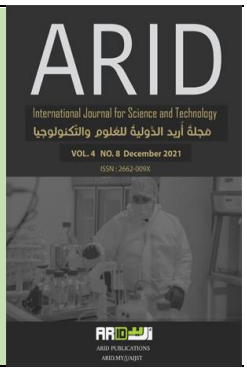
ARID Journals

ARID International Journal for Science and Technology (AIJST)

ISSN: 2662-009X

Journal home page: http://arid.my/j/aijst



مَجلةُ أُريد الدَّوليةُ للعُلومِ والتِّكنولوجيا

العدد 8 ، المجلد 4 ، كانون الأول 2021 م

Epidemiology and Characteristics of Yemeni Hypertensive Patients Attended 48 Hospital Sana'a City- Yemen at 2019

NAIF TAWFIQ AL-NWANY

Faculty of Medicine, The National University of Malaysia,

Selangor-Malaysia

وبائيات وخصائص ارتفاع ضغط الدم بين المرضى اليمنيين الداخلين مستشفى 48 صنعاء خلال العام 2019م

نايف توفيق النواني

كلية الطب - الجامعة الوطنية الماليزية – سيلانجور – ماليزيا

naifalnwany2020@gmail.com

arid.my/0004-0156

https://doi.org/10.36772/arid.aijst.2021.482

ARTICLE INFO

Article history:
Received 25/06/2021
Received in revised form 22/08/2021
Accepted 28/10/2021
Available online 15/12/2021
https://doi.org/10.36772/arid.aijst.2021.482

Abstract

Hypertension is one of the most health problems in the world. People who have hypertension are at high risk of other diseases. This study was conducted to identify distribution of hypertension among patients who attended to 48 Hospital during 2019.

A cross-sectional study was conducted and collected the data of all patients diagnosed with hypertension during the year 2019 as registered by 48 medical compound. The study area has electronic information system where is data collected and filled by physician or specialist in different medical departments and outpatient clinics. The data in excel sheet contain information's about the disease including: age, sex and complications and laboratory tests lipid profile for each patient.

Hospital registration system indicated the admission of total number of patients with hypertensive was 2225 during that year .Chi square and fisher test analysis showed that the most patients with hypertension were with age group above 60 year (50%), residence in Sana'a 88.4% .Females under age 60 years (62%), males above age 60 years (56.9%) and hypertension was significant with age with ***p***-value 00.001.Hypertensive heart diseases patients without heart failure (82.7%) most them : (83%) above age 40 years , females (84.7%) .The most complication of hypertension were heart disease (82%), renal disease (5.9%) , heart failure (5.1%) and stroke (3.2%). In future the researchers need study more about hypertension risk factors such as efforts should be put on more studies about epidemiological distribution of the disease in our community.

Keywords: epidemiology, characteristics, hypertensive, distribution, Sana'a, Yemen.

الملخص:

ارتفاع ضغط الدم واحد من المشاكل الصحية في العالم، الناس الذين يعانون من ارتفاع ضغط الدم عرضة لأمراض أخرى. هدفت هذه الدراسة لتمييز توزيع ارتفاع ضغط الدم بين المرضى الذين دخلوا مستشفى 48 لعام 2019، وقد أجريت دراسة مقطعية وجمعت المعلومات لجميع المرضى الذين تم تشخصيهم ارتفاع ضغط الدم، وتم تسجيلهم بنظام إلكتروني بواسطة الأطباء والأخصائيين في مختلف الأقسام الطبية بما فيها العيادات الخارجية علما أن المعلومات حول المرض تضمنت الاسم وعمر المريض، وكذلك نوع الجنس والحالة الاجتماعية والمضاعفات والفحوصات المخبرية. وقد وضحت النتائج العدد الكلي للمرضى الداخلين المستشفى عام 2019 وعان عددهم 2225 مريض واستخدم تحليل مربع كاي وفايشر، موضحا أن حوالي 50% كانوا فوق عمر 60 عاما، بينما الساكنين صنعاء 88.4%. الإناث تحت عمر 60 عاما 62% والذكور فوق عمر 60 عاما 56.9%. علما أن ارتفاع ضغط الدم ذات دلالة إحصائية مهمة. كان نسبة مرضى ضغط الدم الذين لديهم إمراض القلب بدون فشل القلب 82.7% أغلبهم فوق عمر 40 عاما 83% منهم إناث 84.7%. أغلب مضاعفات ارتفاع ضغط الدم كان مرض القلب 82% وفشل كلوي 5.9% بينما فشل القلب 5.1% وجلطة الدماغ 3.2%. في المستقبل الباحثين سيدرسون عوامل أخرى لها علاقة بضغط الدم مثل تغيير نمط أسلوب الحياة.

الكلمات المفتاحية: وبائيات، خصائص، ارتفاع ضغط الدم، التوزيع، صنعاء، اليمن.

