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Survey Report

Prevalence and Socio-Demographic Determinants of Hypertension in Thi-Qar Governorate: A Household Survey

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ABSTRACT

Objectives: To estimate the prevalence, subtypes, and socio-demographic determinants of hypertension among adults in Nassiriya city.
Design, Setting, and Participants: A cross sectional household survey was carried out in Thi-Qar governorate, Southern Iraq, on 2148 adults from two areas in Nassiriya city, aged 18 years and above, recruited between 1st of November 2012 and 31st of 2014 using multistage sampling.
Main Outcomes and Measures: Hypertensive patient was defined as an individual with self-reported treated hypertension or with an average of two blood pressure measurements of systolic blood pressure 140 and or diastolic blood pressure 90 mmHg or more. Questionnaire based interview was used to measure the determinants.
Results: The overall prevalence of hypertension was 26.5% (19.1% were known hypertensives and 7.4% were unrecognized hypertensives). The prevalence of prehypertension was 58.0%. Of the recognized hypertensives, only 25.4% were with controlled blood pressure. The prevalence of isolated systolic and isolated diastolic blood pressure among the study population were 6.8% and 4.0% respectively. Significant independent association was found between age, family history of hypertension, education, type of the family, socioeconomic status and prevalence of hypertension.
Conclusion: The prevalence of hypertension in Thi-Qar Governorate was high. This necessitates effective preventive and control measures.

Keywords: Hypertension, prevalence, determinants, Thi-Qar

INTRODUCTION

Hypertension which is defined as systolic blood pressure (SBP) of equal or more than140 mmHg and or diastolic blood pressure (DBP) of ≥ 90 mmHg[1], is a progressive cardiovascular syndrome originating from complex causes. It's progression is strongly allied with structural and functional abnormalities that damage many main organs and vasculature[2]. It is an important risk factor for cardiovascular disease and chronic kidney disease[3]. High normal range is responsible for one half of blood pressure related diseases[4]. Hypertension is one of the leading causes of premature mortality, its mortality remains as second most lethal condition worldwide[5]. Every 20 mm Hg increase in systolic or 10 mm Hg increase diastolic in blood pressure, double the mortality from both coronary heart disease and stroke[6].

Hypertension is either primary; that represents 90–95% of cases which is categorized as a high blood pressure with no obvious cause but has some contributing factors[7], or secondary, that results from an identifiable causes[8]. Hypertension is generally a product of environmental factors, genetic predisposition and life style risk factors[9].

Hypertension represents a main public health epidemic and burden in all populations of the world. In a year of 2000 more than a one quarter (nearly one billion) of the world's adult population had hypertension and predicted to be 1.5 billion cases at 2025[1,4,10].

In many countries approximately 4 in 10 adults over age 25 years have hypertension and another 1 in 5 have prehypertension. Adults living to 80 years of age an estimated 90% will develop hypertension. In developed countries, the highly prevalent cardiovascular disorder with modifiable risk factors is the arterial hypertension; where 20% - 50% of the adult population is affected[11].

In Iraq the situation has no wide difference from many countries, at both age distribution and time trend. A survey had been conducted in 1979 revealed that 12% of the Iraqi population were with hypertension[12]. After that, the Chronic non communicable diseases risk factors survey in Iraq (2006) showed that the prevalence of hypertension was 40.4%[13]. While, the last figure for the prevalence of hypertension in Iraq as a part of Eastern Mediterranean Region by WHO health statistics published in 2008 for both sexes for the same age was 29.4% [20.4-38.9%][14].

In Thi-Qar Province south of Iraq, a study done in 2012 on attendants of some primary health care centers in Nassiriya city showed that 46.1% of the study population were hypertensives[15].

Symptoms are usually a result of end-organ damage and the presentation depends on the affected organ[16]. For this reason, the routine screening of symptomatic individuals is critical in early diagnosis, treatment and control. Early diagnosis, treatment and optimum control of hypertension are keys to reduce morbidity and mortality of its related illnesses. Because of little is known about the exact prevalence of hypertension in Nassiriya city and in view of increasing burden of hypertension and the need to have systematic data to determine the magnitude of hypertension and its associated risk factors, and to establish a baseline data so as to influence the prevention and control policy of hypertension and utilization of health resources to confront the increasing burden of morbidity and mortality from hypertension. It is with these concerns, that an assessment of the prevalence of hypertension and its associated risk factors is the focus of this study. This study was

done to assess the prevalence and determinants of hypertension in Thi-Qar Governorate.

