (24.8)	332 (20.5)	16,6 < 0.001
Regularly using salt, salty spice, savory marinades	369 (63.5)	162 (27.9)	972 (59.9)	608 (37.5)	18.7 <0.001
Habits of eating/consuming animal fat	68 (11.7)	37 (6.4)	153 (9.4)	143 (8.8)	39.1 <0.05
Overweight/obese	125 (21.5)	61 (10.5)	318 (19.6)	303 (18.7)	46.5 <0.001
High waist/hip ratio	201 (34.6)	94 (16.2)	512 (31.6)	495 (30.5)	49.9 <0.001

The intervention has reduced the risk of hypertension in the intervention group from 16.6% to 49.9%; p<0.001 and p<0.05.

- The effect of intervention on hypertension rate of community:

Table 3.25 Rate of hypertension in the intervention group (n = 581)

Time	Hypertension		Not hypertension	
	Number	Rate (%)	Number	Rate (%)
Before intervention	205	35.3	376	64.7
After intervention	226	38.9	355	61.1
Level of blood pressure	Increased 21 = 3.6%		*> 0.05*	
***p**-value*	*> 0.05*			

For the intervention group, the rate of hypertension before intervention was found 35.3%, after intervention this increased to 38.9% (increased 3.6%) but not statistically significant (p>0.05).

Table 3.26 Rate of Hypertension in control group (n = 1,622)

Time	Hypertension		Not hypertension	
	Number	%	Number	%
Before	533	32.9	1.089	67.1
After	650	40.1	972	59.9
Blood pressure level	Increased 117 = 7.2		*< 0.05*	
***p**-value*	*< 0.05*			

In a control group, rate of hypertension was found at the point of beginning the intervention step as of 32.9%, this messured after the intervention has raised to 40.1% (increased 7.2%), (p<0,05).

Table 3.27 Association between intervention and hypertension

Intervention	**Hypertension**	**Not hypertension**	**OR** (95%CI) **p**-value
Control group (n = 1.622)	650 (40.1)	972 (59.9)	1.05 (0.98 – 1.27) < 0.05
Intervention group (n = 581)	226 (38.9)	355 (61.1)	

Rate of hypertension among the subjects of intervention group was found less (3.6%) than this rate of control group (7.2%)(OR = 1.05; p <0.05.

3.2.2 The effectiveness of intervention on hypertension treatment for people aged 18 - 69 years old at CHS, Thu Duc District, Ho Chi Minh city (2019 - 2020)

- The improved effect of intervention on treatment adherence hypertension patients:

Table 3.35 Adhere to medication regimes, regular checking blood pressure and periodic follow-up before and after the intervention 3, 6, 12 and 18 months

Treatment adherence	**Adhere to the regimes at times**				
	T0 (n=292) Number (%) (0)	**T3** (n=292) Number (%) (1)	**T6** (n=292) Number (%) (2)	**T12** (n=292) Number (%) (3)	**T18** (n=292) Number (%) (4)
Take medicines	55 (18.8)	203 (69.5)	250 (85.6)	260 (89.0)	288 (98.6)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0.001; p_{(0-2)} < 0.001; p_{(0-3)} < 0.001; p_{(0-4)} < 0.001$				
BP meassure	48 (16.4)	154 (52.7)	214 (73.3)	252 (86,3)	281 (96.2)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0.001; p_{(0-2)} < 0.001; p_{(0-3)} < 0.001; p_{(0-4)} < 0.001$				
Regular re-examination	87 (29.7)	275 (94.2)	292 (100)	292 (100)	292 (100)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0.001; p_{(0-2)} < 0.001; p_{(0-3)} < 0.001; p_{(0-4)} < 0.001$				

The percentage of patients who adhered to taking BP-control drugs, checked BP regularly and periodically re-examined according to the schedule at the time of T3, T6, T12 and T18, all increased significantly compared to the time of T0. The difference in the compliance rate at the time points of after intervension compared with that found at T0 was statistically significant ($p<0.01$).