1. INTRODUCTION

Hypertension is a major public health problem in the world and a leading cause of heart diseases , renal diseases , stroke , diabetic mellitus, death , disability and other diseases globally[1]approximately 20% of the world's adults are estimated to have hypertension, when hypertension is defined as blood pressure in excess of 140/90 mm Hg , force of the blood against artery walls whereas heart failure means that heart can't keep up with its workload, heart failure is insufficient in cardiac output when heart is unable to pump sufficiently to maintain blood flow to meet the body tissues. The prevalence markedly increases in patients older than 60 years. one billion people have hypertension , tow-third are in developing countries and may be increase to 1.56 billion adults will be living with hypertension by 2025, hypertension kills nearly 8 million people every year , worldwide and nearly 1.5 million people each year in the South- East Asia region, approximately one- third of the adult population in the SEA region has blood pressure [2].It is estimated that about 17 million deaths occur worldwide because of cardiovascular diseases every year , of which complications of hypertension alone accounts for 9.4 million deaths [3].As per World Health Organization report, about 40% of people aged more than 25 years had hypertension [4].

Most people with hypertension have no symptoms at all; this is why it is known as the "silent killer". Sometimes hypertension causes symptoms such as headache, shortness of breath, dizziness, chest pain, palpitations of the heart and nose bleeds, but not always[5,6]. Hypertension may be primary, which may develop as a result of environmental or genetic causes, or secondary, which has multiple etiologies, including renal, vascular, and endocrine causes. Primary or essential hypertension accounts for 90-95% of adult cases, and a small percentage of patients (2-10%) have a secondary cause [7]. Hypertensive emergencies are most often precipitated by inadequate medication or poor compliance. Risk factors for hypertension such as a sedentary

lifestyle, obesity, consumption of fatty foods and resultant dyslipidemia are highly prevalent in the population and these factors contribute to the epidemic [8, 9 ,10].

Problem statement

In most developing countries including, Yemen diabetes and cardiovascular diseases in concert with other non-communicable diseases have not been addressed under specific control programs such as those that exist for several infectious and communicable diseases.

In Yemen, population are homogenous and no ethnically uniform. Additionally, the country characterized by a highly traditional lifestyle, the capital, Sana'a, is located at an altitude of 2300 m (7500 ft) in the highlands, one of the highest capital cities in the world. The absence of railways and the poor road transportation system make communications with the coastal plains difficult.

Information regarding prevalence, risk factors awareness, treatment and control rates of hypertension in Yemen is limited to the capital area.Yemen is experiencing urbanization and modernization which cause changes in diet and physical activity particularly in the cities including Sana'a city. Furthermore, like many other developing countries, and as a result of increased longevity and improvement in the standard of living as well as the influence of the western lifestyle such as cigarette smoking and alcohol consumption and chewing khat have assumed a major public health dilemma.In addition, and above living style in Yemen in general and Sana'a city in particular became very stressing as a result of the current conflict which been taken place several years ago.

Rational

our knowledge about epidemiology and characteristic of Yemeni patients are poor as result of scanty information about non-communicable diseases and defective national health information system. In view of the burden of inter world communicable diseases highlighted above there is

need to have a systematic nation-wide data to determine the magnitude of the problem of non-communicable non- communicable diseases.

Therefore, the findings from this study will be used to increase the scientific knowledge base to the scientific world. Also we hope that this new data will high light this problem and help discoing makers in the county allocate more budget in the diagnoses screening and treatment of this disease

makers and practiced people about the characteristic of Yemeni hypertensive patients to reduce the incidence to implants programs that could be prevent the modified risk factors

The findings from this study will be used to increase the scientific knowledge base to the scientific world. The findings may further help to guide policy markers (Ministry of health and social welfare) with the aim of planning interventions to improve patient compliance to antihypertensive therapy to reduce the impact of hypertension and its complications and improve the quality of life of the patients and the health cost burden.

2.0: OBJECTIVES OF THE STUDY

2.1: GENERAL OBJECTIVE

To identify the epidemiology and characteristicsof Yemeni Hypertensive patients

(Hypertensive patients in 48 hospitals at 2019)

2.2: SPECIFIC OBJECTIVES

1. determine the prevalence and determinants of hypertension
2. to identify relationship between hypertension and sex
3. to identify relationship between hypertension and age
4. To give a suggestion how changes the modified factors

3. Methodology

a) Study design

Prevalence cross sectional analytical study.

b) Study area

This study was carried out based on data as registered by 48model medical compound its consist of two hospitals 48 hospital for males and Yamani Chinese for mothers and Childs which is located in Sana'a City, it's a governmental, referral and educational hospital receives patients from all governorates of Yemen.

c) Sampling method and size

collected the data of all patients diagnosed with hypertension during the year 2019 as registered by 48 medical compound.

d) Study instruments

the study area has electronic information system which is data collected from this information filled by physician or specialist in deferent medical department and outpatient clinic but unfortunately the components of the data were not completely filled. The electronic system present data in excel sheet contain information's about the disease including: name , diagnosis , age, sex, marital status, lipid profiles and hypertension category for each patient

e) Inclusion criteria:

All patients from all governorates diagnosed with hypertension and attended 48 Hospital during 2019.

f) Exclusion criteria:

Non-Yemeni patients diagnosed with hypertension during the year 2019

Dependent and Independent variables –

- Dependent variable: hypertension.