SUBJECTS AND METHODS

The study setting

The study was conducted in Nassiriya City, the capital of Thi-Qar Governorate. It is the Iraq's fourth most populated city, near the ruins of the ancient city of Ur. The estimated population in 2013 was 525000. Gender distribution is 50% males and 50% females. Geographically is 42% rural and 58% urban[17].

Official endorsement

Permission was sought from the local and regional authorities in Thi-Qar, and Ministry of Health (Thi-Qar General Health Directorate).

The study population

The study population included all adult inhabitants of two areas in Nassiriyah City aged 18 years and more of both sexes who were not physically or mentally incapacitated. While the exclusion criteria included those who refused to participate, those who are absent at their home after two consequent visits, and pregnant women with gestational hypertension.

The overall study design

The study was an analytical cross-sectional survey based on household visits carried out during the period from 1st of November 2012 to 31st of October 2014.

Sample size and Sampling process

The sample size was calculated according to the following equation[18]:

$$n = \frac{Z^2 P (1-P)}{d^2} \times 1.8$$

Where (n) is the sample size, Z= Z statistic for a level of confidence. For the level of confidence of 95%, which is conventional, *Z* value is 1.96. P= expected prevalence or prevalence from previous studies. It was 46.1% according to Al-Lami & Mousa study[15], d= precision or margin of error allowed, and 1.8 was the design effect. In this study a degree of precision of 0.03 was used. The sample size was calculated to be 1910. Taking in consideration a non-response rate of 12%, the sample size was extended to 2140.

Nassiriya city was intentionally dived into two areas; north and south of the Euphrates River. The study subjects were drawn from the catchment population of 9 primary health care centers in those areas. The sample size was distributed with proportional allocation between the sampled areas on the assumption that the proportion of adults is 53.95% of the general population[19]. Multistage sampling method was used. In the first stage, 9 PHC centers were chosen by a simple random sampling from a list of PHC Centers obtained from Thi-Qar General Health Directorate; 3 PHC centers from the first area, and 6 PHC centers from the second area. In the second stage, a sample of households was chosen by a systematic random sampling starting from a point near the chosen PHC Center, using streets and housing enumeration. Each visited area was classified according to its sub-main streets into even and odd serial numbers. If the street with even number was chosen, the houses with an odd number had been chosen and vice versa. Finally, all adults aged 18 years and above who met the inclusion criteria were invited to participate in the study, in each household selected. Those who were not present at the first and second visits were considered as non-respondents.

Data collection

The research team (One of the researchers and two assistants) visited each

selected household and its head/adult informant was interviewed according to a special questionnaire designed for the purpose of the study. It includes personal and socio-demographic information such as name, age sex, marital status, educational level, occupation, number of family members, type of the family and socio-economic characteristics (per capita monthly income and socio-economic index).

Blood pressure measurement

Blood pressure was measured using mercury column sphygmomanometer with a cuff of appropriate size. The measurement was done according to standardized methods in guidelines[20].

Diagnostic procedures

"Subjects who showed an average systolic blood pressure of ≥ 140 mmHg and/or an average diastolic blood pressure of ≥ 90 mmHg of two initial measurements", and with two consequent additional blood pressure measurements 1-2 weeks apart, were diagnosed as hypertension[21].

Ethical considerations

An informed consent was obtained from all participants before collection of data, and all were told that they had the complete right to withdraw from the study at any time. Ethical Committee in College of Medicine, Basra University approved the current study.

Statistical analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 19. Frequencies and percentages were reported for categorical variables. Chi-square test or Fisher Exact test were used to analyze the differences between groups. Means and standard deviations were used to present the data for continuous variables, Logistic regression analysis was performed to identify the independent significant predictors of hypertension. P-value of <0.05 was consi-dered statistically significant.