Table 3.36 Adherence to medication regimes, check BP regularly and periodic follow-up before and after the intervention 3, 6, 12 and 18 months

Treatment adherence	**Adherence all regimens by the time**				
	T0 (n=292) No. (%) (0)	**T3** (n=292) No. (%) (1)	**T6** (n=292) No. (%) (2)	**T12** (n=292) No. (%) (3)	**T18** (n=292) No. (%) (4)
Eat less salt	134 (45.9)	90 (69.2)	222 (76.0)	245 (83.9)	256 (87.7)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0.001$; $p_{(0-2)} < 0.001$; $p_{(0-3)} < 0.001$; $p_{(0-4)} < 0.001$				
Consumption more vegetables and fruits	150 (51.4)	214 (73.3)	250 (85.6)	258 (88.4)	270 (92.5)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0,001$; $p_{(0-2)} < 0,001$; $p_{(0-3)} < 0,001$; $p_{(0-4)} < 0,001$				
Reduce fat, animal fat	154 (52.7)	211 (72.3)	248 (84.9)	269 (92.1)	268 (91.8)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0,001$; $p_{(0-2)} < 0,001$; $p_{(0-3)} < 0,001$; $p_{(0-4)} < 0,001$				
Limiting alcohol intake	206 (70.5)	219 (75.0)	236 (80.8)	247 (84.5)	254 (87.0)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0,05$; $p_{(0-2)} < 0,01$; $p_{(0-3)} < 0,01$; $p_{(0-4)} < 0,01$				
Stop smoking	220 (75.3)	232 (79.5)	239 (81.8)	246 (84.2)	251 (86.0)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0,05$; $p_{(0-2)} < 0,01$; $p_{(0-3)} < 0,01$; $p_{(0-4)} < 0,01$				
Exercise regularly	142 (48.6)	228 (78.1)	249 (85.3)	260 (89.0)	268 (91.8)
*(McNemar test, **p**-value)*	$p_{(0-1)} < 0.001$; $p_{(0-2)} < 0.001$; $p_{(0-3)} < 0.001$; $p_{(0-4)} < 0.001$				

Percentage of patients who complied to a regimen of reduced-salinity diet, rich in vegetables/vegetables/fruits, reduced animal fat, limited alcohol/beer intake, stopped smoking and exercised regularly at time points T3, T6, T12 and T18 both has increased markedly compared thus found at the time of T0. The difference in the compliance rate to the regimens at the time after intervention compared with that of T0 was statistically significant ($p < 0.05$).

- ***The improvement effect on rate of patients achieving target bloo pressure:***

Table 3.37 Rate of patients achieving target BP at 3, 6, 12 and 18 months after intervention

Level of target BP	**T0** (n=292) No. (%) (0)	**T3** (n=292) No. (%) (1)	**T6** (n=292) No. (%) (2)	**T12** (n=292) No. (%) (3)	**T18** (n=292) No. (%) (4)
Achieving BP	37 (12.7)	97 (33.2)	152 (52.0)	226 (77.4)	276 (94.5)
*EI (%) (McNemar test, **p**-value)*		*(161.4%);*	*(309.4%);*	*(509.4%);*	*(644.1%)*
	($p_{(0-1)} < 0.001$); ($p_{(0-2)} < 0.001$); ($p_{(0-3)} < 0.001$); ($p_{(0-4)} < 0.001$)				
Hypertension of grade 1	186 (63.7)	137 (46.9)	95 (32.5)	40 (13.7)	11 (3.8)
*EI (%) (McNemar test, **p**-value)*		*(-26.4%);*	*(-49.0%);*	*(-78.5%);*	*(-94.0%)*
	($p_{(0-1)} < 0.001$); ($p_{(0-2)} < 0.001$); ($p_{(0-3)} < 0.001$); ($p_{(0-4)} < 0.001$)				
Hypertension of grade 2	69 (23.6)	58 (19.9)	45 (15.5)	26 (8.9)	9 (3.1)
*EI (%) (McNemar test, **p**-value)*		*(-15.7%);*	*(-34.3%);*	*(-62.3%);*	*(-86.7%)*
	($p_{(0-1)} < 0.001$); ($p_{(0-2)} < 0.001$); ($p_{(0-3)} < 0.001$); ($p_{(0-4)} < 0.001$)				
Hypertension of grade 3	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Rate of patients achieving target blood pressure has increased markedly by the time (at T0: 12.7%; T3: 33.2%; T6: 52.0%; T12: 77.4% and at T18: 94.5%) with the efficiency index reached from 161.4 to 644.1%; p<0.001. The intervention has effectively reduced the rate of hypertension of grade 1, 2 at time point T3 (46.9% and 19.9%, respectively); at T6 (32.5% and 15.5%, respectively); at T12 (12.7% and 8.9% respectively); and at T18 (3.8% and 3.1%) versus T0 (63.7% and 23.6%, respectively). The corresponding reduction in efficiency index is - 15.7%; - 34.3%; - 62.3% and - 86.7% (p <0.001).