- Independent variables: Socio-demographic characteristics of the patients including age, sex, marital status and place of residence and hypertension diseases categories.

Variable definition

- Socio-demographic status

Age was classified to the following three categories: -

less than40 years

from 40 to 60

more than 60 years

- Sex: Males and Females.
- hypertension disease categories:

g) Statistical analysis

The data were analyzed using SPSS 20 application. Statistical explanation were made as the following:

- Frequency (%) to describe the qualitative variables, and mean and standard deviation to describe the quantitative variables.
- Chi-square and Fisher test were used to show the significant of association between socio-demographic factors, complications at level of significance (0.05) and 95% confidence interval

4. Results

The aim of this study is to identify the distribution of hypertension among patients attended the 48 Hospital during 2019. Hospital registration system indicated the admission of total number of patients with hypertension was 2225at 2019.

i. Socio-demographic characteristics of registered patients

The mean age of the patients was 54.5 years with standard deviation of 5.93 years. Ages ranged from 21 years to 96 years. About half of the patients (1113) which represent 50.0% of all patients were in the age group of >60 years, followed by 996 patients (44.8%) in the age group of 40-60 years, then 116 patients in the age group of less than 40.

Table(1): Socio-demographic characteristics of the patients (n- number of patients)=2225) (48 hospital, 2019)

		Mean (SD) standard division	Freq.	%
Age (year)		54.5(5.93)		
age groups (year)				
	<40		116	5.2%
	40-60		996	44.8%
	>60		1113	50.0%
Sex				
	Male		1062	47.7%
	Female		1163	52.3%
City				
	Thamar		130	8.5%
	Hajjah		5	0.2%
	Amran		9	0.4%
	Abian		3	0.1%
	Al Baida'a		5	0.2%
	Taiz		16	0.7%
	Sana'a		1967	88.4%
	Sadah		3	0.1%
	Rimah		14	0.6%
	Marib		2	0.1%
	Al Mahwit		6	0.3%
	Jahj		2	0.1%
	Ibb		63	2.8%

The number of female patients were nearly the same as male patients. The females were 1163 (52.3%)and males 1062 (52.3%)and the ratio was 1.1:1 respectively.

Sana'a Governorate were the most governorate patients come from with a number of 1967 patients (88.4%), followed by Thamar with 130 patients (8.5%), and Ibb with 63 patients (2.8%).