RESULTS

Four hundred seventy seven (477) households were targeted, 18 of them declined to participate (response rate 96.2%). The remaining 459 households yielded 2148 persons who represented the total study population. The mean age of the study population was 36.3±15.7 years (36.25±16.27 years for males and 36.32±15.16 years for females without a significant difference, P=0.921). Males slightly predominate females (51.4% vs. 48.6%), low educational level was significantly more common among women than men and nearly half of them (46.2%) were with high level of education. More than half of them were not employed, and the unemployment was significantly more common among women. More than one third of them (39.7%) reported per capita monthly income of > 250,000 Iraqi Dinar, and the majority (72.6%) were considered of moderate socio-economic status. The proportion of extended families was slightly more than that of nuclear families.

The overall prevalence of hyper-tension was 26.5%. Of the total population, 410 (19.1%) were known hypertensives and 160 (7.4%) were newly diagnosed hypertensives (Figure 1).

Figure 2 shows that the proportions of individuals with normal and high normal blood pressure (< 140/90 mmHg) population were nearly equal in both sexes, while the prevalence of unrecognized hypertension (newly diagnosed cases) tends to be higher among males. While a reverse trend was noted regarding the recognized hypertension where females predominate males.

Out of the total hypertensive patients, 425/570 (74.6%) showed uncontrolled blood pressure. Among the uncontrolled hyper-

tensive patients, the isolated systolic hypertension was significantly more common among females than males (44.9% vs. 24.3%). Conversely, the isolated diastolic hypertension was more common among males than females. Systolic- diastolic hypertension was more common among males (Table 1).

Figure 3 shows that the prevalence of hypertension according to age and sex is fluctuating. In the earlier age group (< 25 years), the prevalence of hypertension was nearly equal in men and women. In the age groups (25-44 years), the prevalence of hypertension was more among men than women. While in the age group (45-54), the prevalence was more among women. Thereafter, the prevalence of hypertension in men predominates that among women but without significant difference.

Figure 4 shows that among the prevalence of isolated systolic, isolated diastolic, and systolic-diastolic hypertension among the total study population was 6.8%, 4.0%, and 9.0% respectively.

The association of hypertension with socio-demographic characteristics is shown in table 2. There was a statistically significant association of hypertension with increasing age, low level of education, being retired, with higher income, being divorced, nuclear family, and having a positive family history of hypertension.

To examine the independent risk factors of hypertension, a binary logistic regression analysis was performed (Table3). The variables which showed an independent significant association with hypertension were; age, family history of hypertension, education, type of family, and socio-economic status. Occupation and marital status showed no significant association with hypertension, while sex and family income were excluded.

DISCUSSION

This study showed that the prevalence of hypertension among Nassiriyah City population (26.5%) was lower than the prevalence reported for Iraq in 2006[13] (40.4%), and that reported by a study conducted in 2008 in Nassiriya City (46.1 %)[15]. This difference may be attributed to methodological differences including the design, setting, and population study. It was lower than that reported in some Arab and neighboring countries; Jordan (32.3%)[22], Syria (40.6%)[23] and Qatar (32.1%)[24], and Turkey (44%)[25]. It was also lower than that reported in USA than in USA (30.4%)[26]. and European countries (28 to 44%)[27]. However it was comparable to that reported in Saudi Arabia (26.1%)[28] and some African countries; Zimbabwe (27%)[29], and Nigeria (25%)[30], but it was higher than that reported in Kuwait (20%)[31] and Iran (24.3%)[32]. This difference may be due to socio-cultural factors or difference in prevalence of hypertension determinants.

The detection of hypertension is usually incidental and mostly after the development of its complications[33], as a result the exact extent of hypertension in most countries is under-estimated particularly in developing countries[34]. More than one quarter (28.1%) of the hypertensive patients [7.4% of the total study population] were with unrecognized hypertension and it was more common in men than women. This finding is similar to that reported in United States (7%) in which the undiagnosed hypertension was common in men[35]. Male predominance of unrecognized hypertension may be explained by that women were reported to be more frequent users of health services than men[36].

The isolated systolic hypertension (ISH) was with prevalence of 6.8%, while the isolated diastolic hypertension IDH prevalence was (4%), and systolic diastolic hypertension SDH prevalence was (9.0%). A study in China (2004)[37] showed that the

prevalence of ISH was 7.6% while in a Korean study (2001), it was reported to be 4.3%[38]. In this study the prevalence of IDH was lower than that reported by the Korean study which was 5.28%[38], but comparable to that found in Midha *et al* study in India where the prevalence was 4.5%[39].