Table 3.38 The relationship between sex and rate of subjects achieving target blood pressure before and 3, 6, 12 and 18 months after intervention

Sex	**Achieving target blood pressure by the time**				
	T0 (n=292) No. (%)	**T3** (n=292) No. (%)	**T6** (n=292) No. (%)	**T12** (n=292) No. (%)	**T18** (n=292) No. (%)
Male (n = 130)	15 (11.5)	40 (30.8)	64 (49.2)	91 (70.0)	117 (90.0)
Female (n = 162)	22 (13.6)	57 (35.2)	88 (54.3)	135 (83.3)	159 (98.1)
Total (n = 292)	37 (12.7)	97 (33.2)	152 (52.0)	226 (77.4)	276 (94.5)
*McNemar test, **p**-value (Male-Female)*	*>0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*

At time points T3, T6, T12 and T18 after intervention, rate of subjects achieving target blood pressure in female group was found higher significantly than that in male group (p <0.05).

Table 3.39 The relationship between age group and rate of subjects achieving target blood pressure at the time before and after the intervention 3, 6, 12 and 18 months

Age group	**Achieving target blood pressure by the time**				
	T0 (n=292) No. (%)	**T3** (n=292) No. (%)	**T6** (n=292) No. (%)	**T12** (n=292) No. (%)	**T18** (n=292) No. (%)
<50 (n = 33) (1)	5 (15.2)	13 (39.4)	19 (57.6)	28 (84.8)	32 (97.0)
50 – 59 (n=118) (2)	16 (13.6)	40 (33.9)	62 (51.7)	92 (78.0)	114 (96.6)
60 – 69 (n=141) (3)	16 (11.3)	44 (31.2)	72 (51.0)	106 (75.2)	130 (92.2)
McNemartest ***p*** *value*$_{(1-2)}$	*> 0.05*	*< 0.05*	*< 0.05*	*< 0.05*	*< 0.05*
McNemartest ***p****-value*$_{(1-3)}$	*> 0.05*	*< 0.05*	*< 0.05*	*< 0.05*	*< 0.05*

Chapter 4. DISCUSSION

4.1. Current situation of hypertension and some related factors in people aged 18 - 69 years old at Thu Duc district, Ho Chi Minh city in 2018

- Current situation of hypertension in people aged 18 - 69 years old aat 3 wards owr Thu Duc district:

Survey on 2,203 people aged 18 - 69 years old in 3 wards of Thu Duc district showed the prevalence of hypertension of 33.5%. The results of our study are equivalent to the prevalence of hypertension in the research results of the several authors such as Pham The Xuyen (2019) found hypertension rate of 35.5% at a survey conducted on a group of 45-64 years old, mainly Thai ethnicity, in Dien Bien district, Dien Bien province in 2014 – 2015; Van Cong Minh et al (2015) found the prevalence of hypertension was 33.7% in the servey conducted on group of people aged 40 and over in Vinh Long province in 2013. But our result is higher than the results obtained from country servey focused on the risk factors for non-communicable diseases (NCDs) with the national prevalence of hypertension of 18.9% in people 18 - 69 years old. Truong Thi Thuy Duong et al. (2016) studied people aged 18 and over years old in two communes of Ha Nam province showed the prevalence of hypertension of 24.4%. Nguyen Thanh Binh et al. (2017), conducted study on the Khemer ethnic group aged 24-64 years old in Tra Vinh province and found the prevalence of hypertension of 25.4%. But our results are lower than the results oobtained by the investigation of hypertension in people aged 18 - 80 years old in Romania in 2014 with the prevalence rate of 40.41%. Explaining the difference in the prevalence of hypertension in our study results and published research results in the country and abroad, it may be due to the research

conducting time, the age in the study subjects and due to the difference in sample size as well as in sampling methods.