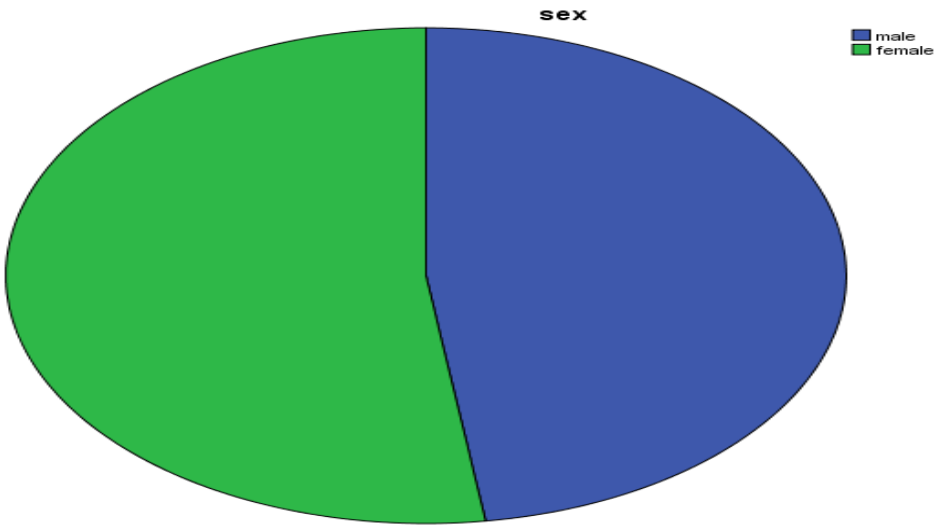


Figure (1): Distribution of hypertension according to Gender

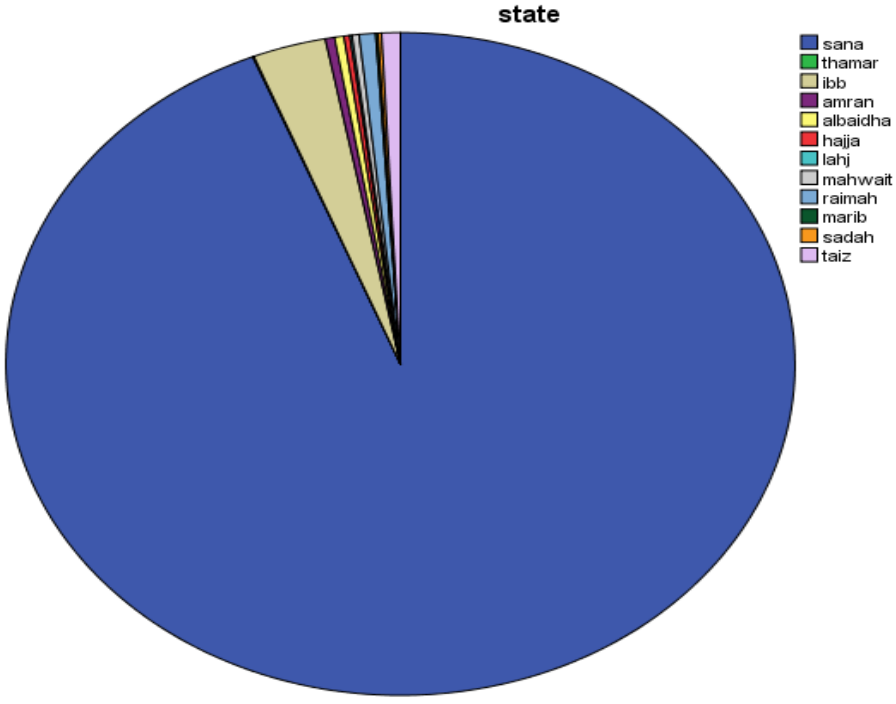


Figure (2): Distribution of hypertension according to Governorate

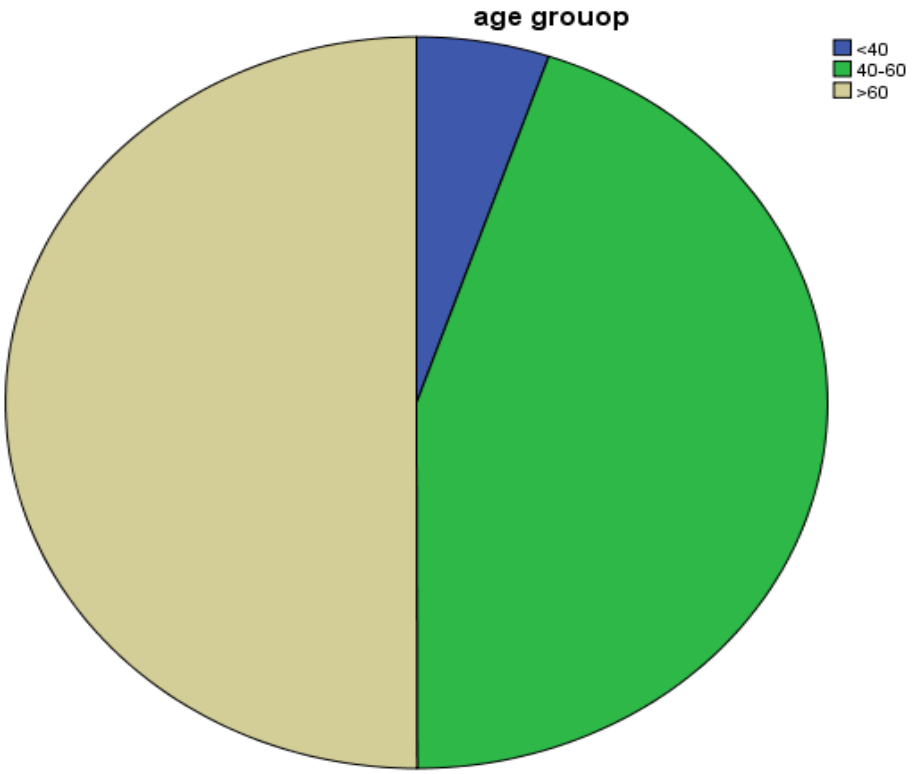


Figure (3): Distribution of hypertension according to age group

Table (2) show that the females are more affected by hypertension than males among age groups less than 60 years, (< 40 year (62.1%) and 40-60 year (61.4%)) but the males are more affected among age more than 60 year 56.9%. This difference is statistically significant (p-value <0.001).

Table (2): Distribution of sex of hypertensive patients by age groups (48 hospitals, 2019)