The sex distribution in the current study showed that the ISH was significantly more common among females, a result which is similar to that reported by other researchers [40], in reverse to IDH which was significantly more common in males, a result which agrees with that reported by Midha *et al*[39], while the SDH showed no significant difference in sex distribution.

It was reported that the prevalence of ISH was lower in women at younger age, but it exceeds that among men after age of 65 years[41]. These results suggest that stiffness of large arteries varies between genders intrinsically, but it may be also modulated by both male and female sex hormones[36].

With increasing age, the means of both systolic and diastolic blood pressure were increasing. The prevalence of hypertension was found to be strongly age related. The prevalence of hypertension in this study increased from 6.5% among the younger age group (25years and below) to 77.8% among those who were aged 65 years and above. Similar pattern was seen in Egypt[42] and Turkey[25]. The increasing prevalence of hypertension with age represents the biological effect of increased arterial resistance due to thickening arterial wall that comes with age[43] or due to aggregation of the other risk factors which tend to increase with age advancement[43].

The prevalence of hypertension in females (27%) was found to be slightly higher than that among males (26.1%). Similar result was reported in Turkey in a general population survey where hypertension prevalence was higher in women than that in men[25], and also in Iran[32]. The higher prevalence of hypertension in females may be due to the high level of some risk factors such as obesity and physical inactivity which were more common in females than males. But, this finding is inconsistent with that of other studies which showed that the prevalence in men was higher than that in women[44].

This study showed that the prevalence among males is much higher than among females in younger age. A similar result had been reported by Martins *et al*.[45]. One of the reasons could be the protective effect of sex hormones[46].

A negative association between educational level and hypertension was noted in this study, a result which had been reported by others[47]. The explanation may be that, the higher prevalence of unhealthy behavior such as smoking, low physical activity, obesity, unawareness of hypertension are among individuals with low educational level[48]. Also low education usually accompanies low income, which adds a further barrier to get the medication[49].

Retired people showed higher prevalence which was similar to that reported by a study in Saudi Arabia[28], but such association disappeared on logistic regression analysis. It is possible that such association is confounded by age.

The marital status had a complex relation with hypertension. The divorced, widowed, and married people had significantly higher prevalence of hypertension compared with unmarried people. The possible explanation that unmarried people had lower prevalence of hypertension may be probably due to their younger age. Such association disappeared on multivariate analysis which may be attributed to other confounders such as age. This finding is inconsistent with that of a study in China (2005) which suggested that marriage is associated with good health especially high-quality marriages, which protects against cardiovascular diseases[50].

Socio-economic was found to be significantly associated with hypertension. It cannot directly impose its effects on hypertension, it exerts its impact through a complex interaction of biobehavioral factors[51]. In agreement with other studies[52], higher prevalence of hypertension was among highly income people showed. But as this effect disappeared in the multivariate analysis, it is more likely to be confounded by other factors. In some studies, no association was found between income and hypertension[53], where as other studies reported that low income people were at higher risk of hypertension[52].

The major strengths of the present study were the fairly large population-based sample, and the high participation rate. However, the results of this study should be interpreted in the context of some limitations; this study was a cross-sectional one, therefore precluding inferences of causality among variables. Another limitation was; the participants were drawn from an urban area so caution needs to be exercised in generalizing conclusions.

CONCLUSIONS

The prevalence of hypertension in Nassiryia city was high, but it was comparable to that among many neighboring countries. It was increased with age in both men and women. A substantial number of subjects with hypertension were unaware of their condition. More than one quarter of hypertensive patients 160/570 (28.1%) were unrecognized, and the unrecognized hypertensive patients were mainly men. The prevalence of isolated systolic hypertension in the current study was higher than that of isolated diastolic hypertension, and it was significantly more common among females. While males showed significantly more common prevalence of isolated diastolic hypertension. There is a need for preventive programs and health education campaigns to raise awareness of people about hypertension.