- Some factors related to hypertension in people aged 18 - 69 years old:

The results of our study showed 11 factors related to hypertension in people aged 18 - 69 years old in the study area, including: 4 factors of individual characteristics (age group; gender; BMI; rate of death and waist circumference/hip circumference), 4 behavioral factors (smoking; habits of eating animal fat; monitoring nutritional composition of daily meals and recognizing hypertension, elevated cholesterol, and hyperglycemia), 3 pathological factors (diabetes; hypercholesterolemia; cardiovascular disease). All these factors are related to hypertension at the level of statistical significance (OR >1.0; p <0.05).

Results of our study on factors related to hypertension are similar to those found in the study of Nguyen Thanh Binh (2017) conducted on Khmer community in Tra Vinh province and Pham The Xuyen (2019) in Dien Bien district, province Dien Bien 2014.

4.2 The effectiveness of intervention measures on hypertension prevention and treatment for people aged 18 - 69 years old at Thu Duc district, Ho Chi Minh city (2019 - 2020)

- The effect of intervention on hypertenstion prevention in community of Thu Duc district:

Our research results showed that the intervention measure such as conducting intensive communication - health education for the community has had the effect on reducing hypertension risk behaviors, specifically: Effectively reduced smoking behavior (38.7%); drinking alcohol/beer (16.6%); Regularly adding salt, salty seasoning or salty sauce to food (18.7%); habits of eating/consuming animal fat (39.1%); rate of

overweight/obese (46.5%). Our research results are similar to those obtained by Nguyen Thanh Binh (2017) in the study conducted on Khmer people of Tra Vinh province and Pham The Xuyen (2019) in Dien Bien district, Dien Bien province in 2014.

- The effect of intervention on treatment of hypertension in people aged 18 - 69 years old at CHS in Thu Duc district:

Results obtain in our study showed that the rate of hypertension patients achieving target blood pressure increased significantly by the time, at T3: 33.2%; at T6: 52.0%; at T12: 77.4%; and at T18: 94.5%, compared with T0: 12.7% with efficiency index reached up to 644.1% from 161.4% ($p < 0.001$).

The rate of hypertension patients achieved target blood pressure found in our study is higher than that obtained from the research of Nguyen Lan Viet (2007) with this rate 87.4%; that obtained after 18 months of intervention on treatment of hypertension in a study of Dong Van Thanh et al. (2011) with the rate of patients achieved target blood pressure of 79.7%. However, our results are lower than the research results found by Ly Huy Khanh et al (2009) after 6 months of treatment for 429 hypertension patients at Trung Vuong hospital, Ho Chi Minh City. In Ho Chi Minh City, 97.9% of patients achieved target blood pressure. The reason for this difference in the research results may be related to difference of antihypertension drug prescription for treatment hypertension patients by the doctor at Trung Vuong hospital (class 1) and that used at the ward/commune CHS.

Regarding the relationship between gender and achieving target blood pressure at the time point before and 3, 6, 12 and 18 months after intervention, our results showed that the rate of target blood pressure achievement in the group of female patients was higher than that of male patient group ($p <0.05$).

Regarding the relationship between age group and achieving target blood pressure at the time before and after intervention 3, 6, 12 and 18 months: Research results at the time of T3, T6, T12 and T18 showed that the rate of target blood pressure achievement in the group of patients < 50 years old was higher than that of groups of patients 50 - 59 years old and patients of 60 - 69 years old group ($p < 0.05$).

Results of a study of antihypertension treatment in France conducted on 30,000 hypertension workers at work from January 1997 to April 1998 showed that the proportion of patients with BP <140/90 mmHg was 12.5% for men and 33,2% for women. The HANE study conducted on 868 hypertension patients for 48 weeks showed that the rate of achieving target blood pressure in female patients was 55% and in men was 47.7%.

Research results of Dong Van Thanh et al in 2011 monitoring over 316 hypertension patients managed according to the model showed that the rate of patients achieving target blood pressure in women was 81.3% and in men was 78.0%. Research by Pham Thi Kim Lan (2011) on 106 hypertension patients gave similar results with the rate of patients achieving target blood pressure among women was 98.7% and among men was 96.8%. The rate of achieving target systolic blood pressure (SBP) and diatolic blood pressure (DBP) in the group of patients of >50 years old was lower than that in the group of ≤55 years old (97.75% compared with 100%).

- Side effects of antihypertensive drugs on hypertension patients encountered during treatment:

The results of the study showed that, during treatment, the number of patients with edema and cough at T3 was found the most: 10 patients with edema and 7 patients with cough. The number of patients with edema and cough decreased at the time of T6 and T12. By T18, no patient had edema or cough was

detected due to side effects of the drug. During the treatment, no patient had dangerous complications such as myocardial infarction (MI), stroke/MI or death.