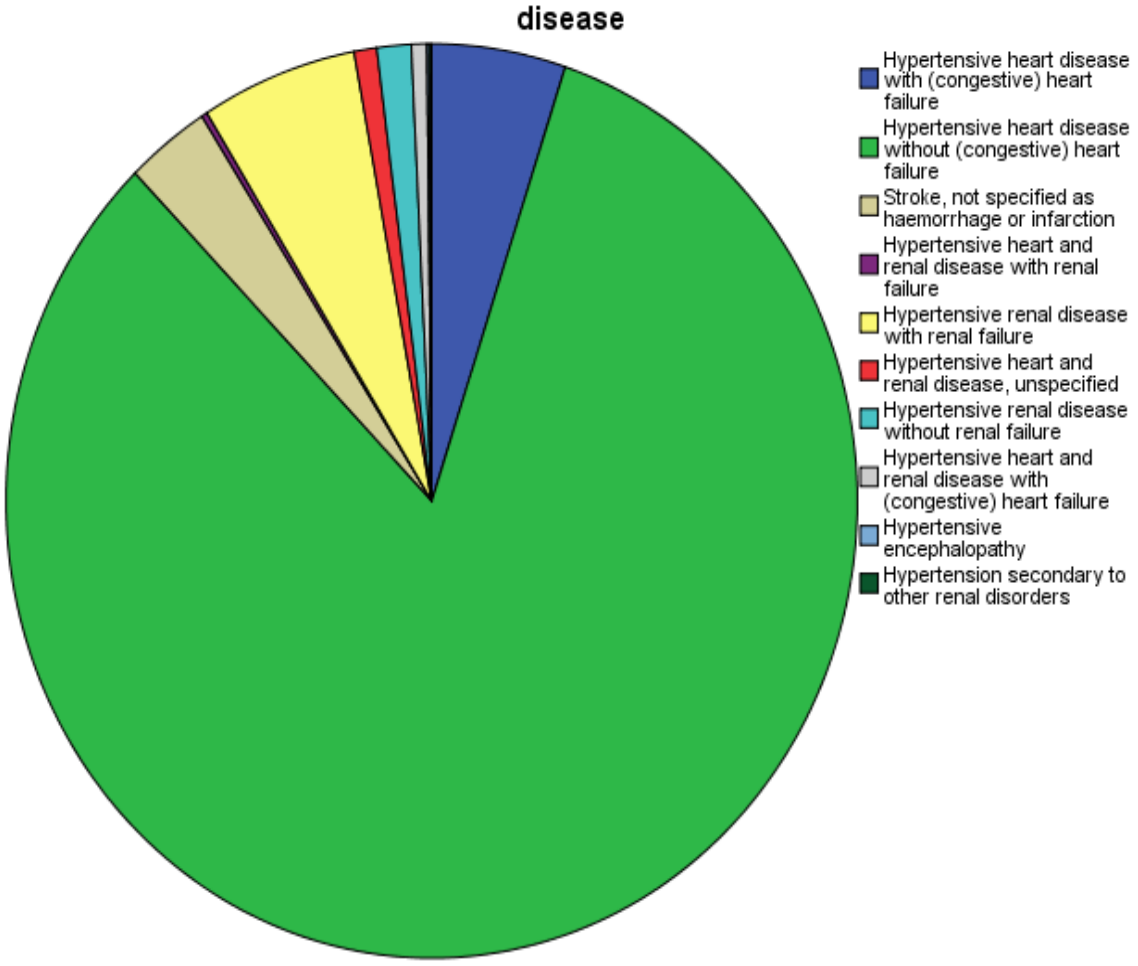
	Male		**Female**		***p-value***
age (year)	Freq.	%	Freq.	%	
<40	44	37.9%	72	62.1%	0.001
40-60	385	38.7%	611	61.3%	
>60	633	56.9%	480	43.1%	

ii. Hypertension categories:

The majority of 1839 patients (82.7%) were with hypertensive heart disease without (congestive) heart failure followed by 132 patients (5.9%) with hypertensive renal disease with renal failure than 113patients (5.1) with hypertensive heart disease with (congestive) heart failure.Table (4) shows that 71 patients (3.2%) had Stroke, not specified as hemorrhage or infarction , 29 (1.3%) with hypertensive renal disease without renal failure , 19 (0.9%) with hypertensive heart and renal disease(unspecified) , 13(0.6%) with Hypertensive heart and renal disease with (congestive) heart failure , 5 patients (0.2%) with hypertensive heart and renal disease with renal failure , 2 (0.1%) with hypertensive encephalopathy and 2 (0.2%) with hypertension secondary to other renal disorders.

Table(3): Hypertension categories (n=2225) (48 hospital, 2019)

Category	Freq.	%
Hypertensive heart disease with (congestive) heart failure	113	5.1
Hypertensive heart disease without (congestive) heart failure	1839	82.7
Stroke, not specified as hemorrhage or infarction	71	3.2
Hypertensive heart and renal disease with renal failure	5	.2
Hypertensive renal disease with renal failure	132	5.9
Hypertensive heart and renal disease, unspecified	19	.9
Hypertensive renal disease without renal failure	29	1.3
Hypertensive heart and renal disease with (congestive) heart failure	13	.6
Hypertensive encephalopathy	2	.1
Hypertension secondary to other renal disorders	2	.1



Figure(4): Distribution of hypertension categories

Table(4): Distribution of Hypertension categories by age groups (48 hospital, 2019)