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Table 1. Types of hypertension among uncontrolled hypertensive patients*

Type of hypertension	Male No. (%)	Female No. (%)	X^2, P-value	All No. (%)
Isolated systolic	53 (24.3)	93 (44.9)	30.987, 0.0001	146 (34.4)
Isolated diastolic	63 (28.9)	22 (10.6)		85 (20.0)
Systolic - diastolic	102 (46.8)	92 (44.5)		194 (45.6)
Total	218 (100)	207 (100)		425 (100)

*145 of the patients had controlled hypertension and were not included.

Table 2. Association of hypertension with socio-demographic characteristics

Risk factor	Hypertensive No. (%)	Non-hypertensive No. (%)	X^2, P-value
Age (years) < 25 years 25- 34 35 - 44 45 - 54 55 - 64 ≥ 65	 46 (6.5) 56 (12.1) 74 (24.1) 167 (50.0) 129 (62.3) 98 (77.8)	 667 (93.5) 405 (87.9) 233 (75.9) 167 (50.0) 78 (37.7) 28 (22.2)	597.418, < 0.001
Sex Male Female	 288 (26.1) 282 (27.0)	 815 (73.9) 763 (73.0)	0.211, 0. 341
Educational level Six years or less From 7-12 years More than 12 years	 243 (43.8) 126 (21.0) 201 (20.2)	 312 (56.2) 474 (79.0) 792 (79.8)	114.306, <0.001
Occupation Employed Unemployed Retired	 163 (24.0) 327 (24.2) 80 (67.2)	 517 (76.0) 1022 (75.8) 39 (32.8)	107.014, < 0.001
Per capita monthly income (ID) < 100,000 100,000-250,000 > 250,000	 184 (22.1) 114 (24.7) 272 (31.9)	 650 (77.9) 348 (75.3) 580 (32.8)	22.074, < 0.001
Marital status Married Unmarried Divorced or widowed	 459 (33.9) 52 (7.5) 59 (57.8)	 896 (66.1) 639 (92.5) 43 (42.2)	216.818, < 0.001
Type of family Nuclear Extended	 290 (28.7) 280 (24.6)	 720 (71.3) 858 (75.4)	4.633, 0.031
Family history of hypertension	317 (29.8)	746 (70.2)	11.649,

Positive Negative	253 (24.0)	832 (76.0)	0.001
Socio-economic status Low Medium High	 77 (31.7) 402 (25.8) 91 (26.4)	 166 (68.3) 1158 (74.2) 254 (73.6)	 3.783, 0.151

Table 3. Logistic regression analysis of association of hypertension with the studied risk factors

Status	Variables	β	Significant (P- value)	Expected B	95 % CI for expected B	
					Lower	Upper
Significant	Age	0.082	<0.001	1.09	1.08	1.10
	Family history of hypertension	0.578	< 0.001	1.78	1.41	2.26
	Education	- 0.266	0.001	0.77	0.66	0.89
	Type of family	- 0.352	0.004	0.70	0.56	0.89
	SES	- 0.232	0.041	0.79	0.64	0.99
Insignificant	Occupation	0.206	0.066	1.23	0.99	1.53
	Marital status	- 0.177	0.090	0.84	0.68	1.03
Excluded variables	Sex	Non significant				
	Family income					