- ***Sustainability of the intervention solution:***

Although the thesis topic has evaluated and the program finished from June 2020, until now (August 2022) it has been 26 months (post-intervention), but the management and treatment of hypertension patients at CHS in Linh Xuan ward is still maintained and becomes a regular professional work content of the CHS. The number of hypertension patients managed and treated at CHS increased from 292 to 351 patients (increase of 59 patients).

Whole year of 2021 is the time when the Covid-19 epidemic was the most complicated and stressful in the Ho Chi Minh City city area, including Thu Duc district as one of the "hotest" areas with high morbidity and mortality rates. The total number of deaths due to Covid-19 in Linh Xuan ward was 63. However, there was no case of hypertension patients in the management and treatment at CHS died from Covid-19 or other causes. No patient had any major complications or even just complications. All hypertension patients managed and treated at CHSs were guaranteed to have adequate supply of antihypertensive drugs during the past 28 months (from July 2020 to August 2022) and continue to be maintained. In 2021, there were times due to the complicated and stressful situation of the Covid-19 epidemic, the whole city had to apply very strict social distancing measures, patients could not go to CHS for follow-up examination and treatment. It was very difficult to receive treatment drugs, meanwhile, was very difficult to find the source of conventional medicines and drugs to treat high blood pressure. However, because hypertension patients have full records of management and treatment at CHS, therefore Thu Duc District Hospital can maintains and creates conditions to

ensure a regular and adequate supply of drugs to Linh Xuan Health Station to provide for treatment of the patients and then still fully covered by health insurance. On the other hand, CHS still maintains and uses a team of health workers participating in the topic so that they can receive drugs from CHS and deliver antihypertensive drugs to each house for hypertension patients.

CONCLUSION

1. Current situation of hypertension and some related factors among people aged 18 - 69 years old at Thu Duc district, Ho Chi Minh city in 2018

The overall prevalence of hypertension in the 3 wards was quite high (33.5%); this of group 60 - 69 years old was the highest (53.5%). The rate of patients having high risk behaviors for hypertension was the highest for eating salty (60.9%), following by drinking alcohol/beer (24.9%), smoking (18.2%) and habit of eating animal fat (10,0%). There number of factors on individual characteristics (age group, gender), lifestyle behaviors (smoking; eating animal fat, monitoring nutritional composition of daily meals), metabolic risks (BMI, waist/hip ratio; hypercholesterolemia; cardiovascular disease) were found related with hypertension (OR >1.0; p <0.05).

2. The effectiveness of some intervention measures on hypertension prevention and treatment for people aged 18 - 69 years old at Thu Duc district, Ho Chi Minh city, 2019 - 2020

The effectiveness of interventions to prevent hypertension in the community:

The interventions has effected on reducing risk behaviors: Smoking (38.7%); drinking alcohol/beer (16.6%); salty eating (18.7%), habit of consuming animal fat (39.1%); overweight/obese (46.5%); waist-to-hip ratio (49.9%). There was a relationship between the impact of intervention solutions to prevent hypertension and the rate of hypertension (OR = 1.47; p < 0.001).

The effectiveness of intervention to manage hypertension at commune Health Station CHSs:

The rate of patients compliance the treatment regimes, having regular blood pressure checks and periodic re-examination at the time point of T3, T6, T12 and T18 after intervention all increased markedly compared to that of T0 ($p < 0.01$). The rate of patients adhered to the diet and lifestyle at the time points T3, T6, T12 and T18 after intervention all increased significantly compared to the time T0 ($p < 0.05$). The rate of atients achieved target blood pressure has been increased from 12.7% (at T0) to 94.5% (at T18). There were no patients with complications or deaths related to the management of hypertension at the investigated Commune Health Station.

RECOMMENDATION

1. Thu Duc Health Center needs to work closely with the Thu Duc District Hospital to replicate the solution of “the Commune Health Station to manage and treat hypertension for people at the station.

2. Thu Duc Health Center needs to develop plan and periodically organize hypertension screening for people in all wards to detect early and promptly treat cases of hypertension and pre-hypertension. At the same time, continue to maintain and replicate solutions to strengthen communication - health education on hypertension prevention for people in the community.