Category	Age group					
	<40		40-60		>60	
	Freq.	%	Freq.	%	Freq.	%
Hypertension secondary to other renal disorders	0	0%	1	0.1%	1	0.09
Hypertensive encephalopathy	0	0%	1	0.1%	1	0.09
Hypertensive heart and renal disease with (congestive) heart failure	0	0%	3	0.3%	9	0.8
Hypertensive heart and renal disease with renal failure	0	0%	1	0.1%	4	0.4
Hypertensive heart and renal disease, unspecified	3	2.6%	14	1.4%	2	0.2
Hypertensive heart disease with (congestive) heart failure	2	1.7%	54	5.4%	57	5.1%
Hypertensive heart disease without (congestive) heart failure	82	70.7%	827	83%	930	83.6%
Hypertensive renal disease with renal failure	18	15.5%	49	4.9%	65	5.8%
Hypertensive renal disease without renal failure	2	1.7%	16	1.6%	11	1%
Stroke, not specified as hemorrhage or infarction	9	7.8%	30	3%	32	2.9%
Total	**116**	**100%**	**996**	**100%**	**1113**	**100%**

Majority of patients in age group < 40 year were 82 (70.7%) with hypertensive heart disease without (congestive) heart failure , 18 patients (15.5%) with hypertensive renal disease with renal failure , 9 patients (7.8%) with Stroke, not specified as hemorrhage or infarction.Majority of patients in age group 40-60 year were 827 (83%) with hypertensive heart disease without (congestive) heart failure , 54 (5.4%) with hypertensive heart disease with (congestive) heart failure and 49 patients (4.9%) with hypertensive renal disease with renal failure.Majority of patients in age group> 60 year were 930(83.6%) with hypertensive heart disease without (congestive) heart failure , 65(5.8%) with hypertensive renal disease with renal failure and 57 patients (5.1%) with hypertensive heart disease with (congestive) heart failure.

Table(5): distribution of Hypertension categories by gender (48 hospitals, 2019)

Category	Sex			
	Male		Female	
	Freq.	%	Freq.	%
Hypertensive heart disease with (congestive) heart failure	59	5.6%	54	4.6%
Hypertensive heart disease without (congestive) heart failure	854	80.4%	985	84.7%
Stroke, not specified as hemorrhage or infarction	52	4.9%	19	1.6%
Hypertensive heart and renal disease with renal failure	5	0.5%	0	0
Hypertensive renal disease with renal failure	65	6.1%	67	5.8%
Hypertensive heart and renal disease, unspecified	8	0.7%	11	0.9%
Hypertensive renal disease without renal failure	11	1%	18	1.5%
Hypertensive heart and renal disease with (congestive) heart failure	6	0.6%	7	0.6%
Hypertensive encephalopathy	2	0.2%	0	0
Hypertension secondary to other renal disorders	0	0%	2	0.2%
Total	**1062**	**100%**	**1163**	**100%**

Gender distribution among the different hypertension categories were nearly the same.

Table (6): distribution of Hypertension categories by material status (48 hospitals, 2019)

Category	Married		single		Divorced	
	Freq.	%	Freq.	%	Freq.	%
Hypertensive heart disease with (congestive) heart failure	113	5.1%	0	0	0	0
Hypertensive heart disease without (congestive) heart failure	1800	82.7%	30	79%	9	90%
Stroke, not specified as hemorrhage or infarction	64	2.9%	7	18.4%	0	0
Hypertensive heart and renal disease with renal failure	5	0.2%	0	0	0	0
Hypertensive renal disease with renal failure	132	6.1%	0	0	0	0
Hypertensive heart and renal disease, unspecified	18	0.8%	0	0	1	10%
Hypertensive renal disease without renal failure	28	1.3%	1	2.6%	0	0
Hypertensive heart and renal disease with (congestive) heart failure	13	0.6%	0	0	0	0
Hypertensive encephalopathy	2	0.1%	0	0	0	0
Hypertension secondary to other renal disorders	2	0.1%	0	0	0	0
Total	**2177**	**100%**	**38**	**100%**	**10**	**100%**

5. Discussion

The aim of the present was to identify distribution of hypertension among patients attended 48 hospital during 2019. The hospital where the patients attended, located in Sana'a capital. The present study showed that total hypertension patients was 2225.The most hypertension patients were elderly age group (50%). Thisfinding supported by many studies conducted in Kenya[11] Bangladesh[12] Kerala India [13]United states [14] Brazil [15] and Myanmar [16] that showed that prevalence of hypertension was associated with increase of age . our study showed that frequency hypertension was higher among females than males,this finding supported by A worldwide study in 17 countries reported a higher prevalence of hypertension among

women[17]however in some previous studies conducted in other countries such as Nigeria [18] showed reverse it , these differences may be because differences in the age of the population

some previous studies conducted in Nigeria [19] showed that hypertension was more prevalent in the urban area than in the rural area and this difference was statistically significant. our study

showed that Sana'a city was the most common for frequency hypertension in Yemen 88.4%. The reasons offered for high frequency hypertension in Sana'a include change in diet with higher salt and calorie intake and reduced potassium intake, sedentary life style, obesity and more psychosocial stress which are worse in urban dwellers or may be difficult access to capital Hospitals from rural areas surrounding of Sana'a because war and poverty, thus, we observed high number of patient's hypertension came from Sana'a in our study.