SES= Socio-economic status

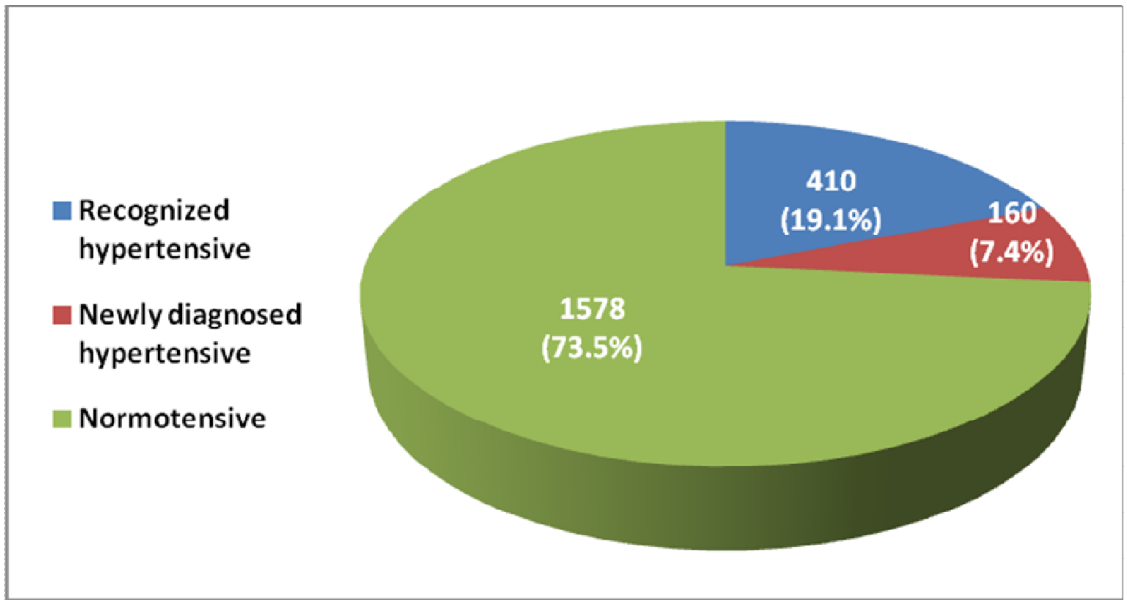


Figure 1. Prevalence of hypertension among the study population

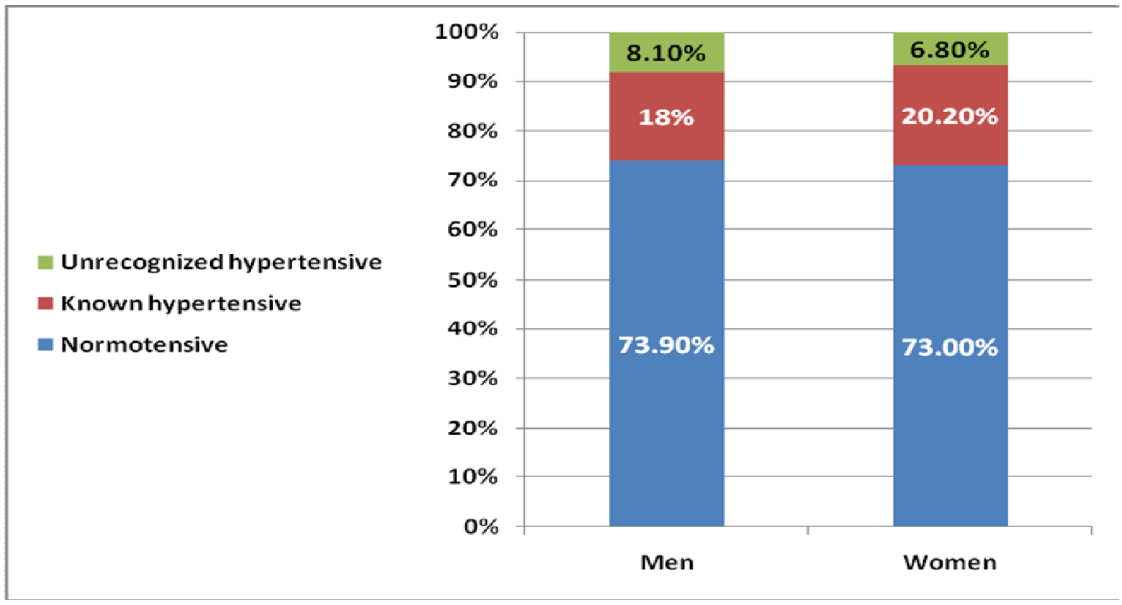
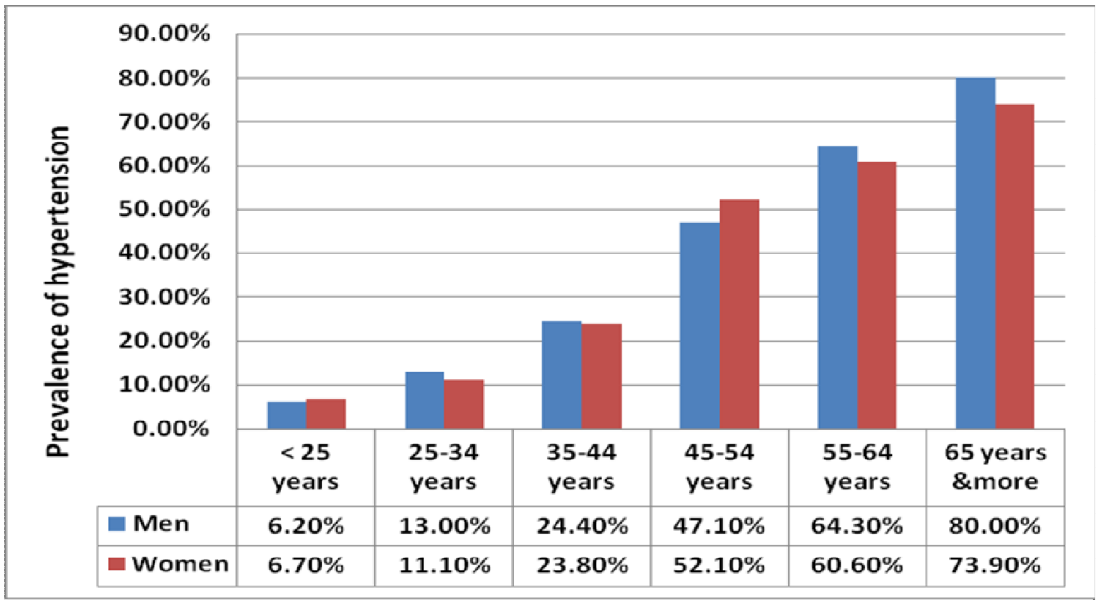