Result from present study showed that females (with age < 40 YR) more affected by hypertension than males in the same age group and males (with age >60 YR) more affected by hypertension than females in the same age group , this difference are statistically significant (p-value <0.001).However many studies were conducted in other countries such as Arabia countries and Afghanistan, that showed that prevalence hypertension among females elderly age more than males in same ages and reverse in young [20 , 21]. The reason for high and low prevalence hypertension among both sex by age groups in our setup may be difference in number of patients among groups. Result from present study showed that the most common complication due to hypertension was heart disease without heart failure, renal disease, heart failure and stroke (82%, 5.9%, 5.1%, 3.2%)respectively, this finding supported by many studies conducted in other countries such as Fihaya etal [22] and WHO[23] that showed that most complication of hypertension was heart disease, renal disease and stroke .our study showed that these complications were most prevalence among age groups >40 year this is the most important of information in this research, it indicates that most of the diagnosed patients with hypertension in

Yemen are diagnosed at late stages, in seems that the hypertension is not brought to the attention until the patient is symptomatic with heart failure.

Global study showed that strokes and myocardial infarctions have been attributed to suboptimal blood pressure control and two-thirds of this attributable burden occur in middle-aged individuals (45–69 years) [24]. Present study showed that stroke due to hypertension more among males than females. This finding supported by systematic review study showed that strokeis more common among men, but women are more severely ill [25]. However, previous studies showed that hypertensive heart disease and stroke more among males than females in adulthood [26]. Our study showed that females more hypertensive heart disease than males. The reason for high heart disease due to hypertensive among females in our study that, after 40 years of age, a higher percentage of women than men have hypertension in our study, and the gap will likely increase with the continued aging of the female population. In menopause transition many women have vasomotor symptoms which may affect their normal daily activities. With the decline in estrogen levels, risk factors for coronary heart disease become more apparent.

Results from present study showed that most complications of hypertension were among married patients. However, previous studies in other countries showed that opposite is true [27]. The reason for a higher prevalence complications of hypertension among married patients in our setup maybe low in number of singles patients.

6. Conclusion

This study showed that prevalence of hypertension among patients attended 48 Hospital was low. Prevalence of hypertension and its complications was most common among patients who were females elderly age group, married, resident Sana'a. The most common hypertension complications were heart diseases, renal diseases, heart failure and stroke. In Yemen, a country characterized by a highly traditional lifestyle, hypertension burden is favorably affected by

urbanization and by living in the capital area. We recommend change traditional lifestyle especially among resident in Sana'a. changes the modified factors:

1) Maintain normal weight for adults (body mass index 20-25 kg/m^2)

2) Reduce salt intaketo <100 mmol/day (<6g NaCl or <2.4 g Na^+/day)

3) Engage in regular aerobic physical exercise(brisk walking rather than weight lifting) for ≥30 minutes per day, ideally on most of days of the week but at least on three days of the week.

4) Consume at least five portions/day of fresh fruit and vegetables.

5) Reduce the intake of total and saturated fat.

6) Psychological support and avoid of stress a tensions.

7) Stop of smoking.

8) Early detection and frequency of measurements of blood pressure by visiting clinics or health care centers.

List of abbreviations

p-value	Probability	
WHO	World health organization	
N	Number of patients	
SD	Standard division	
YR	Year	
Freq.:	Frequency	

Acknowledgement

We would like to thank the 48 Hospital manager for cooperation with us in all research stages and I wish to acknowledge the financial support and approval obtained from our parents.

References

[1] A. Alwan, T. Armstrong and D. Bettcher," Global status report on Noncommunicable diseases Geneva, Switzerland, *"World Health Organization*",12(4) (2011) 96-110.

[2] World Health Organization," hypertension regional office for south- east Asia" (2012).

[3] WHO,"A Global Brief on Hypertension", Geneva Switzerland, World *Health Organization* (2013).

[4] World Health Organization, "Global brief on hypertension," 2013, http://apps.who.int/iris/bitstream/10665/79059/1/WHO_DCO_WHD_2013.2_eng.pdf?ua=1.

[5] http://www.emro.who.int/world-health-days/2013/http://www.who.int/world-health-day/en/.

[6] Mayo clinic, "high blood pressure (HTN)", [*general Internet], Mayo Foundation for Medical Education and Researc*h; c2001-2015. [updated 2014 Sept 5, cited 2015 Jan 26]; [about 6 screens], Available from: http://www.mayoclinic.org/diseases-conditions/high-bloodpressure/basics/definition/con-20019580.

[7]V. Bharati. M.D.Mittal, K. Ajay,M. Singh," Hypertension in the developing world challenges and opportunities*", American journal of kidney diseases* ", 55 (3) (2010)590-598.

[8] J.J.Saseen, J.T.MacLaughlin, R.L DiPiro,G.C.Talbert,G.R.Yee, B.G.Matzke,L.M.Wells ,L.M. Posey, Editors. Pharmacotherapy: A path physiologic approach. 9th ed. New York: McGraw-Hill Medical; c2014. Chapter 3.

[9] CDC: high blood pressure [Internet]. Centers for Disease Control and Prevention; 2015. [updated 2014 Oct 29, cited 2015 Jan 26]. Available from: http://www.cdc.gov/bloodpressure/index.htm.

[10] J. Saseen," Essential hypertension", In: B.K.Alldredge, R.L.Corelli, M.E.Ernst , B.J.Guglielmo, P.A.Jacobson, W.A .Kradjan, B.R.Williams, Editors. Koda-Kimble and Young's Applied Therapeutics: The Clinical Use of Drugs. 10th ed. Philadelphia: Lippincott Williams & Wilkins; c(2013), Chapter 14, pp.10-22.

[11] O.Bob , M. Awino,A.Lilin, A.Ogond, and C.Grace, " Awareness status and associated risk factors for hypertension among adult patients attending Yala sub-county Hospital, Siaya county , Kenya", *public health researc*h 6(4) (2016) 99-105.

[12] A. Razzaque, L. Nahar , A. Haider, M.Mustafa , K. Ahsan, M.Islam ,M.Yunus, Sociodemographic differentials of selected non communicable diseases risk factors among adults in Matlab Bangladesh,. *Asia pac J public Health* 9(23) (2011) 183-191.

[13] N. Sebstain, M. Jesha , P.H. Sheela, S.N. Arya , Hypertension in Kerala," A study of prevalence , control, and knowledge among adults, *International Journal of medical science and public health*, 5(10) (2016) 2041-46.

[14]S.S. Yoon,D.Cheryl, M.Frayr,M.Carool," Hypertension prevalence and control among adults in United States",*NCHS*,(2012) , (107) 1-8.

[15] R.V. Picon, F.D. Fuchs, L.B. Moreira, G.Rigel , S.Funch , "Trends in prevalence of hypertension in Brazil a systematic review with meta-analysis", *PLoS One*(2012) 7:e48255. [PMC free article] [PubMed].

[16] C.Naingand K. Aung," Prevalence and risk factors of hypertension in Myanmar: a systematic review and meta-analysis", *Medicine* (2014) 93:e100. [PMC free article] [PubMed.].

[17]C.K.Chow,K.K.Teo,S.Rangarajan,Islam,R.Gupta,A.Avezum,A.Bhonar,J.Cheifamba,G.Dagenais,others " PURE (prospective urban rural epidemiology) study investigators. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high, middle, and low-income countries," *J Am Med Assoc*(2013) 310:959–968. [PubMed].

[18] O.S. Oga, I. Okpechi ,I. Chukwuonye , J.O. Akineymi, B.JC. Onwubere , A.O. Falce,S. Stewart, K. Sliwa," Blood pressure, prevalence of hypertension and hypertension related complications in Nigeria African :A review",*World Journal of cardiology*26;4(12) *(*2012) 327-3.

[19] A.O. Sola1, O.I . Chinyere, A.O. Stephen, J. A. Kayode.," Hypertension prevalence in an Urban and Rural area of Nigeria",*Journal of Medicine and Medical Sciences* 4(4) (2013) 149-154.

[20] A.Tailakh , L. S. Evangelista, J.C. Mentes, N.A Pike, L.Philip, D.Morisky "Hypertension prevalence, awareness, and control in Arab countries: a systematic review", *Nurs Health Sci*(16)(2014)126–130. [PMC free article] [PubMed].

[21] K.M.I. Saeed " Prevalence of hypertension and associated factors in Jalalabad City, Nangarhar Province, Afghanistan",*central Asian Journal of global health*4 (1) 2015) 65-80.

[22]Y.F Fihaya; Ong Y. Sofiatin, , P. Anam; S.Hadyana, M.A. Rully,"Prevalence of Hypertension and Its Complications in Jatinangor",.*Journal of Hypertension*(2015), doi: 10.1097/01.hjh.0000469851.39188.36.

[23] World Health Organization," A global brief on hypertension: Silent killer, global public healthcrisis",(2013),http://apps.who.int/bitstream/10665/79059/1/WHO_DCO_WHD_2013.2_eng.pdf?ua=1.

[24] A. Finlay. McAlister, Ross D. Feldman, Katherine Wyard, Rollin Brant, and R.C. Norman," The impact of the Canadian Hypertension Education Program me in its first decade,"*European Heart Journal* (2009)(30) 1434–1439.

[25] Apperlos P, Stegmyar B , Terent A," sex differences in stroke epidemiology A systematic review",*https://doi.org/10.1161/STROKEAHA.108.540781*stroke.(2009)(40)1082-1090 published.

[26] British Heart Foundation Centre on Population Approaches for Non-Communicable Disease Prevention. Nuffield Department of Population Health, University of Oxford, 2014.

[27] R. Blieszner, V.H. Bedford," Cardiovascular prevalence among married. *Handbook of families and aging",* 2nd Edition greenwood publishing group, America (1995).