Figure 2. Prevalence of hypertension by sex



	< 25 years	25-34 years	35-44 years	45-54 years	55-64 years	65 years &more
Men	6.20%	13.00%	24.40%	47.10%	64.30%	80.00%
Women	6.70%	11.10%	23.80%	52.10%	60.60%	73.90%

Figure 3. Age and sex distribution of the prevalence of hypertension

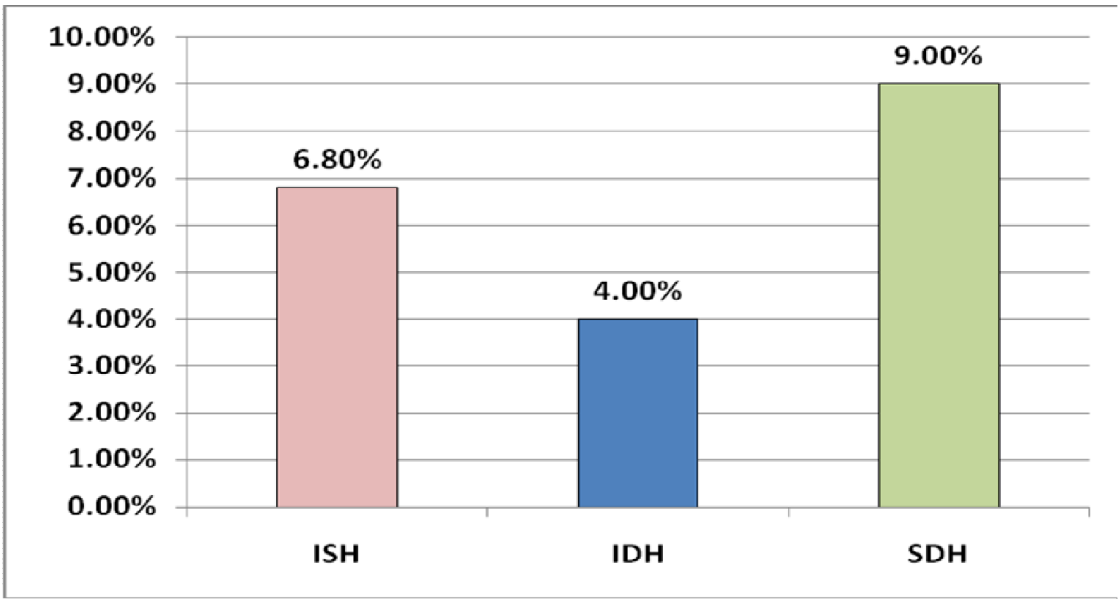


Figure 4. Distribution of types of hypertension among all hypertensive patients (Controlled &uncontrolled)